PCE JOURNAL OF ELECTRONICS AND TELECOMMUNICATION

PCE
PILLAI COLLEGE OF ENGINEERING
A+ NAAC

MAY 2022

VISION

Pillai College of Engineering (PCE) will admit, educate and train in technology, a diverse population of students who are academically prepared to benefit from the Institute's infrastructure and faculty experience, to become responsible professionals. It will further attract, develop and retain, dedicated, excellent teachers, scholars, scientists and professionals from diverse backgrounds whose work gives them visibility beyond the classroom and who are committed to making a significant impact in the lives of their students and the community.

MISSION

To develop professional engineers with respect for the environment and to make them responsible citizens, both from a local and global perspective. This objective is fulfilled through quality education, practical training, research, entrepreneurship and interaction with industries and social organizations.

INSTITUTIONAL OBJECTIVES

To evolve a teaching-learning process where by students have freedom of thought and thereby explore the various aspects of technological development.

To encourage the teaching faculty to pursue research in specialized and emerging areas of technology and develop their skills to impart that knowledge to students.

To provide the requisite infrastructure including workshops, Library and IT laboratories to create a learning environment.

To promote the interaction of students and faculty with the industry.

To collaborate with other leading institutions in India and overseas to gain improvement for the lives of all global citizens.

Department of Electronics and Telecommunication Engineering

The field of Electronics and Telecommunication Engineering requires the handling of complex apparatus and electronic mechanisms to produce state-of-the-art telecommunication systems capable ofprocessing information at incredible speeds. Specialist engineers of this field design the electronicequipment devised to revolutionise the industries of entertainment, IT, communication and defence.As developments in communication technology continue to shape and increasingly improve our dailylives, Electronics and Telecommunication Engineers gain a crucial catalytic role in evolving modernsociety. As globalization continues, modern engineers face the exciting challenge of providing the robust technological infrastructure for the telecommunication industry. The curriculum of Electronics and Telecommunication Engineering equips students with a rigorous understanding of basic science and engineering concepts so that learners acquire knowledge of computer architecture, microcontrollers, embedded systems, integrated circuits, electromagnetic field theory, signal and image processing and communication technologies.

VISION:

Strive towards producing world class engineers who will continuously innovate, upgrade telecommunication technology and provide advanced, hazard-free solutions to the mankind. Inspire, educate and empower students to ensure green and sustainable society.

MISSION:

Benchmarking against technologically sound global telecommunication institutions with a view towards continuous improvement. Continually exposing students to scenarios that demand structuring of complex problems and proposing solutions. Educate students and promote values that can prevent further degradation of our planet. Becoming responsible citizens genuinely concerned with and capable of contributing to a just and peaceful world.

PROGRAM EDUCATIONAL OBJECTIVES:

Provide graduates with a strong foundation in mathematics, science and engineering fundamentals to enable them to analyze and solve challenging problems in Electronics and Telecommunication Engineering. Impart analytic and thinking skills to develop innovative ideas in the field of Telecommunication Engineering. To keep students up to date with the latest advancement in the field of Electronics and Telecommunication. Inculcate qualities of leadership skills, multi-disciplinary team work and an ability to adapt to evolving professional environment in the field of Engineering and Technology. To create awareness among the students towards ethical, social and environmental issues in the professional career.

PROGRAM SPECIFIC OUTCOMES:

Able to understand the concept of Basic Electronics, Network and Circuit Analysis, Analog and Digital circuits, Signals and System, Electro magnetics and apply them in various areas like Microwave Engineering, Wireless Communication, Digital image processing, Advance Communication systems etc.

Able to use techniques, skills, software, equipments and modern engineering tools necessary for Electronics and Telecommunication Engineers to identify, formulate and solve problems in industries and research work.

Able to work in multi disciplinary environment to provide socially acceptable technical solutions for complex communication engineering problems.

FROM THE PRINCIPAL'S DESK

It brings me great pleasure to present the "Journal of Electronics and Telecommunication Engineering Department," which depicts numerous technological advances in the field of electronics and telecommunication. In today's engineering sector, continuous discovery and advancements are essential, and it needs the highest level of inventiveness. It creates a strong urge to express one's views and a forum for students to demonstrate their abilities in the genuine sense of the term.Pillai College of Engineering has always been dedicated to producing environmentally mindful and ethical engineers. Our students demonstrate a professional approach by diligently keeping up with the newest technical breakthroughs and innovations, not just in India, but also globally. The Journal is not only informative, but also instructive, with original, fascinating, and enlightening technical articles that add value and quality to the publication.
I would really like to express my gratitude to the coordinators, student members, and editorial board for their valuable contributions and outstanding achievement.

Best wishes for all your future endeavors.

Dr. Sandeep Joshi
Principal, Pillai College of Engineering

FROM THE HEAD OF DEPARTMENT'S DESK

Innovation is the soul of engineering and looking at innovative project works implemented by the final year students from the Department of Electronics and Telecommunication Engineering brings me immense pleasure. The final result put forward by students really shows their dedication towards the creation of their projects. All the works are remarkable and are implemented paying close attention to sustainability and cost-effectiveness of the projects. The papers submitted to the journal are proof of the dedication and efforts taken by the students. I would like to commend the journal committee for providing a place where the earnest efforts of our students can be noticed, and be appreciated by everyone. The work done by the students and the committee really brings forth what our department has to offer, and I really appreciate everyone involved in the process. I hope the students keep their sparks of innovation lit and keep on finding creative solutions to all the hurdles in their life. I wish all the students good luck in their future endeavors.

With Best Wishes,

Dr Avinash R. Vaidya
Head of Department
Electronics and Telecommunication Engineering
Pillai College of Engineering

FROM THE TEACHER'S DESK

This year's annual journal event will motivate students as their proposals are going to be addressed in front of everyone in the campus after almost two years since pandemic lockdown. The papers acknowledge not only students' hard work but also their dedication of research to go above and beyond traditional teachings by exploring with their own abilities. This will motivate other students as reference from their proposals. Today these papers will be the stepping stones for future research developments done by our students. These journals will act as guides for upcoming students' future in their dedicated field. These technical papers show that the students are prepared with the problem solving skills which are necessary in today's world. The Journal committee has put a tremendous amount of effort, punctuality and dedication. The members of the committee not only planned the report but also assisted the students who were writing the articles. The committee has co-ordinated impressively even after working under strict deadlines. I wish the committee best luck and look forward to more marvelous issues of this journal in the future.

Prof. Jayashri D. Bhosale
Assistant Professor
Electronics and Telecommunication Engineering

This year's efforts have all been intriguing and fruitful in their own way. We came across a wide range of projects, each demonstrating our student's inventiveness and ingenuity. Project work is a type of learning that allows students to combine material from several subjects of study and apply it critically and creatively to real-world circumstances. All of this was both cost-effective and novel, showcasing the student's capacity to think creatively. It's a thorough examination of a real-world topic that merits student's time and effort. The members of the journal committee did an excellent job of exposing the potential of our department's students. The journal committee staff worked hard to fulfil deadlines and guarantee that the papers submitted were perfect. I appreciate the collaborative effort and precise attention to detail that allowed us to shorten the process and meet our goals. I wish all the best to all the committee members and a good heart to keep up the good work.

Prof. Suchitra Patil
Assistant Professor
Electronics and Telecommunication Engineering

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Wavelet Transform Based Classification of Epileptic EEG Signals

Mudassir Solkar, Ankita Deokar, Taskeen Mulla, Akhil Vinodkumar

***Abstract*- A Seizure is a sudden, uncontrolled electrical disturbance in the brain. In short anything that interrupts the normal connections between nerve cells in the brain can cause a Seizure. In this study, an automated detection technique for epileptic seizure activity is present. The use of wavelet transform used for feature extraction of EEG signals and classifiers used are Support Vector Machine (SVM) and K- Nearest Neighbour (KNN). Classifiers are based on the parameters such as Accuracy, Sensitivity and Specificity**

***Keywords*— EEG Signal, Wavelet Transform, Support Vector Machine (SVM), K-Nearest Neighbour (KNN)**

I. INTRODUCTION

Epilepsy is the neurological disorder in which the abnormal firing activity of neurons can be seen which leads to the formation of seizure. It is mostly seen in the children and adults at the age 65-70 and at about 1 % of worldwide population affected by this disease and it can be cured if it detected in initial stages. Traditionally EEG recordings were visually inspected by the trained neurophysiologist for detecting epileptic seizure or other abnormalities present. Various techniques were employed for the detection of seizures in the EEG using correlation function, time domain analysis, frequency domain analysis, time-frequency domain analysis. In first stage features are extracted from EEG signals and in the second stage the expert system is created for detection of epileptic activity with high accuracy in less time. In this work an algorithms like Support Vector Machine (SVM) and K-Nearest Neighbour (KNN) classifier is used to detect the epileptic signal from the EEG signature.

II. LITERATURE SURVEY

A. Epilepsy

Epilepsy is one of the major fields of application of EEG and it is classified as one of the common chronic neurological disorders characterized by recurrent seizures that affect the brain. These epileptic seizures can occur in the brain locally and are seen as sudden abnormal functions of the body such as increase in muscular activities, loss of consciousness or abnormal sensations. It is curable if it is detected in initial stages.

B. Seizure Detection.

Seizures are transient abbreviations in the brain's electrical activity. Basically the seizure detection is a classification between normal and seizure EEG. There are three functional modules of EEG processing systems namely, preprocessing, feature extraction and classification. Normally the EEG data gets corrupted by the artifacts. Artifacts are generally electrical signals that are picked up by the scalp electrodes. Eye movement, blinking and muscular movements are the most common causes of artifacts

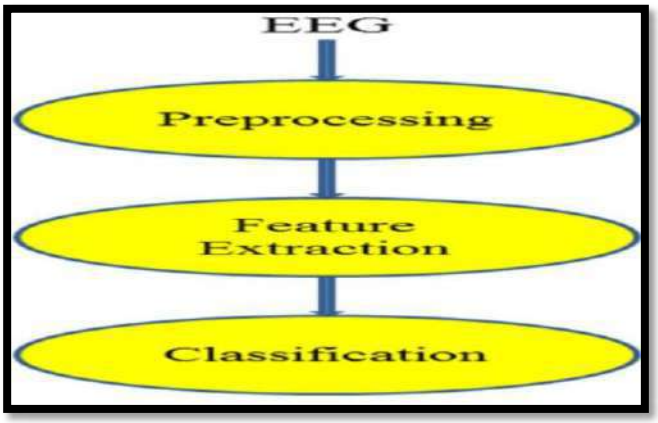

Fig 1. EEG Processing System

C. Feature Extraction Method

Wavelet transform is used as a feature extraction method for both seizure patients and non-seizure patients. In this work, we have implemented wavelet transform and non – negative matrix factorization methods for feature extraction of EEG signal. Selection of appropriate wavelet and the number of decomposition levels is very important for analyzing signals using wavelet transform. Choosing the number of decomposition levels is based on the dominant frequency components of the signal. The levels are chosen in such a way that the parts of the signal, correlating well with the frequencies required for classification of the signal are retained in the wavelet coefficients.

III. PROPOSED SYSTEM

1) Wavelet Transform

The electrical activities of the brain since 1930s has been measured by making use of surface electrodes connected to the scalp. But nowadays various mathematical tools such as Fourier Transform (FT), Fast Fourier Transform (FFT), Short Time Fourier Transform (STFT) and Wavelet Transform (WT) have been introduced for EEG signal feature extraction. . Wavelet is a type of time-frequency analysis, which provides information about both frequency and time within signals. Analysis by wavelet represents a special type of linear transform of signals and also physical data represented by the signals about processes and physical properties of mediums and objects. . The main advantage of wavelet transform is that it has a varying

window size which is broad at low frequencies and narrow at high frequencies leading to an optimal time frequency resolution in all frequency ranges i.e. it holds the multiresolution. A wavelet is a wave like oscillation with amplitude that begins at zero, increases and then decreases back to zero. Wavelets transforms are broadly divided into three classes: continuous, discrete, and multiresolution-based. Here we are using "DWT" .

2) Discrete Wavelet Transform (DWT)

Discrete Wavelet Transform(DWT) It is just another form of representing the signal and does not change the information content in the signal. The wavelet series is simply a sampled version of the continuous wavelet transform and the information provided by it is highly redundant as far as the reconstruction of the signal is concerned. DWT is more efficient in removing redundancy than continuous wavelet transform. It provides sufficient information both for the analysis and synthesis of the original signal. DWT is easy to implement, reduces the computation time and also resource required in comparison to CWT.

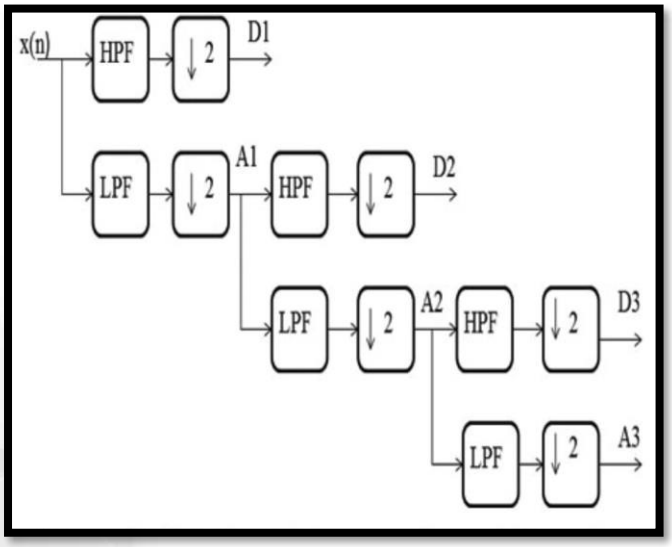

Fig 2. Decomposition Of Discrete

3) Wavelet Transform Implementation

The above figure shows a sub band decomposition of wavelet transform implementation each stage consists of high pass and low pass filters. These filters are basically digital filters. It also consists of two down sampler by 2.the first type of filter is high pass in nature and the second filter is low pass filter in nature. The second type of filter is basically a mirror version to the first filter. The down sampled outputs of first high pass filter and low pass filter helps in providing the detail D1and the A1 as the approximation. These approximations are further decomposed and the same process is being continued.

4) Classification Techniques

In this experimental work, the artificial neural network and support vector machine are used as classifiers for the classification of EEG signal as normal or epileptic.

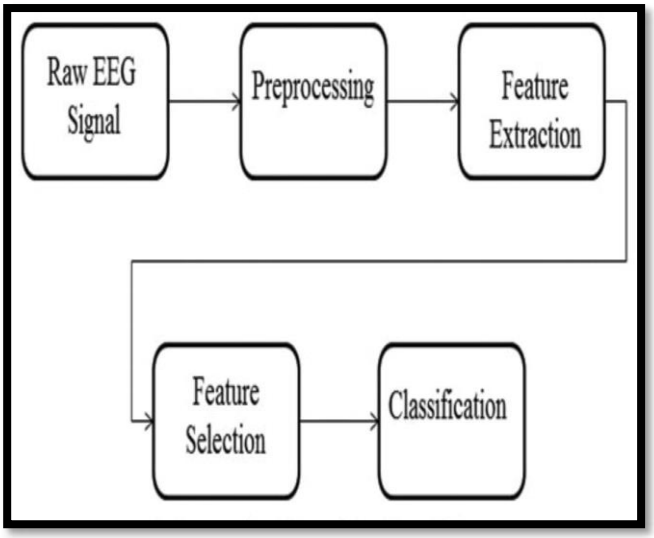

Fig 3. Classification Steps

5) Support Vector Machine (SVM)

Support vector machine (SVM) has been used widely for classification of electroencephalogram (EEG) signals for the diagnosis of neurological disorders such as epilepsy and sleep disorders. SVM shows good generalization performance for high dimensional data due to its convex optimization problem. The incorporation of prior knowledge about the data leads to a better optimized classifier. Different types of EEG signals provide information about the distribution of EEG data. To include prior information in the classification of EEG signals, we propose a novel machine learning approach based on universal support vector machine (USVM) for classification

6) K- Nearest Neighbour

K-Nearest Neighbour (KNN) is known as a simple but robust classifier and is capable to produce high performance results even for complex applications. The KNN uses a distance of features in a data set to determine which data belongs to which group. A group is formed when the distance within the data is close while many groups are formed when the distance within the data is far. In Electroencephalogram (EEG) research, KNN is widely used as a classifier to classify the EEG signals.

IV. CONCLUSION

Visual testing of signals doesn't provide much information about the health of individual. We have proposed a wavelet based feature extraction technique for epileptic EEG signal classification. In our implemented work, the parameters such as accuracy, sensitivity and specificity are calculated. SVM classifier has achieved good results while compared to KNN and obtained more than upto 90%.

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Remote Sensing for Mapping and Analysis of Indigenous Lands

Pratyoosh Sharma, Aniket Patil, Prof. Swati Patil

***Abstract* — Landsat 9 is the most recent generation of Landsat satellite missions for providing remote sensing imagery for Mapping and Analysis. This study concentrated on the Landsat 8 that has Operational Land Imager (OLI) and Thermal Infrared sensor (TIRS) for representing the optimal combination of the radiometric and geometric images resolution provided by the sensors for evaluation of specific intercalibration functions such as NDVI (Normalized Difference Vegetation Index), NDWI (Normalized Difference Water Index) and Supervised Learning Accuracy Assessment for Indigenous Regions of Navajo Nation, Rosebud and Chippewa respectively using the data made available by USGS.**

***Keywords* — Remote Sensing, Land Use Land Cover, NDWI, NDVI, Supervised Classification, Accuracy Assessment, Indigenous Lands, Landsat .**

I. INTRODUCTION

Remote Sensing is the process of detecting and physical characteristics of a location by measuring its reflected and emitted radiations from a distance which involves sensors to be ground, air or space based which helps in Monitoring large areas, have consistent, objective oriented and repeatable measurements. Remote sensing can be bifurcated into two as Passive Remote Sensing where Sunlight is used as the Light Source and Active Remote Sensing where the System has its own Light source. The reflectance received is captured by the Sensor, the Wavelength of Green has Slight Reflectance whereas the Infrared reflectance is quite higher.

There are four types of Resolution which helps to understand the type of band data that is to be used in the Image formation and Processing.

1. Spectral Resolution is used for knowing the Wavelength intervals.
2. Spatial Resolution is used for knowing the discernible details of an image and the higher the Spatial Resolution the less area is covered by the image.
3. Temporal Resolution is the time needed by the Satellite to revisit and acquire data for the same location.
4. Radiometric Resolution is the fineness of the Image that is formed, Landsat OLI uses 16 bit Image i.e it is a 65535 bit data.

Image are formed by Merging Satellite Band Data and during Data Pre-processing of Image there can different errors such as,
Error in training data

Bands	Wavelength (μm)	Res (m)
Band 1 – Coastal aerosol	0.43–0.45	30
Band 2 – BLUE	0.45–0.51	30
Band 3 – GREEN	0.53–0.59	30
Band 4 – RED	0.64–0.67	30
Band 5 - Near Infrared (NIR)	0.85–0.88	30
Band 6 – SWIR 1	1.57–1.65	30
Band 7 – SWIR 2	2.11–2.29	30
Band 8 – Panchromatic	0.50–0.68	15
Band 9 – Cirrus	1.36–1.38	30
Band 10 – Thermal Infrared (TIRS) 1	10.60–11.19	30
Band 11 – Thermal Infrared (TIRS) 2	11.50– 2.51	30

Figure 1: Wavelength and Resolution for Landsat 8

1. Error in training data
2. Incomplete atmospheric correction
3. Spectral confusion

Which can be corrected using the process of filtering for the pixels that may have been incorrectly classified one of them is Majority Filter where the predominant class is assigned to the centre pixel for Error Reduction.

Accuracy Assessment is the process by which accuracy or correctness of an image classification is evaluated by involving the comparison of the image classification to reduce data that are assumed to be true are performed on it and based on Sampling techniques Accuracy Assessments are divided into three,

1. Simple Random Sampling - In this observations are randomly placed across the image/ training area.
2. Stratified Random Sampling - In this observation across each class is randomly placed but each class is covered.
3. Systematic Sampling - In this observations are placed at equidistance on the image.

II. Related Works

A. *Landsat 7 v/s Landsat 8*

1) G, Ferrara A, et. al [1] compared Landsat 8 and Landsat 7 against each other with respect to the features of both exhibits, Landsat 7 and Landsat 8 belong to Landsat Satellite Group that are Sun-Synchronous and with different sensors MSS, TM and ETM+.

The researchers have differentiated the OLI and ETM+ based on seven characteristics i.e Mixed Agriculture Areas, Tree Crops, Water Bodies, Pasture and Grassland, Arable Land, Urbanized Areas, Forest.

It was concluded that, Almost for all characteristics, there is a statistical difference between OLI and ETM+ sensors by land use class except of water class where NDWI (for Wetlands), SAVI and EVI don't show significant difference between the sensors and for Agriculture class the SAVI doesn't show significant difference for Urbanised and Mixed Vegetation. Even Arable land classes show a similar trend to tree crops with low average value between the two sensors.

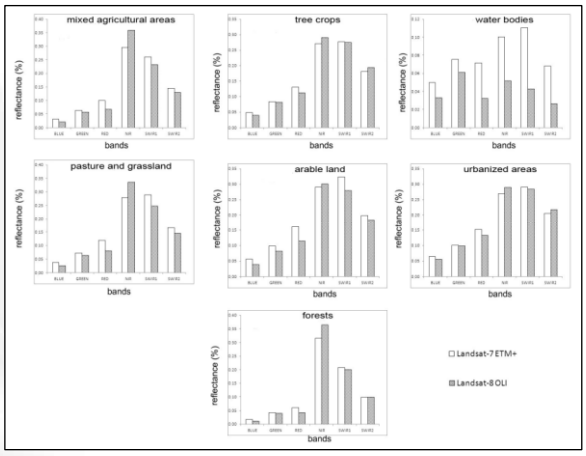

Figure 2.1: OLI and ETM+ bands reflectance values for land use classes | Source: [1]

2) Nugraha A S A, Gunawan T, et. al [2] compared Landsat 7 and Landsat 8 with respect to their conversion methods used for deriving LST information from their image pixels where Landsat 7 applies a Simple Algorithm using single thermal band whereas Landsat 8 TIRS applies dual thermal bands and SWA Algorithm in the East Java Province of Indonesia for Drought Monitoring.

It was concluded that, SWA method was able to show that results based on conditions but requires more research on SWA by using other methods for Landsat 8 data. TCI and CWSI were nearly the same for both the satellite data but for variation on vegetation CWSI is a good choice to opt for data processing.

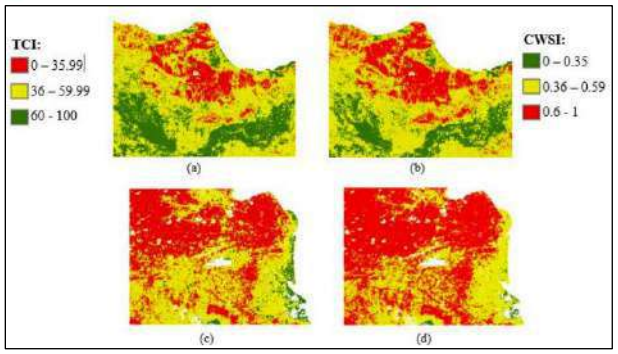

Figure 2.2: The Results of TCI and CWSI | Source: [2]

B. *Mapping*

1) Shaharum N. S. A, Shafri H. Z. M, et. al [3] compared the three supervised classification algorithms i.e SAM, SVM, and ANN for Landsat 8 Satellite Image with five classes each i.e dense forest, less dense forest or agriculture, built-up area, bare soil, and water.

It was concluded that, ANN outperformed other two supervised classification SVM and ANN for classification of spatial image is used to produce updated LULC map of KWR.

Pan-Sharpened Image		
Classifier	Overall Accuracy (%)	Kappa Coefficient
SAM	81.96	0.28
SVM	97.45	0.71
ANN	98.22	0.82

Table 2.1: Accuracy Assessment for SAM, SVM and ANN | Soure: [3]

2) Norman L. M, Middleton B. R, et. al [4] compared supervised classification and unsupervised classification for Landsat 8 Satellite Image to classify and map vegetation at the San Carlos Apache Reservation, Arizona and surrounding area for giving accuracy for the vegetation community.

It was concluded that, using unsupervised classification in a smaller area was of limited success where 900 classes were compared with SWReGAP map and recorded the coinciding data lead to larger majority of shared pixels and Researchers hypothesis didn't succeed for potential improvement in classification of SWReGAP map as the errors were propagating through SWReGAP map and experimental techniques were insufficient to overcome the shortfall and for producing an accurate product for classification.

C. *Forest Change*

1) Brown M. I, Pearce T, et.al [5] assessed the Mangrove changes in the Maroochy River, Queensland, Australia with the objective to document changes of mangrove, changes in mangrove extent and link between mangrove changes and its implications around the region based on the various changes noted in previous researches and effort though use of remote sensing and TEK to provide holistic management approach.

It was concluded that, out of total of 683Ha across 5795Ha declined from 1988 - 2016 which implied to 24.4Ha/Year and drivers in the study area included farming, pollution, boating activities and sewage discharging which lead to widespread consequences to mangroves such that during research only few Mangrove were left untouched leading to increase in pH and decrease in Turbidity, Dissolved Oxygen and Salinity of Water which is imparting effects on the Mangrove, Locals who are dependent on the Maroochy River.

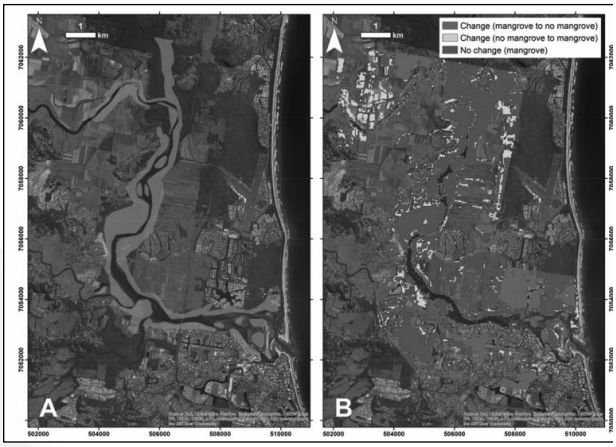

Figure 2.3: Mangrove (A) extent pre-colonisation using Participatory Mapping, (B) extent 1988 - 2016 | Source: [5]

2) Nicolau A. P, Herndon K et. al [6], assessed the Forest changes in Madre de Dios region, Peru where Landsat 8 as well as Landsat 7 i.e OLI and ETM+ were analysed from 2013 - 2018 for analysing the region using High-resolution Planet Dove(3m) and RapidEye (5m) imagery for validation of forest.

It was concluded that Madre de Dios has been exploited for many years beside the knowledge that Madre de Dios had a rich concentration of endemic species where 20,641Ha of forest have been lost where maximum belonged to protected areas. Such conservation areas play an important role in the regions that are getting tempered as forest loss expansion continues to prevail in the region.

Sample points(#)	Forest loss-reference	No forest loss-reference	Map totals
Forest loss-map	129	21	150
No forest loss-map	28	922	950
Reference totals	157	943	1100
Sample points(#)	**Forest loss-reference**	**No forest loss-reference**	**Map totals**
Forest loss-map	0.0540	0.0088	0.0628
No forest loss-map	0.0276	0.9096	0.9376
Reference totals	0.0816	0.9184	1
User's Accuracy	86%	97%	
Producer's Accuracy	66%	99%	
Overall Accuracy	96%		

Table 2.2: Confusion Matrix and Accuracy Assessment | Source: [6]

III. PROPOSED SYSTEM

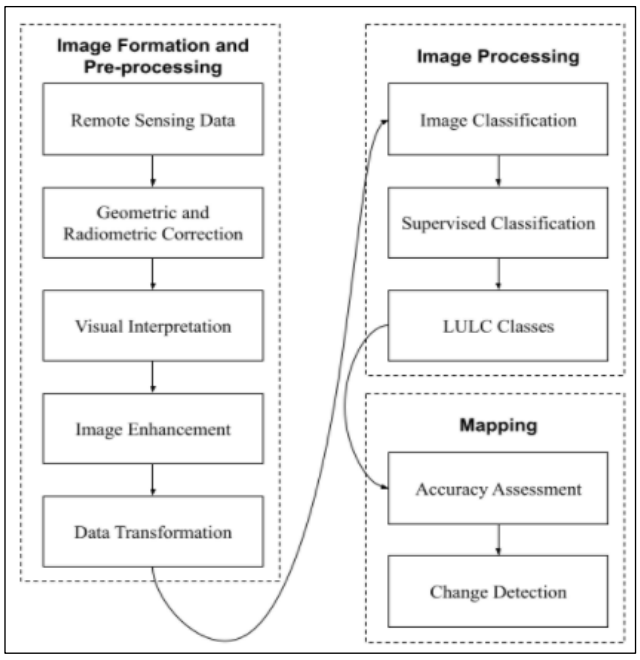

Figure 3.1: Workflow

The study is done by integrating data from different sources and using different methods and approaches for analysing the LULC trends. The approach includes the imageries from Landsat 8 multi-temporal dates. Pixel based classification is to be used as an approach for semi-arid regions.

The QGIS (Quantum GIS) 3.20 is to be used for image formation, image processing, masking and classification. Google Sheets are to be used for statistical analysis. Since the area has 65% covered with forest, agricultural land hence cloud cover has to be minimal as reflectance of agriculture and similar areas disturbing the delineation of forest cover as the spectral signal constitutes a mixture of green.

The are data taken from Landsat 8 through United States Geological Survey (USGS) designed portal USGS Earth Explorer and the data was pre-processed to L1TP (Level 1 Precision and Terrain Correction)

Instrument	OLI
Landsat Type	Landsat 8
Acquisition Date	16.09.2016
Path/Row	35/35
Ground Resolution	(30x30), (60), (15) m
Dynamic Range (bits)	16 bits

Table 3.1: Characteristics of Landsat Satellite Imagery

Landsat satellite images are among the widely used satellites for remote sensing data and their spatial, spectral and temporal resolution which are useful input for creating land use land cover maps and for change detection. The Landsat images in study are from OLI Landsat operations.

IV. EVALUATION METRICS

Spectral Class Accuracy Assessment using Kappa Coefficient

$$\acute{K} = \frac{Observed\ Accuracy\ -\ Chance\ Agreement}{1\ -\ Chance\ Agreement}$$

Accuracy is the ratio of percentage of pixels from each class labelled in the image correctly by the classifier to the pixels from each class erroneously labelled into every other class.

V. RESULTS AND DISCUSSIONS

1) 2016 and 2021 Navajo Nation Analysis for Drought Monitoring

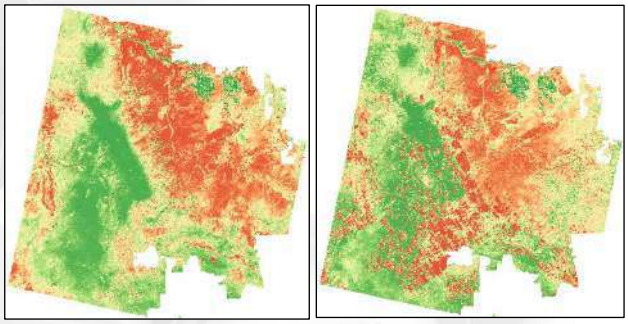

Figure 5.1: Thematic Map of Navajo Nation for Year 2016 & 2021

Green indicates Vegetation or Forest, Brown Indicates Soil Condition in the area. Light Green indicates reduction in the Forest, Light Brown indicates reduction in water Content in the Soil, Dark Green Indicates existence of forest in good number whereas Dark Brown indicates Barren Land which is in good condition for using for Agriculture.

2) Accuracy Assessment for Chippewa Reservations

```
                ACCURACY ASSESSMENT
LOCATION: temp_location                    Sat Oct 23 18:35:36 2021
MASK: none
MAPS: MAP1 = (untitled) (rast_6174087b0a18b3 in PERMANENT)
      MAP2 = (untitled) (rast_6174087b015002 in PERMANENT)

Error Matrix (MAP1: reference, MAP2: classification)
Panel #1 of 1
                    MAP1
     cat#   1     2     3     4     5     6     Row Sum
 M     1    17    0     0     0     0     0     17
 A     2    0     15    4     7     0     0     26
 P     3    0     0     7     0     0     6     13
 2     4    0     0     1     3     0     4     8
       5    0     0     0     0     14    0     14
       6    0     0     0     2     0     0     2
Col Sum          17    15    12    12    14    10    80


Cats  % Comission  % Omission  Estimated Kappa
1     0.000000     0.000000    1.000000
2     42.307692    0.000000    0.479290
3     46.153846    41.666667   0.457014
4     62.500000    75.000000   0.264706
5     0.000000     0.000000    1.000000
6     100.000000   100.000000  -0.142857

Kappa        Kappa Variance
0.634495     0.003524

Obs Correct  Total Obs    % Observed Correct
56           80           70.000000
```

Figure 5.2: Accuracy Assessment for Supervised Classification of Chippewa (2016/Assessment 01)

```
                ACCURACY ASSESSMENT
LOCATION: temp_location                    Mon Mar 07 02:15:05 2022
MASK: none
MAPS: MAP1 = (untitled) (rast_62251ce475e453 in PERMANENT)
      MAP2 = (untitled) (rast_62251ce4670ab2 in PERMANENT)

Error Matrix (MAP1: reference, MAP2: classification)
Panel #1 of 1
                    MAP1
     cat#   1     2     3     4     5     6     Row Sum
 M     1    17    0     0     0     0     0     17
 A     2    0     15    3     7     0     0     25
 P     3    0     0     7     0     0     6     13
 2     4    0     0     2     3     0     4     9
       5    0     0     0     0     14    0     14
       6    0     0     0     2     0     0     2
Col Sum          17    15    12    12    14    10    80


Cats  % Comission  % Omission  Estimated Kappa
1     0.000000     0.000000    1.000000
2     40.000000    0.000000    0.507692
3     46.153846    41.666667   0.457014
4     66.666667    75.000000   0.215686
5     0.000000     0.000000    1.000000
6     100.000000   100.000000  -0.142857

Kappa        Kappa Variance
0.634703     0.003525

Obs Correct  Total Obs    % Observed Correct
64           80           80.000000
```

Figure 5.3: Accuracy Assessment for Supervised Classification of Chippewa (2016/Assessment 02)

High Accuracy denotes better classification as compared to the true classification of the region. Accuracy depends upon the processing and correct mapping of the region which is achieved in the Chippewa Reservation.

3) Rosebud Flood Mapping

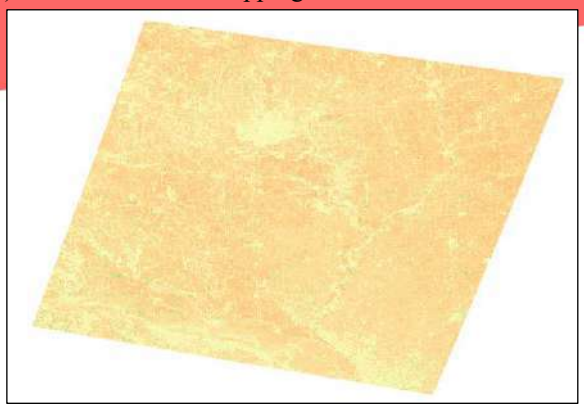

Figure 5.4: NDVI of Rosebud Region for Year 2018

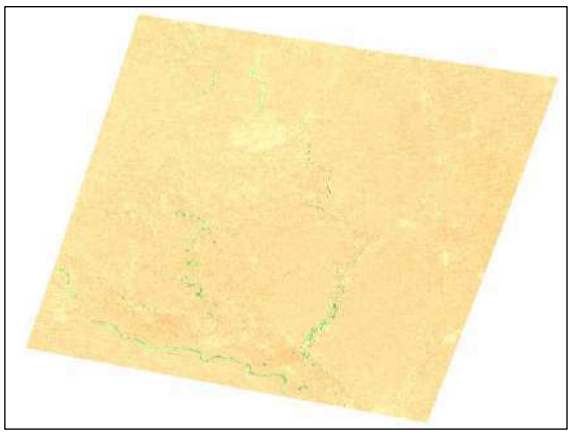

Figure 5.5: NDVI of Rosebud Region for Year 2019

Figure 5.6: NDWI Differentiated of Rosebud

Region between Years 2019 and 2018

Normalized Difference Vegetation Index (NDVI) used in the Rosebud Reservations helped to understand the Flooding regions which due to course of time lead to Vegetation Growth in the Areas of Flood between 2018 and 2019.

CONCLUSION

This report "Remote Sensing for Mapping and Analysis of Indigenous Lands" has considered three different Indigenous Lands namely Navajo Nation, Chippewa Reservations and Rosebud Reservations for doing analysis. This report has a interdisciplinary application which can help to do take preventive measures for protection of indigenous regions across the globe.

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Fruit and Vegetable Identification System using Efficient Convolutional Neural Networks for Transfer Learning

AVL Yasaswi, Rutuja Ambale, Pradnya Kokil, Ridhi Ghosh

***Abstract*— Image identification of fruits and vegetables using Machine Learning techniques as well as transfer learning concepts is proposed in this paper. The system has higher accuracy of identifying the fruit or the vegetable in the image. In this project we will be also providing the information regarding the Nutrient contents in the identified fruit or vegetable. The human intervention also causes errors and inaccuracy. Therefore, a web application is created which takes image as an input and identifies the fruit or the vegetable. The system uses effective convolutional neural network concepts with the data sets for the identification of the fruit or the vegetable. CNN architecture is used as a deeper architecture provides an exponentially increased expressive capability.**

***Index Terms*—CNN, Transfer learning, Normalization, Feature extraction**

I. INTRODUCTION

Artificial Intelligence is outgrowing in demand in everysector in recent years. Agricultural sector also has a hugedemand for Artificial intelligence be it for maintaining recordsor for other applications such as harvesting, irrigation and so on. Deep learning, is used to build the classifier which analysesbased on features like shape, colour, and so on. Maintaining data is very essential for any field or sector. In order to work onthis, time consumption is the most important factor. Currently, in the food industry the method of segregation of fruits and vegetables based on category and grade is done manually. Hence effective methodologies to deal with such heavy work is needed and machine learning is a major concept that can deal with such huge industrial applications. Image segmentation is one of the major concept that is used nowadays for daily life application.

In this project they have made to identify the image of the fruit and for that the have designed a dataset named- Fruit 360.The data set used has wide variety of fruits that can be detected.

II. RELATED WORK

2.1. A fruits recognition system based on a modern deep learning technique (2019) Dang Thi Phuong Chung and Dinh Van Tai In this project they have made to identify the image of the fruit and for that the have designed a dataset named- Fruit 360. With the help of that dataset they have completed their project. This paper briefly discusses the use of deep learning (DL) for recognizing fruits and its other applications. The paper will also provide a concise explanation of convolution neural networks (CNNs) and the Efficient Net architecture to recognize fruit using the Fruit 360 dataset.

The results show that the proposed model is 95% more accurate. This paper explores a fruits recognition classifier based on Efficient Net algorithm. The recognition rate has dramaticallyimproved throughout the experiment.

Fruit recognition from images using deep learning (2018) Mihai Oltean, Horea 13 Mures In this project they have used the dataset Fruit-360 using CNN and completed their project. In this paper they have introduce a new, high-quality, dataset of images containing fruits. They also present the results of some numerical experiment for training a neural network to detect fruits. They have discussed the reason why we chose to use fruits in this project by proposing a few applications that could use such classifier.

Fruits and vegetables quality evaluation using computer vision (2021) Anuja Bhargava, Atul Bansal The project paper highlights the use of image processing and computer vision technology in the field of food industry and agriculture. The most important quality characteristics of agricultural products are size, color, shape, texture and defect.

III. SAMPLES USED

Fruits 360 dataset, Version: 2020.05.18.0 was used. A total of 67692 images were taken for training and 22688 images for testing. There are total of 131 classes of fruits and vegetables which includes common ones such as lemon, orange, strawberry, cauliflower, eggplant and rare varieties like huckleberry, raspberry, kaki, clementine and more.

IV. PROPOSED SYSTEM

In this project, we use CNN and transfer learning for the detection of fruits and vegetables from images. RGB images areused for fruit and vegetable images.

For feature extractions we use segmentation. Segmentation is used to focus on desired characteristics of fruit or vegetables. This is also called feature extraction. Feature extraction is carried out and is categorized according to classes. The data collection was trained and tested.

In CNN edges are detected in the first layer, objects in the second layer, and task-specific characteristics in the remaining layer.

Advantages of CNN over traditional methods:

1) CNN automatically detects important characteristics froman image without human intervention
2) CNN also has the highest accuracyCNN reduces time & complexity

Transfer Learning:

Transfer learning is used to reduce the computation as the timeto retrain the whole model can be reduced. The machine uses the previous information to increase the accuracy of predictions. In transfer learning, the first layers are kept the same and only task-specific layers are retrained. Transfer learning also reduces memory use.

The proposed algorithm consists of six main steps. 1) Image collection: Receiving the input image 2) Data set splitting: training and test models 3) Feature extraction: Convolution 18

Normalization : Reducing pixel values between 0 and 1 5) Train CNN algorithm: A convolution neural network has multiple hidden layers that help in extracting information froman image. 6) Classify using CNN algorithm: Classifying the Species in an image The dataset comprises two sets, training, and testing. In the training stage, a set of images are provided as visual examples and the machine is trained to recognize those images. In the testing stage, the image is given as input to the classifier to check whether it is able to detect the imagesaccording to

A. Receiving the input image: In the proposed system, the test image is used as input. The RGB image matrix is flattened and then divided by 255 so that the values are in between 0 to 1 to increase the accuracy. A set of trained images are present in the dataset whose features are matched with those of the test image, in order to determine the species of the fruit or vegetablepresent. Greater the accuracy more is the success of system

B. Feature Extraction The test image which is received as input is segmented to extract the features. The selected features contain the task specific characteristics due to which the desired task can be performed. Deep neural networks recognize these features from images, and determine the number of levels of representation. The distinct characteristics are more easily detected.

C. Classifying the Species in an image for the task of classification of species, the machine selects all the probabilities of the fruit or vegetable matched with the image and gives the answer with highest accuracy.

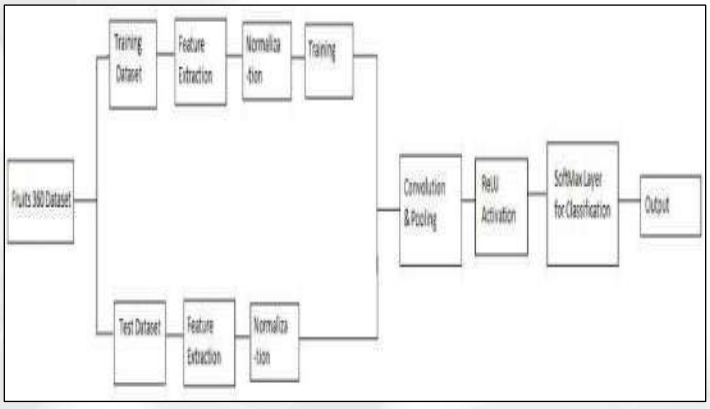

Figure 4.1 Basic Block Diagram

V. RESULTS AND DISCUSSION

For training and testing, all the images were selected from the fruits and vegetable dataset which is publicly available on Kaggle fruit 360. The set of images was randomly split into a training set and a test set. The dataset contains different fruit images of different categories. The test set contains the imageswe use while executing the network.

Sample images of fruits and vegetables were taken for experimentation, in the future few more fruits or vegetables canbe taken as samples for experimentation. Different fruit varieties of images were taken for testing this algorithm using CNN classifier.

The CNN-VGG16 algorithm was coded and tested using python programming and a deep learning approach. VGG16 gave 91% accuracy & this methodology reduces the number of trainable variables and a reduced number of trainable variables means faster learning and more robust to over-fitting. Also, by using the concept of transfer learning, we have trained our model on a fully connected layer for our customized dataset (On train and test dataset) and the benefits include saving of resources and improved efficiency.

The following output was obtained after the execution of the proposed methodology:

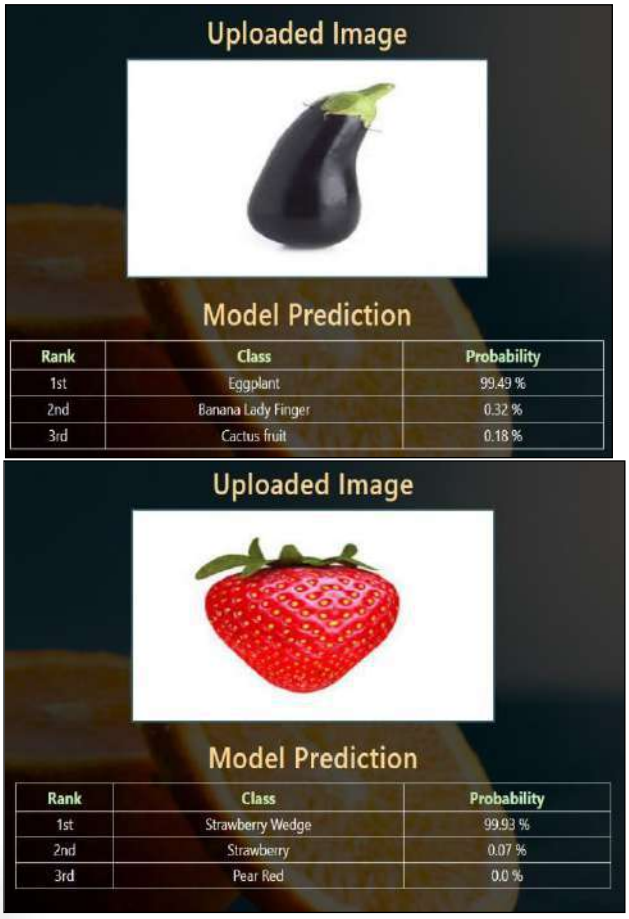

Figure 5.1 Model predictions for fruit and vegetable

VI. Conclusion

In this paper, several computer vision and image-processing approaches adopted for the classification of fruits and vegetables are explored. The survey of literature for image-processing-based solutions that use different features for the recognition and classification of fruits and vegetables is presented.

The different standard datasets or variable inputs are defined that is used in experiment for these domain systems. The CNN technique is explained with examples. In order to obtain higheraccuracy in the classification of any fruit or vegetable in the agriculture industry, a computer vision system for segregating/classifying fruit and vegetable was developed and tested for 91% accuracy and the same was obtained. Also, we have designed a web application that will provide these services for public use. This app is created with the help of flask framework, HTML, and CSS. So, the approach of making the app using deep learning techniques for the classification of fruits and vegetables is proposed and implemented. And the applications of this domain are identified and presented.

This research work can be extended to help the agriculturist to classify different species and varieties of fruits and vegetables in a single image. Also, freshness and diseases of fruits and vegetables can be detected in the future.

ACKNOWLEDGEMENT

We would like to take this opportunity to record our sincere thanks and deep sense of gratitude to all those individuals who have helped in visualizing this project. We are grateful to our principal Dr. Sandeep Joshi for providing us with an environment to complete our project successfully. We would like to express our sincere thanks to our H.O.D. Dr. Avinash Vaidya for giving us valuable guidance and constant encouragement while performing the project work and imposing his full confidence in us. We would like to thank Prof. Suchitra Patil who was also our project guide for giving us valuable, helpful guidance and timely suggestion. Last but not least we would like to thank all the members of EXTC Department who helped us directly or indirectly in our project. We are very thankful to all those well-wishers who contributes in our project work; who gives us strength, time, knowledge, faith, and support. We would like to thank our guide and co-guide for their contribution to our project and their involvement throughout the entire duration of the project. Their constant motivation, encouragement and time management deeply affected the productivity of our project and gave a proper and constant boost to our project.

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Credit Card Fraud Detection in R

Akash Das, Shreyas Dhakate and Prof. Jayashri Bhosale

***Abstract*— The rapid growth in E-Commerce industry has led to an exponential increase in use of Credit Card. With cashless transactions it becomes easy to buy products and book electronics, furniture, and other things with secure payment online. In this age of online transactions many frauds take place. Credit card fraud generally happens when the card was stolen for any of the unauthorized purposes or even when the fraudster uses the credit card information for their use. For banks it has become very difficult for detecting the fraud in credit card system. Machine learning plays a vital role for detecting the credit card fraud in the transactions. Our project mainly focuses on finding fraudulent transactions by the help of information of when the cards are used and any unusual transactions. Using R programming, we are focusing on machine learning algorithms such as Logistic Regression, Decision Tree, Random Forest, and XGBoost and researching on different methods we can use to track fraudulent transactions.**

***Index Terms* — Credit Card Fraud, Logistic Regression, Decision Tree, Random Forest, and XGBoost.**

I. INTRODUCTION

As progress is formed in modern technologies world is heading to a cashless society, rapid growth has been experienced on making online transactions more frequently. Also, now-a-days modern frauds does not require fraudsters to be present all the time in location to perform a fraud. They mask themselves in hiding techniques to make a fraud transactions which online users might not always be aware of it. The losses caused during online fraud cannot be underestimated.

One of such fraud is using Credit Card. Credit card fraud happens when the card was stolen or even when the fraudster hack into actual cardholder's data and uses these credit card information for their personal gain. For banks it has become very difficult for detecting the fraud in credit card system.

Credit Card Fraud Detection using R language is a basic machine learning technique. This technique helps a computer to recognize the patterns of transactions taking place by the owners of the card. The fundamental of using R programming in the field of credit card fraud detection system is taken place so that the machines can calculate a large number of information in short amount of time, using different methods that are simulated through the application. The Credit Card Fraud Detection includes modeling past credit card transactions with the data of the ones that turned out to be fraud. Then this model is used to recognize whether new transaction is fraudulent or not. The methods that we studied while studying detection techniques use are Decision Tree, XG Boost, Random Forest and Logistic Regression.

II. LITERATURE SURVEY

Devi D, Biswas SK, Purkayastha B[1] proposed paper explored Cost-sensitive weighted random forest technique for credit card fraud detection.They researched on Cost-sensitive weighted random forest and concluded that the model gave output in form of G-mean,Fmeasure and AUC values in order to find a cost effective way to determine fraud.

Vasihnavi Nath Dornadula,Geetha S.[2] stated that Using machine learning AI methods for data mining to recognize extortion in a progressing exchange on the web and organize the exchange of information as genuine or suspicious. They have implemented different extortion recognition frameworks such as Logistic regression, decision tree and random forest in suggested that Matthews Correlation Coefficient is better than any other sampling technique to solve imbalance in data set

Altye Altaher Taha,Sharaf Jameel Malebary [3] suggested an intelligent approach for detecting fraud in credit card transactions using an optimized light gradient boosting machine (OLightGBM).They have conducted several experiments using two real-world data sets. The performance of the proposed approach was evaluated through comparison with other research outcomes and state-of-the-art machine learning algorithms, The experimental results indicate that theproposed approach outperformed the other machine learning algorithms and achieved the highest performance in terms of Accuracy, AUC, Precision and F1-score.

Doaa Almhaithawi, Assef Jafar, Mohamad Aljnidi[4], conducted study on various classifiers such as Logistic regression (LR), random forest (RF) with modern classifiers XGBoost (XG) and CatBoost (CB) and proposed that XG has given good Savings when wrapped with BMR, but CB and RF has outperformed when using SMOTE.

Pooja Twari,Jitendra Kumar,Nishtha Sakhuja,Simran Mehta,Jitendra Kumar,Ashutosh Kumar Singh.[5], studied various classifiers to find credit card fraud detection as Hidden Markov Model, Decision Trees, Genetic algorithm, Support Vector Machines(SVM),Logistic Regression, Neural Networks, Random Forests, Bayesian Belief Network. The objective of the study was taken differently than the typical classification problems in that we had a variable classification cost, Percision, recall.f1-

score,support and accuracy were used to evaluate the performance for the proposed system. Finally they concluded that Neural Network has high accuracy which is best but it is expensive

III. Proposed System

Here we are proposing an effective way to develop credit card fraud detection system. It uses the latest machine learning algorithms to defect fraudulent activities which are termed as outliers. This first step is input data collection. We have obtained our dataset from a data analysis website which provides huge volume of datasets i.e Kaggle. Next step is sampling of data where highly imbalanced data is converted into balanced dataset. Third step is to divide the sampled data into training dataset and test dataset. This training dataset is trained using various classifiers as : Decision Tree, Logistic Regression, Random Forest and XGBoost. Finally, after training data another part system is tested against test dataset. The outcome of both these results are used to determine the performance and accuracy of classifiers.

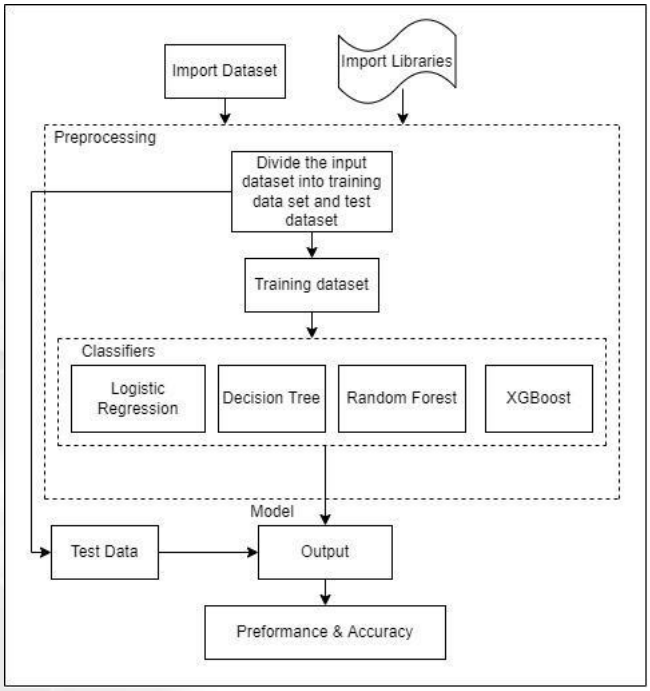

Fig. 3: Proposed System

3.1 Dataset

The dataset contains transactions made by cardholder for the duration of 2 days where total of 284,807 transactions are made among which 492 transactions are fraud. The data obtained is highly unbalanced. Inside this dataset, there are 31 columns in which 28 are named as v1-v28 for security reason to protect sensitive data. The remaining columns represent Amount, Time and Class. Time shows the time gap between the first transaction and the subsequent transactions. Amount is the amount of money debited during each transactions. Class 0 represents a valid transaction and 1 represents a fraud transaction.

Software Specification:

Name of Component	Specification
Operating System	Windows, Linux
Language	R programming
Development Kit	R Studio
Dataset	Kaggle --Analysis Data Set

Table 3.1.1: Software Specifications

3.2 Splitting Dataset

The dataset fetched from sources are divided into two sets of data as trained and test data set. 80% of the data set is under training and the remaining 20% is under testing. Here we are using some supervised machine learning algorithms such as algorithms are Decision Tree, Logistic Regression and Random Forest and XG boost technique.

3.3 Classifier Algorithms

3.3.1 Logistic Regression

This method is employed in predictive analysis when dataset includes binary or dyadic dependent variables. The algorithm is used for classification task based upon the probabilities that detects fraud using curve based on logistics. The value of curve varies from 0 to 1. It is accustomed to identify and help in understanding class membership possibilities.

After training the dataset using logistic regression classifier, it's tested against minimum threshold cut-off value for actual prediction to search out the accuracy of the classifier model. This method basically uses natural logarithmic function to search the probability of fraud predicted.

3.3.2 Decision Tree Classifier

This classifier uses supervised learning algorithm. While training the dataset using this classifier model it created a tree like decision structure which has root node and other nodes which are referred as child node that can be split into binary or multiple nodes which is based upon the input given to the model. Decision tree can be used for the classification as well as regression problems. This model fetches the entropy and information gain value in order to build the decision tree model. Entropy guides us on the content the data is random and information gain tells about how much information we can get from this feature. The formula used for calculation is P(X|Y) is the conditional probability of event X occurring for the event Y which has already been occurred.

3.3.3 Random Forest Classifier

Random Forest is one of the widely used machine learning algorithm. In this technique it randomly selects the features variables that are independent along with the number of rows obtained by row sampling.

Based upon these parameters a decision tree can be determined to find fraud during training of data set by using hyper parameter optimization. In this algorithm uses maximum occurrence methods from the decision tree model model that is created internally into random forest technique. This approach basically forms several randomized decision trees and evaluates their predictions by Averaging. As compared to logistic regression Random Forest classifier has shown accurate predictions.

3.3.4 XGBoost Classifier

XGBoost is one of the classifying technique which belongs to Decision Tree. This s technique uses gradient boosting framework that includes set of regression trees. This classifier uses Gradient Boosted Trees to give maximum output and accuracy for the prediction. From all the classifier studied XGBoost gave more and best accurate prediction results.

IV. Result Analysis

The result of our study are shown in the following figures. The metrics used to test the classification models such as accuracy are taken from the confusion matrix. This confusion matrix is used for representation of the utility of a classification model on a set of test data of which the true values are known.

A receiver operating characteristic curve or ROC curve, is a graphical plot that illustrates the performance of a classification model at all classification thresholds. The entire two dimensional area which lies under the ROC curve from (0,0) to (1,1) is measured to predict the accuracy of model. It provides an aggregate measurement of performance across every classification threshold.

True positive rate, which is the percentage of fraudulent transactions that are accurately classified as such and True negative rating is the percentage of regular transactions that are legit transactions.

1. Logistic Regression

Prediction	Reference 0	1
0	56846	38
1	9	68

Fig. 4.1.1: Logistic Regression

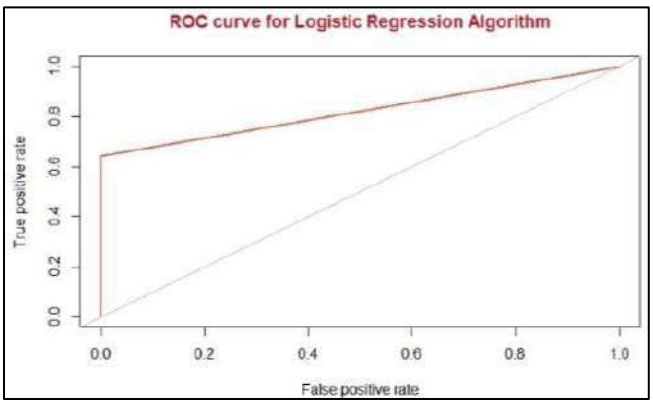

Fig. 4.1.2: Logistic Regression Graph

Logistic Regression has Detected 68 Fraud Transaction with accuracy of 84.92% and area under ROC curve is 0.8207.

2. Decision Tree

Prediction	Reference 0	1
0	56848	24
1	7	82

Fig. 4.2.1: Decision Tree

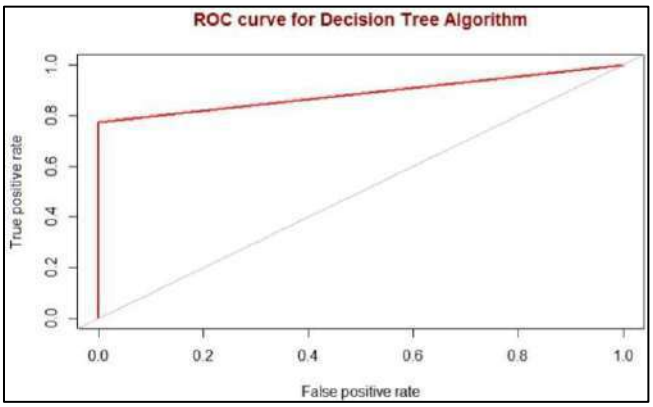

Fig. 4.2.2: Decision Tree Graph

Decision Tree has detected 82 Fraud Transaction with the accuracy of 85.67% and area under curve is 0.8867.

3. Random Forest

Prediction	Reference 0	1
0	56853	21
1	2	85

Fig. 4.3.1: Random Forest

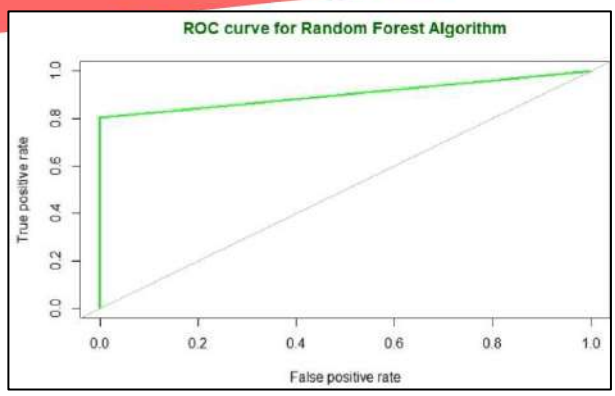

Fig. 4.3.2: Random Forest Graph

Random Forest has Detected 85 Fraud Transaction with accuracy of 91.95% and area under Roc curve is 0.9009.

4. XGBoost

Prediction	Reference 0	1
0	56854	19
1	1	87

Fig. 4.4.1: XGBoost

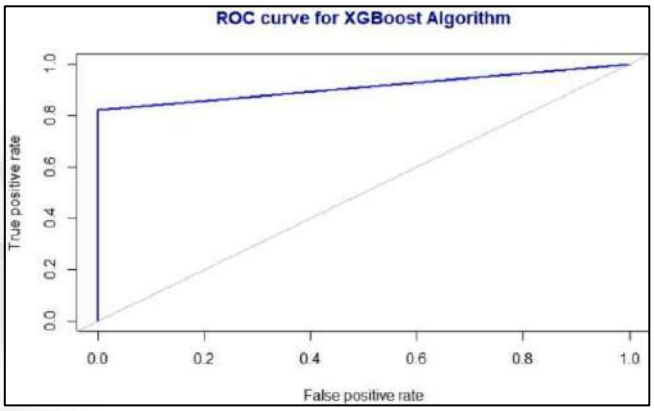

Fig. 4.4.2: XGBoost Graph

XGBoost has Detected 87 Fraud Transaction with accuracy of 96.96% and area under Roc curve is 0.9104.

Algorithms	Accuracy	Area under Curve	Correct Prediction
Logistic Regression	84.92	0.8207	68
Decision Tree	85.65	0.8867	82
Random Forest	91.95	0.9009	85
XGBoost	96.96	0.9104	87

Table 4.1: Overall Results

V. CONCLUSION

In this Paper we have studied different classifiers such as Logistic Regression, Decision Tree, Random Forest and XGBoost technique trained with dataset to predict fraud and legitimate transaction. After predicting the fraud and legitimate transaction we have compare the classifier in terms of accuracy and area under ROC.

After Comparing XGboost algorithm technique works best on the dataset and achieved significant improvement in model performance. The best score of 0.9104 was achieved using an XGBoost model though both random forest and logistic regression models performed well.

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Secured Wireless Communication using RSA

Pooja Kulkarni, Ritesh Kumar, Maddela Kiran, Akanksh Shetty

***Abstract*—The system developed in this paper is a method of cryptography, used for encryption and decryption of data to improve security during communication/uses. The technology behind this method is RSA asymmetric cryptography, which is a secure and reliable method to send and receive encrypted data. RSA is more secure than symmetric encryption as it generates two keys, private and public keys for decryption and encryption respectively. Using Tkinter package in Python for developing GUI for the program to generate public and private keys for the encryption process.**

***Keywords*—RSA, Secure Wireless Communication, Cryptography, Encryption, Decryption, Python, GUI**

I. INTRODUCTION

The study of secure communication mechanisms that allow only the sender and receiver of a message/data to see the contents of the message/data is called Cryptography. Cryptography means hidden and is derived from the Greek word *kryptos,* It can be further classified into two types as Symmetric key Cryptography and Asymmetric key Cryptography(more commonly known as Public key cryptography). Symmetric key cryptography requires only a single key for both the encryption and decryption process whereas in Asymmetric key cryptography two keys are required respectively for the encryption and decryption process. As a result, Asymmetric key cryptography is more secure and slower than Symmetric key cryptography. For any attacker, Asymmetric key cryptography will be much harder to decode because of the complex algorithm used [1].

The rest of the paper is organized as follows:
Section II discusses the theory and history of RSA cryptography, Socket programming and Graphical User Interface. Section III describes the Implementation of RSA, its scheme and algorithm. Section IV shows and explains the expected results. Section V discusses the applications of RSA. Section VI describes the limitations of RSA. Section VII explains the future scope of the system. Section VIII concludes the paper.

II. THEORETICAL BACKGROUND

In this section, theory and history of RSA, Socket Programming and Graphical User Interface has been explained.

A. RSA

RSA is a public-key asymmetric cryptosystem that is widely used for secure data transmission. The abbreviation "RSA" is the surnames of Ron Rivest, Adi Shamir and Leonard Adleman, who described the algorithm in 1977. In a public-key cryptosystem, the encryption key is distinct and public from the decryption key, which is kept private (secret). The user based on two large prime numbers creates and publishes a public key, along with Euler's Totient Function. The prime numbers are to be kept secret. Messages can be encrypted by everyone who has the public key, but can only be decrypted/decoded by someone who knows the prime numbers. The security of RSA is based on the practical difficulty of factoring the product of two large prime numbers. There are no known methods of defeating the system if large enough prime numbers are used. RSA is a slow algorithm relatively, because of which, it's not used to directly encrypt user data. More frequently, RSA is used to transmit shared keys for symmetric-key cryptography, which are then used for bulk encryption–decryption.

B. Socket Programming

Socket programming is used to establish a connection between two different users on a network. Socket programming is a way of connecting two sockets on a network to communicate with each other. Socket is one end-point of a two-way communication link between two programs running on the network .

C. Graphical User Interface

Graphical user interface also known as GUI, is a common user interface which includes graphical representation like buttons and icons, that allows an individual to communicate with the computer by interacting with these icons rather than the usual text based communication.
A good GUI can make a product user friendly and easy to understand. The term "User Interface" refers to the methods and devices that are used to provide interaction between computers and a person who uses them.

Tkinter is one of the python GUI libraries that is used for developing desktop applications. It's a combination of the TK and python standard GUI framework. Tkinter provides various widgets such as labels, buttons, text boxes, that are used in a graphical user interface application.

III. IMPLEMENTATION OF RSA

In this section, the working of RSA cryptography along with steps used in RSA Algorithm has been demonstrated.

A. RSA Scheme

The sender encrypts the data with the receiver's public key to get a Ciphertext. This Ciphertext is then sent to the receiver who decrypts the data with his own private key to get the actual data. Fig 3.1. shows a simple block diagram describing the working of the RSA algorithm.

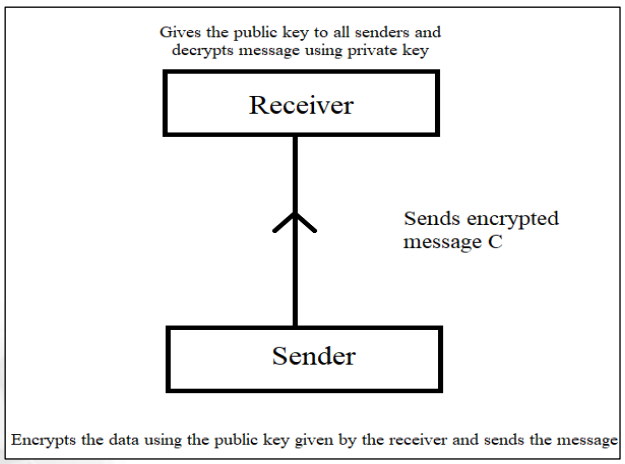

Fig 3.1. Implementation of RSA

B. Steps involved in RSA Algorithm

The steps involved in RSA algorithm is as follows:

Step 1: Two random prime numbers p and q are taken such that p is not equal to q, p and q are kept secret.

Step 2: n is called modulus for both encryption and decryption and is calculated, n=p*q.

Step 3: Φ(n)=(p-1)(q-1) is calculated where 'Φ' is Euler's totient function. This is to be kept private.

Step 4: An integer 'e' is selected for encryption such that gcd(Φ(n),e)=1 and 1<e<Φ(n). Public key (e,n) is generated.

Step 5: d=e-1(mod Φ(n)) is calculated, where d is the modular multiplicative inverse of e. Private key (d,n) is generated here.

i. Encryption

Step 6: C = M^e mod n is calculated, where C is the Ciphertext and M is the plaintext or the actual message.

Step 7: The cipher text is transmitted to the receiver.

ii. Decryption

Step 8: The receiver decrypts the encrypted message/ ciphertext using the private key with the formula Plaintext M = C^d mod n [2] [3].

IV. EXPECTED RESULT

In this section, the expected result of the system is explained.

To explain the result efficiently, an example is taken. The prime numbers used are 23 and 29 as shown in Fig 4.1.

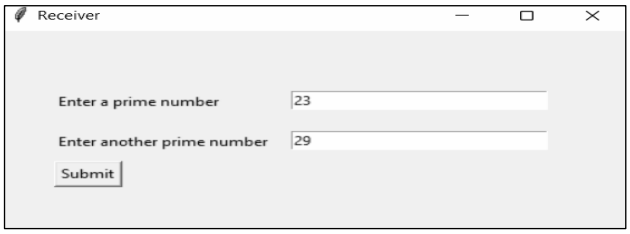

Fig 4.1. Two input prime numbers.

Using the two prime numbers, public and private keys are generated. The public key is given to the senders to encrypt the data while the private key is kept secret by the receiver. Fig 4.2. shows the public and private keys that are generated.

Fig 4.2. Generation of Public and Private keys.

The sender encrypts the message using the public key. As shown in the Fig 4.3., the message 'Hello, my name is Crypt' and the public key [221,667] is given to the system.

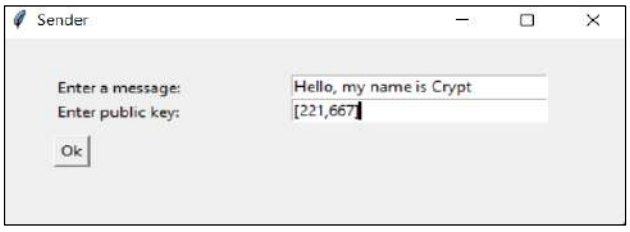

Fig 4.3. Sender gives the message and public key as input.

The sender decrypts the received ciphertext using the private key as shown in Fig 4.3. where the private key is [485,667] and receives the original message 'Hello, my name is Crypt' as shown in Fig 4.4.

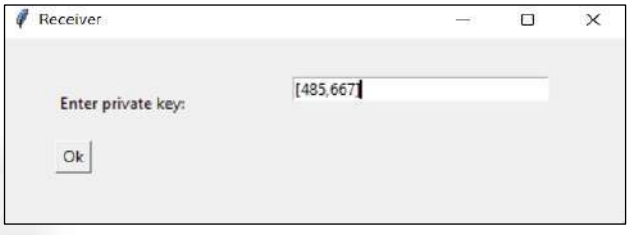

Fig 4.4. Receiver inputs the private key.

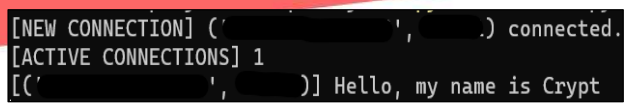

Fig 4.5. Message is received at the receiver's end.

V. APPLICATIONS

In this section, applications of the RSA algorithm are discussed.

RSA cryptography is used in many fields for secure data transmission such as-

Banking: In banking, RSA algorithm is used to protect their data like customer transaction records, credit and debit card details and customer personal information.

E-commerce: Used for protecting an user's transaction details and for securing communication between e-commerce sites and browsers with the help of SSL (secure) certificates.

VPN: Virtual private network uses RSA algorithm to form a secure connection between vpn clients and vpn servers.

Telecommunications: Used to encrypt the call information/data during a call for privacy and security issues.

VI. LIMITATIONS

In this section, the limitations faced by the RSA Algorithm are mentioned.

Small prime number provides less security, as it is easier to factorize them.

Using prime numbers that are very close to each other. Even if we take large prime numbers if they are close to each other, then searching for any factor in the vicinity of root N will reveal either of the prime numbers.

RSA is slow compared to AES and DES. RSA is slower compared to DES in software and more slower than DES in hardware [4] [5].

VII. CONCLUSION

In this paper, the implementation of cryptography is presented. The different techniques such as AES and RSA are explained. The different hybrid approaches are also described. The comparative study of various techniques mentioned above is presented. The proposed method securely transfers data between two systems present on the same network [1] [4] [6].

VIII. FUTURE SCOPE

In this section, the improvements which can be made to the system to work better and faster has been discussed.

As RSA is an asymmetric key cryptography method, it is slower than symmetric key cryptography methods such as AES and DES. On the other hand, RSA is more secure than AES because factoring two large prime numbers consumes an abundant amount of time and resources.

Using a hybrid version of RSA and AES makes the communication faster and more secure. This can be done by encrypting the contents of a file using a symmetric key algorithm like AES, and encrypting the key generated by the AES algorithm using the RSA algorithm [4] [6].

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Image Classification Using Deep Learning

Anisha A.K Achary, Vidhi Bhosale, Vidya Bordekar

***Abstract* – Deep learning techniques are used widespread for image recognition and classification problems. Gradually, deep learning architectures have modified to comprise more layers and become a more robust model for classification problems. In this paper, for the classification of flowers into 13 categories. The dataset consists of 5326 images and Images are about size 320x240 pixels. The dataset is divided into training dataset (80 %), validation dataset (20%). The flowers are classified as required. Furthermore, medical uses were also added to each flower and are displayed in output.**

Keywords–CNN, Dataset, Deep Learning, image Classification.

I. INTRODUCTION

Flower identification systems are prominently used nowadays. Although modern search engines give mechanisms for visually searching for a query image containing a flower, robustness is lacking due to the intra-class variation among millions of flower species worldwide. Therefore Convolution Neural Networks is used in this proposed research work to identify highly accurate flower species.

This project is basically designed to help medical industries in identifying new and rare species, to help people in the field of floriculture to save time and efforts and also to simplify the representation of the flower and to provide something which is more significant and easier to analyze.

II. LITERATURE SURVEY

1. *Neda Alipour, Mohammad Awrangjeb "Flower Image Classification Using Deep Convolutional Neural Network - 2021"* According to this paper, the image was trained with the help of DenserNet21 and the output was in the form of probability.

2. *Yuanyuan Liu, Dengwen Zhou ``Flower Classification via Convolutional Neural Network - 2016"* In order to get much better performance , they adopted a traditional method along with CNN.

3. *Dr. Shantala Giraddi, Dr, Shivanand Seeri "Flower classification using deep learning Models - 2021"* They carried out flower classification where accuracy was highest with VGG fine tuned model as compared to CNN.

4. *Yasir Hamid, Yonis Gulzar "A Convolution Neural Network Based Seed Classification - - 2020"* System The quality of the seed can be identified easily as bad seed and good seed.

5. *Swathi K Hiremath, Suhas Suresh "Seed Segregation using Deep Learning - 2019"* In this paper research has been conducted on assessing the quality of seeds and to classify seeds based on their grade a & quality.

III. PROPOSED SYSTEM

(a) Visualizing the data:

We trained the model using datasets by passing them to model.fit. It can also be done manually and retrieve batches of images. The image_batch is a tensor of the shape(32, 180, 180, 3). This is a batch of 32 images of shape 180x180x3(the last dimension refers to color channels RGB).

(b) Configuring the dataset for performance:

Here we used 2 methods for loading data:

I. *Dataset.cache()* keeps the images in memory after they are loaded off disk during the first epoch.

II. *Dataset.prefetch()* overlaps data preprocessing and model execution while training.

(c) Standardizing the data:

Normalization refers to rescaling the pixel values so that they lie within a confined range. One of the reasons to do this is to help with the issue of propagating gradients.

(d) Creating the model:

The model consists of 3 convolutional blocks with a maxpool layer in each of them. There is a fully connected layer with 128 units on top of it that is activated by a ReLu activation function.

(e) Visualizing training results:

It was seen that the validation loss was more due to overfitting, so in order to avoid that data augmentation and dropout were added to the model.

I) *Data Augmentation* is used to increase the dataset

II) *Dropout* is a technique which is used to reduce overfitting.

After applying data augmentation and dropout there is less overfitting than before, and training and validation accuracy are closely aligned.

(f) Deploying model on colab:

A prompt to choose any required image appears. After selecting the image the model predicts the name and also its medical use.

(g) Dataset:

The kaggle dataset is used and also many flowers were added from our end.

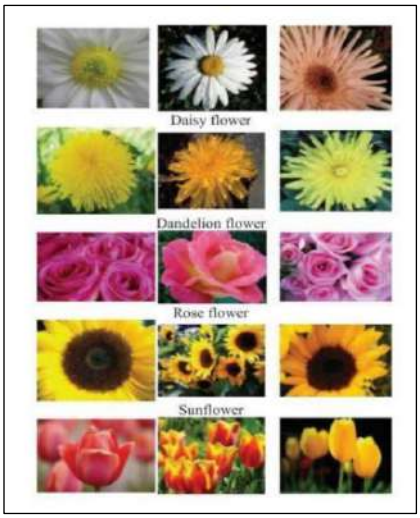

Fig 3.1. Flowers used for classification.

(h) Algorithm:

Here we used CNN architecture because a Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance to various aspects/ objects in the image and be able to differentiate one from the other.

Convolutional Neural Network is composed of multiple building blocks, such as convolutional layer, max-pooling layer & fully connected layers. CNNs are used for image classification & recognition because of its high accuracy rate.

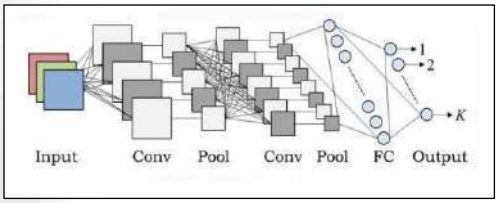

Fig 3.2. CNN architecture

The model consist following convolutional blocks:

I) *Convolutional Layer* used to extract features from input images using image matrix and a filter (Kernel).

II) *Pooling Layer* is used to reduce spatial size of feature map & thus reduces the parameters required to preserve significant information.

III) *Fully Connected Layer* is used to build feature vectors of input images and thus used for the classification of images.

IV. RESULTS

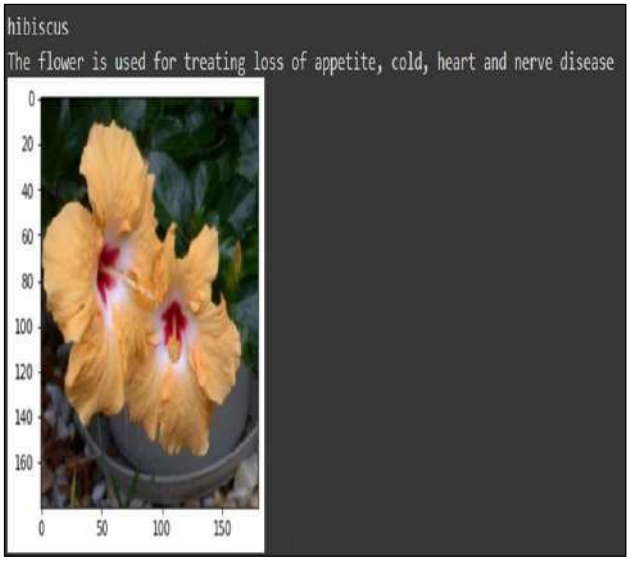

Fig 4.1. This is the output with the medical use

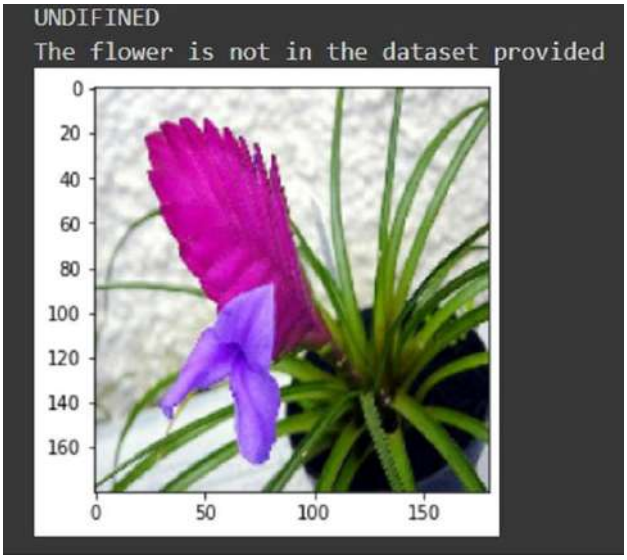

Fig 4.2. This is the output of the flower which is not provided in the dataset.

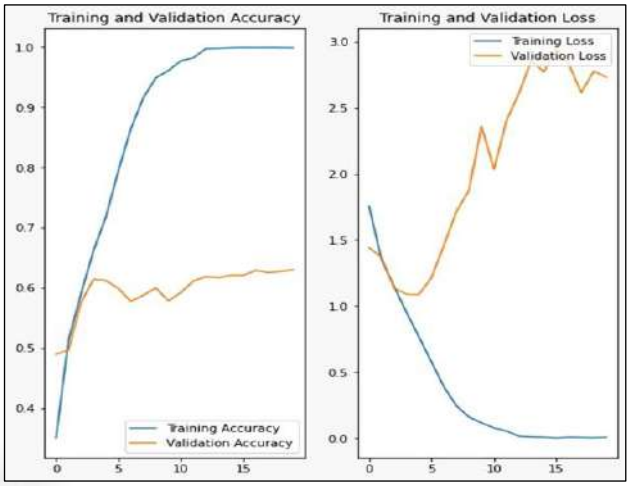

Fig 4.3. The below is an accuracy X epoch graph because of overfitting.

Overfitting occurs because of the model learning the details and noises to an extent that it gives negative impact to the performance of the model on new data.

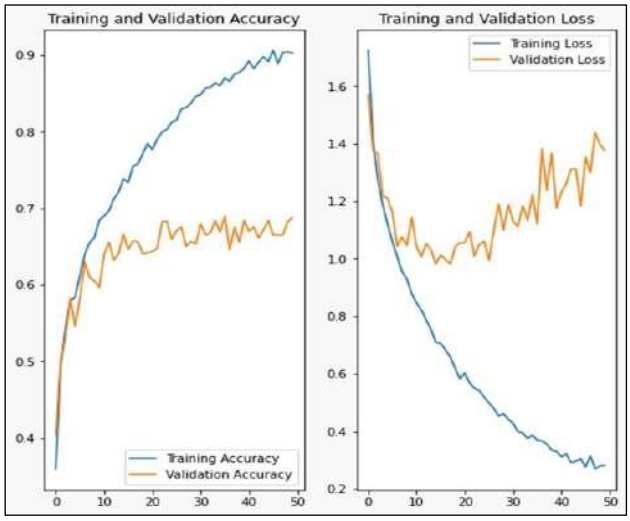

Fig 4.4. This is an accuracy X epoch graph after adding data augmentation and dropout.

Here, the validation loss is less as compared to the previous graph.

V. CONCLUSION

Main aim of this project is to build a model which classifies flowers as per different classes and also to classify it as medically useful or not. CNN is an algorithm which is mainly used for classification because of its accuracy rate. In this we proposed a flower classification approach to automatically identify flower categories using Deep Learning and Convolutional Neural Network. The model is able to predict the flower with an accuracy rate of approximately 70%

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Design and Analysis of Patch Antenna for 5G Communication

Malhar Koshe, Akul Nair, Aryan Bhardwaj and Srinivas Goparaju

***Abstract*—This article presents the design, fabrication, and characterization of a dual-band microstrip patch antenna. The antenna is designed to operate at 2.7 GHz and 3.2 GHz, which are suitable bands for sub-6 GHz 5G applications. Substrate FR-4 is used with a permittivity of 4.4 and a thickness of 1.6 millimeters (mm) is chosen for the antenna design and fabrication. The antenna model consists of a rectangular patch with three rectangular slots of different dimensions. For the feeding of the antenna, a 3 mm thick 50 Ω microstrip line is utilized. The overall size of the antenna is 60 x 50 mm. The patch has dimension of. The simulation results show that the antenna exhibits an S-Parameter of -17.15 dB at 2.7GHz, and -29.07 dB at 3.2 GHz. VSWR obtained is 2.42 dB at 2.7 GHz and 0.6117 dB at 3.2 GHz.**

***Index Terms*—antenna, gain, hfss, patch, radiation pattern, return loss, s-parameter, 5G**

I. INTRODUCTION

Antenna is a metallic device which transmits and receives radio waves. It works as a transducer as it converts electronic signals to electromagnetic waves. It's a Passive device. Over the years, many types of antennas have been developed for different purposes. An antenna may be designed specifically to transmit or to receive, although these functions may be performed by the same antenna. Antennas may consist of single lengths of wire or rods in various shapes (dipole, loop, and helical antennas), or of more elaborate arrangements of elements (linear, planar, or electronically steerable arrays). Directional antennas are designed to be aimed directly at the signal source and are used in direction-finding. There are various types of antennas. Wire Antennas are classified into Dipole antenna, Monopole antenna, Helix antenna etc. Aperture Antennas have types such as Waveguide (opening), Horn antenna, etc. Reflector Antennas are further classifying into Parabolic reflectors, Corner reflectors. Lens Antennas have types Convex-plane, Concave-plane, Convex-convex, Concavo-concave lenses. Micro strip Antennas have types such as Circular-shaped, Rectangular shaped metallic patch above the ground plane. Microstrip patch antenna has applications such as Air-craft, space-craft, satellites, missiles, cars, mobile phones etc. We use electromagnetic simulator HFSS version 16.0 simulations in his work.

II. LITERATURE SURVEY

1) *Shengjie Wang, "Design of Wide Band Antenna Array for 5G Applications' –3rd International Conference on Circuits, System and Simulation, 2019*:
In this paper radiation behavior have been investigated and concludes that antenna offers reasonable gain with multi-beams over 5G band which are suitable for 5G applications.

2) *Wen-Shan Chen, Yung-Chi Lin – "Design of 2×2 microstrip patch array antenna for 5G C-band access point applications", Department of Electronic Engineering Southern Taiwan University of Science and Technology, Tainan City, Taiwan. – 2019:*
This paper concludes the need of slots in the antenna design to increase the gain, improve VSWR and S11 parameter.

3) *Qudsia Amjad, Ariba Kamran – "Design and Characterization of a Slot based Patch Antenna for Sub-6 GHz 5G Applications" – 2019:*
This project concludes the use of 2x2 array of patch antenna to improve gain and S11 parameter.

III. PROPOSED SYSTEM

Design: This is a proposed Rectangular Microstrip Patch Antenna. Frequency range used for the design is 2.7 and 3.2 GHz on a surface. Microstrip patch antenna is a low-profile antenna mounted on a surface. The patch used is a rectangular patch and the feeding technique is Microstrip line feed. Expected output: The antenna should produce a s parameter value of less than -10 dB and the VSWR value should be well the range of 1-2 dB and should produce wavelength

IV. PROCEDURE

The designed antenna has a ground of 60x50 mm. The metal patch has the dimension of 45x mm. Microstrip line has Length of 25mm and width of 3 mm.

l) Designing a basic rectangular micro strip patch antenna with FR-4 epoxy as substrate and taking observations mentioned in table 1.2.
2) Addition of single slot at (7,22,1.6) and taking observations in table.
3) Addition of second slot at (10,48,1.6) and taking observations in table.
4) Addition of third slot at (10,40,1.6) and observing values.
5) Refinement of observation by repositioning slots and adjusting its height in width.

V. GRAPHICAL RESULTS AND OUTPUTS:

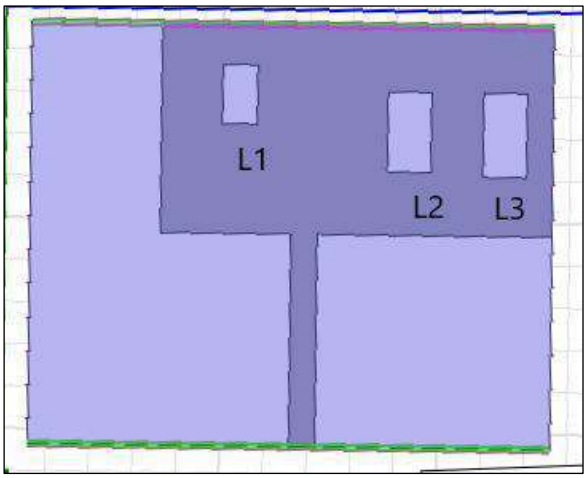

Fig 5.1: Triple slot antenna

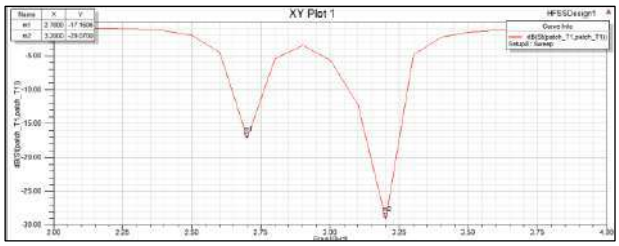

Fig 5.2: S parameter

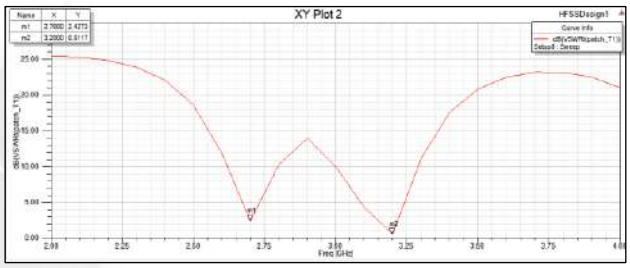

Fig 5.3: VSWR

DESIGN TABLE:

Model No	Slot No	Length of slot	Width of slot	X axis	Y axis	Z axis
1	L1	15	3	7	22	1.6
	L2	10	5	10	55	1.6
	L3	10	5	10	40	1.6
2	L1	10	4.8	7	22	1.6
	L2	10	5	10	55	1.6
	L3	15	3.5	10	40	1.6
3	L1	15	3	7	22	1.6
	L2	10	5	10	48	1.6
	L3	10	4.8	10	40	1.6

Table 5.1: Design Table (All dimensions are in mm)

OBSERVATION TABLE:

Model No	VSWR	S11 parameters
1	3.2Ghz -1.6, 2.7Ghz -2.82	3.2Ghz -20.65, 2.7Ghz - -10.98
2	At 2.7Ghz – 0.75	2.7Ghz- -27.6
3	3.2 GHz – 0.61 2.7 Ghz – 2.42	3.2 GHz- -29.07 2.7 Ghz - -17.15

Table 5.2: Design Table (All dimensions are in mm)

VI. EQUATIONS USED

In order to construct a microstrip patch antenna, we must first choose a resonant frequency and a dielectric medium for which the antenna will be used. The parameters given below that must be determined. The following equation is used to determine the patch's width.

$$W = \frac{C_0}{2f_r}\sqrt{\frac{2}{\varepsilon_r + 1}}$$

Where,

W = Width of the patch

C_0= Speed of light

ε_r= value of the dielectric substrate

In the construction of a microstrip patch antenna, the effective refractive index value of a patch is a critical parameter. Some of the radiations that move from the patch to the ground travel through air, while others travel through the substrate (called as fringing). Because the dielectric properties of the air and the substrates differ, we must calculate the effective dielectric constant to account for this. The following equation is used to get the value of the effective dielectric constant.

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2}\left[1 + 12\frac{h}{W}\right]^{-1/2}, W/h > 1$$

The antenna's electrical size is enlarged by an amount of (ΔL) due to fringing. As a result, the actual increase in patch length (ΔL) must be determined using the equation below.

$$\frac{\Delta L}{h} = 0.412\frac{(\varepsilon_{reff} + 0.3)\left(\frac{W}{h} + 0.264\right)}{(\varepsilon_{reff} - 0.258)\left(\frac{W}{h} + 0.8\right)}$$

$$L = \frac{C_0}{2f_r\sqrt{\varepsilon_{reff}}} - 2\Delta L$$

The length (L) of the patch will now be calculated by using the equation below.

$$L_g = 6h + L$$
$$W_g = 6h + W$$

For feeding the microstrip patch antenna, there are different methods for example, feed line method, coaxial probe feeding method etc. We have used microstrip line feed.

VII. Conclusion & Future Scope

In the above paper we have designed and characterized a slot based microstrip patch antenna. The antenna is designed on FR-4 epoxy substrate with a permittivity of 4.4 and dimensions of 45 x 25 mm. It has 3 slots. Slot 1 has dimension of 15 x 3mm. Slot 2 has dimensions of 10 x 5 mm. Slot 3 has a dimension of 10 x 4.8 mm. The antenna operates at two bands at 2.7 GHz and 3.2 GHz, both of these bands are potential candidates for sub-6 GHz 5G applications. The antenna shows a good performance as evidenced by its simulated and measured results. Here we have opted to work with a sub-6 band 5G technology as it will be able to cover a larger geographical area for 5G coverage and with further improvement in design we can adapt the antenna to work in the Bluetooth frequency range that is 2.4 GHz.

Acknowledgment

It gives us great pleasure and immense satisfaction to present this report on our project "Design and Analysis of Patch Antenna for 5G Communication", which became possible due to the unstinted guidance and focused direction of our Professor, Prof. Ameet Mehta, Electronics & Telecommunication Department. We express our sincere gratitude to Dr. Avinash Vaidya, HOD, Electronics & Telecommunication Department without him it would not have been possible to successfully accomplish our project. We also thank our senior faculty members of our department, who taught us throughout the years and helped us to understand the concepts used to develop the project. Furthermore, we are thankful to the Principal Dr. Sandeep Joshi whose constant encouragement and motivation inspired us to do our best. Last, but not the least, we sincerely thank our family members, colleagues and all others who directly or indirectly contributed in making our task easier.

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Image Encryption and Verification with Chaotic Maps In MATLAB

Jay Mhatre, Abhijeet Mankame, Sushant Poojari, Shubham Pawar

***Abstract*- Selective image encryption has a significant importance in many applications as it offers significant savings in computations, cost, and time. Many attempts are exerted for this purpose as the traditional full image encryption/decryption algorithms may be too massive. As the exchange of data over the open networks and Internet is rapidly growing, security of the data becomes a major concern. One possible solution to this problem is to encrypt the data. The data can be text, image, audio, video etc. In today's world most of the multimedia applications involve images. Earlier image encryption techniques like AES, DES, RSA etc. exhibit low levels of security and also weak anti attack ability. This problem was overcome by using chaos-based cryptography. The chaotic systems are very sensitive to initial conditions and control parameters which make them suitable for image encryption. Many works have been done in the field of chaos-based image encryption. In this project an attempt has been made to review the aspects and approaches of the design used for image encryption.**

Keywords— Image encryption, verification, Logistic map, chaotic maps.

I. INTRODUCTION

The images have enough importance in our life, so it used in digital form and increasing importance due to improvements of performance in computer speed, media storage and network bandwidth. the vulnerability of this form of information to be attacked such as modification and fabrication is higher as compared to paper-based image. Chaotic maps often occur in the study of dynamic nonlinear systems. Mathematical equations rule its behavior and slight change in initial position leads to a significant different outcome, and appears in random and disorderly, but actually they follow some of the patterns. Chaotic output signals, which presents random statistical properties are used for both confusion and diffusion operation in a cryptosystem. Standard image encryption algorithms used to secure the transfer of data between satellite ground stations and commercial, academic or government communities have been often referred to as "naive" approaches. These approaches give a false impression of impossible pirate attacks. To, overcome the limitations and weaknesses of the classical approaches, chaos-based encryption is recommended by many researchers to encrypt bulky data such as satellite images.

II. LITERATURE SURVEY

A) *Image Encryption Based on the General Approach for Multiple Chaotic Systems, 2011 Qais H. Alsafasfeh and Aouda A. Arfoa* proposed new image encryption technique based on new chaotic system by adding two chaotic systems: the Lorenz chaotic system and the Rössler chaotic system. From Experimental analysis they demonstrate that the image encryption algorithm has the advantages of large key space and high-level security, high obscure level and high speed.

B) Modified AES Based Algorithm for Image encryption, 2007 M. Zeghid, M. Machhout, L. Khriji, A. Baganne, and R. Tourki

They use the Advanced Encryption Standard (AES) and include a key stream generator in their picture encryption technology to provide better encryption performance. Block-Based Transformation Algorithm for Image Encryption, 2008 Mohammad Ali Bani Younes and Aman present a block-based transformation technique that combines image modification with Blowfish, a well-known encryption and decryption algorithm. The original image was separated into blocks, which were then reassembled using a transformation method creating a transformed image, which was then encrypted using the Blowfish technique. The association between image elements was dramatically reduced, according to their findings. Their findings also demonstrate that adopting smaller block sizes to increase the number of blocks resulted in a poorer correlation and a lower correlation coefficient.

C) Image Encryption Using Self-Invertible Key Matrix of Hill Cipher Algorithm, 2008 Saroj Kumar Panigrahy, Bibhudendra Acharya and Debasish Jena

They demonstrate a Hill cipher-based picture encryption technique For the Hill Cipher algorithm, they are creating self-invertible matrices. They used this key matrix to encrypt both grayscale and colour images. Except for photographs with a background of the same grey level or colour, their technique works well for all types of grey scale and colour images. An Approach to Image Encryption Using a Permutation Combination Technique After that, in 2008, Mohammad Ali Bani Younes and Aman Jantan present a novel permutation strategy based on a mix of picture permutation and the Rijndael encryption algorithm. The original image was divided into 4 pixels by 4 pixels blocks, 31 of which were rearranged using a permutation technique to create a permuted image

D) New modified version of Advance Encryption Standard based algorithm for image encryption, 2010 Kamali S.H., Shakerian R.,Hedayati M. and Rahmani M

The Advanced Encryption Standard (AES) algorithm is examined, and a modification to the Advanced Encryption Standard (MAES) is presented to reflect a higher level of security and improved picture encryption. As a result of their work, the image security after change is very high. Their algorithm is also compared to the original AES encryption technique

.

E) *Zhang Yun-peng, Liu Wei, Cao Shui-ping, Zhai Zheng-jun, Nie Xuan and Dai Wei-di* studies chaotic encryption, DES encryption, and a combination of image-encryptional algorithms. First, the new encryption strategy employs a logistic chaos sequencer to generate a pseudo-random sequence, then applies this sequence to the RGB to create an image in a chaotic manner, before performing double time encryptions with improved DES. Their findings reveal a high starting value sensitivity, as well as a high level of security and encryption speed

III. PROPOSED SYSTEM

A) *Chaotic maps:* One-dimensional (1D) chaotic maps and high-dimensional (HD) chaotic maps are the two types of chaotic maps. One variable and a few parameters are common in 1D chaotic maps. The Logistic, Gaussian, Sine, and Tent maps are among examples. Their chaotic orbits and topologies are quite simple. When minimal information is recovered from chaotic signals, their chaotic orbits can be estimated and their parameters or/and beginning values can be predicted thanks to the development of chaotic signal estimation tech. Because of these flaws, they can't be used in a lot of security scenarios. Because neighboring pixels have significant correlations, digital images frequently feature a lot of information redundancy. This section presents a novel chaotic magic transform (CMT) to randomly modify image pixel coordinates in order to disrupt these connections.

B) *Image Encryption:* Encryption is a mechanism for ensuring confidentiality in the context of cryptography. Sensitive information like passwords and personal conversations may be accessible to prospective interceptors because data may be visible on the Internet. Encrypting and decrypting messages requires the use of keys. In cryptography systems, there are two sorts of keys: symmetric and public (also known as asymmetric-key). In the development of many complicated cryptographic methods, simple modular arithmetic is frequently used. To encrypt a particular image, we need MxN pixels. So, we have used a logistic chaotic map which creates pseudo random sequence i.e., non linearity between pixels. If we plot this in graph, we will not get a linear line.

C) *Logistic map:* In this paper we have used chaotic logistic chaotic map. It is a polynomial mapping of degree 2. Chaotic behavior can arise from a very simple non-linear dynamical equations.

$x(n+1) = r*x(n)*(1-x(n))$ .... [x= initial value y= parameter value]

In the above equation x(n) takes in the interval (0,1). It is one of the simplest models that present chaotic behavior. The below figure is the Bifurcation diagram of Logistic map.

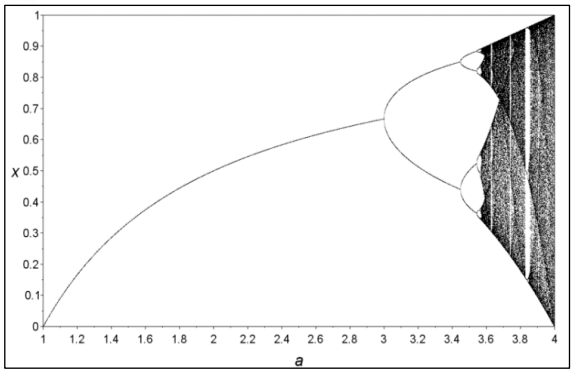

Fig 3.1: Bifurcation diagram

The relative simplicity of the logistic map makes it a widely used point of entry into a consideration of the concept of chaos. A rough description of chaos is that chaotic systems exhibit a great sensitivity to initial conditions—a property of the logistic map for most values of r between about 3.57 and 4 (as noted above).[1] A common source of such sensitivity to initial conditions is that the map represents a repeated folding and stretching of the space on which it is defined. In the case of the logistic map, the quadratic difference equation describing it may be thought of as a stretching-and-folding operation on the interval

IV. RESULTS

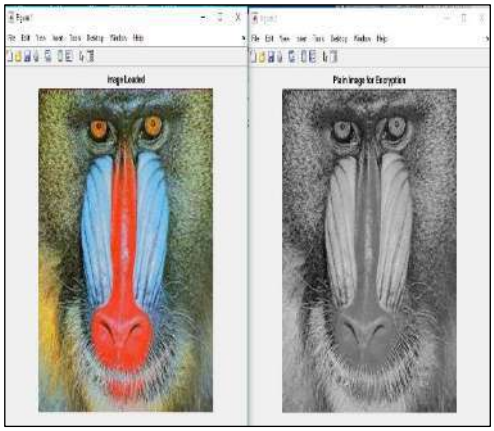

Fig 4.1: Image for Encryption

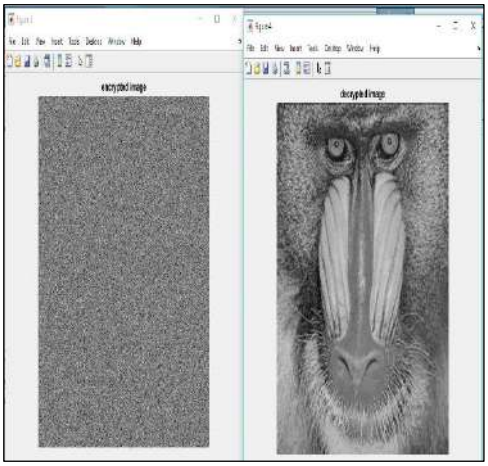

Fig 4.2: Decrypted Image

V. Conclusion

The security of digital photographs is becoming increasingly crucial in today's digital environment, as digital product communications through open networks grow more common. We reviewed existing picture encryption research in this study. We also provide a generic cryptography guideline. All strategies are useful for real-time picture encryption, we conclude. The techniques described in this paper can provide security functions as well as an overall visual assessment, and may be appropriate in some situations. As a result, no one can access an image that is being transferred over an open network. In general, a well-studied, fast, and safe traditional cryptosystem should be employed, with better security algorithms being preferred.

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Compact Antenna Design for 5G Smartphones

Mayuri Salve, Sakshi Singh, Umakant Tiwari

***Abstract*----In the recent years the development in communication systems requires the development of low cost, minimal weight and low-profile antenna that is capable of maintaining high performance over a wide spectrum of frequencies. This technological trend has focused much effort into the design of a microstrip patch antenna. The aim of this paper is to design and simulate a rectangular microstrip patch array antenna using CST software the performance of 4 element patch arrays with that of a single patch for the 3.5Ghz operating frequency. Also comparisons are made between the performance of corporate feed and Coax feed in terms of return loss, gain, directivity and radiation pattern. Details of simulated results are presented and discussed. Enhancement in gain, directivity and better return loss performance can be obtained by the use of FR-4 substrate because Low dielectric constant substrates are generally preferred for maximum radiation. These arrays are designed to operate at a frequency of 3.5 GHz. Our goal is to obtain a high directivity with better gain and reduced losses**.

Keywords—array antenna, frequency, slots, antenna, bandwidth

I. INTRODUCTION

The Compact antenna design is necessary for future mm Wave 5G smartphones to improve transmit power and battery life. 5G has been designed to meet the very large growth of today's modern society. 5G mobile networks can operate in various frequencies. So, the frequency bands used for communication are one reason why we see more antennas. Today, precision is even more important as we move into new technology, like 5G. Mobile communications are becoming progressive demanding as far as bandwidth is concerned due to the increased content requirements. In order to face this challenge, the telecommunication community will channel towards higher frequencies where more spectrum could be accessible. The antenna Must have high gain for the available physical coaxial feed patch and support array microstrip beam for single hand and dual hand modes. The 3.5GHz band has not been studied for mobile application and there are very few researchers actively pursuing this topic. The Department of Telecommunications gave a green signal to Indian operators to start the 5G trials in India, that the mid band (3.2-3.67 GHz) is among the frequencies being used. It is also designed to provide a theoretical data rate of 1GB and latency time less than 1millisecond to support the big data and internet of things. To achieve these objectives, 5G needs a large bandwidth. Microstrip patch antennas are narrowband antennas in the order of 1. Various techniques have been carried out to improve the microstrip patch antenna. These techniques can be impedance matching networks, multiple resonators frequency selective surface modification geometry of the radiating element and the use of high substrates of low dielectric constant or the increasing of substrate thickness. Design of microstrip patch antenna array with four elements radiating for 5G application resonating at 3.5GHz. Proposed antenna is designed on FR-4 substrate with 1.6mm thickness and dielectric constant. Simulated by using CST Studio, the gain of the designed antenna is 10dBi and its bandwidth is 3.4GHz-3.6GHz.

II. LITERATURE REVIEW

A. Microstrip Patch Antenna

Rashmitha R,(2020):"Microstrip Patch Antenna Design for Fixed Mobile and Satellite 5G Communications" in his research paper a microstrip patch slot antenna for 5G and satellite communication has been designed.

The simulation of the design has been carried out in Ansys HFSS v.15.0 simulation tool. The obtained results are found to be satisfying the requirements of the 5G communication antenna. The antenna works at a resonating frequency of 43.7GHz. The compact-sized antenna is suitable both in the communication device and the mini base stations. Due to the requirement of Massive MIMO antennas for 5G, use of similar types of multiple antennas is suggested Jen.

B. Compact Microstrip Antenna For 5g Mobile Phone

Archana R. Cheekatla (2019): Dr. Pankaj S. Ashtankar "Compact Microstrip Antenna For 5g Mobile Phone Applications"

This paper, a compact micro strip patch antenna for 5G mobile phone application. The proposed antenna with a compact size of 50 mm × 50 mm is fabricated. It is observed that the antenna shows a -10 dB impedance bandwidth from from 3.3 – 3.6 GHz i.e. 0.3GHz. The geometry of the proposed antenna is designed and simulated in HFSS13 (High Frequency Structural Simulator) software which enables to include fine details in the design. As per Microstrip Patch antenna (MPA) provide low profile and low volume, so it is used in nowadays communication devices.

C. Microstrip patch MIMO Antenna

Rashmitha R,(2020): "Microstrip Patch Antenna Design for Fixed Mobile and Satellite 5G Communications" in his research paper a microstrip patch slot antenna for 5G and satellite communication has been designed.

The simulation of the design has been carried out in Ansys HFSS v.15.0 simulation tool. The obtained results are found to be satisfying the requirements of the 5G communication antenna. The antenna works at a resonating frequency of 43.7GHz. The compact-sized antenna is suitable both in the communication device and the mini base stations. Due to the requirement of Massive MIMO antennas for 5G, use of similar types of multiple antennas is suggested Dipole Antenna.

III. PROPOSED SYSTEM

3.1 Antenna Design

1) Single Patch

Design: This is the proposed Microstrip patch antenna designed in CST software. The frequency range used for this design is up to 3.5GHz. It is resonated at a frequency of 3.2-3.67GHz. The total length of the antenna is 14mm, the width 10mm.

Expected Output: The figures below represent the expected output. The above graph of S parameters show frequency

resonating at -22dB. It is resonating at a frequency at 3.5 So, the output received is quite good.

2) Corporate Array Antenna

Design: Microstrip patch antennas normally provide gain not more than 10dB. In order to have a larger gain, multiple numbers of antenna elements are connected together to form an antenna array. While designing an antenna array, designing the feeding process is very crucial. Microstrip planar antennas can mainly be fed in two methods: (a) Corporate feed (b) Series feed. As for series feed, it is difficult to implement and is also sensitive to frequency. It is also difficult to produce amplitude tapper. Corporate feeding method, on the other hand, provides better impedance matching and radiation pattern. So corporate feeding method has been chosen as the suitable feeding method for the proposed design. As a result, desired radiation pattern, gain or beamwidth were not achieved. Designing process of the feed array has been discussed in details for 4 elements array.

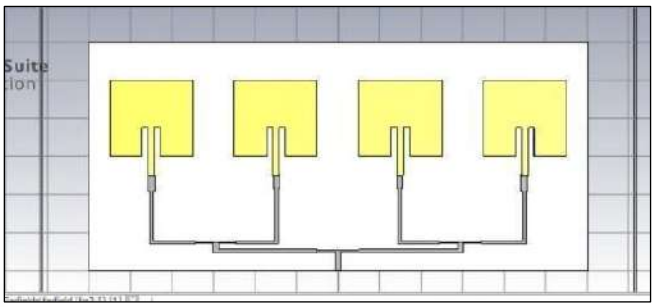

Fig. 3.1. Array

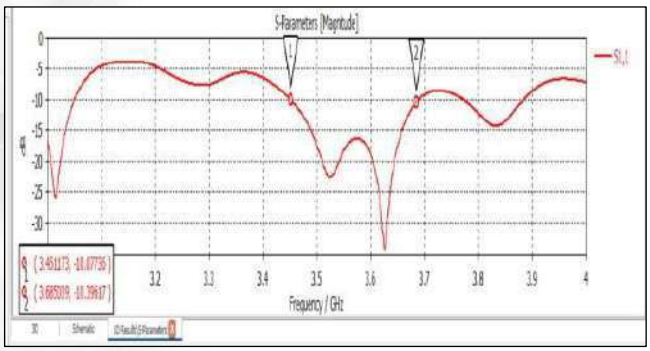

Fig. 3.2. S 1,1 of Corporate Array

The proposed structure is simulated under CST Studio, the reflection coefficient is showed in the Fig. 3.1. Expected Output All the inputs are for-10 dB. The output obtained is -39 its relatively good. The following Fig. 2 shows the reflection coefficient curve of this study. The better result is when the patch width is 30.29mm. The final structure antenna array and its simulation result is given by Fig.3.2. The bandwidth is increased and the proposed antenna has the good reflection coefficient, it is acceptable resulted comparted with the conventional antenna array.

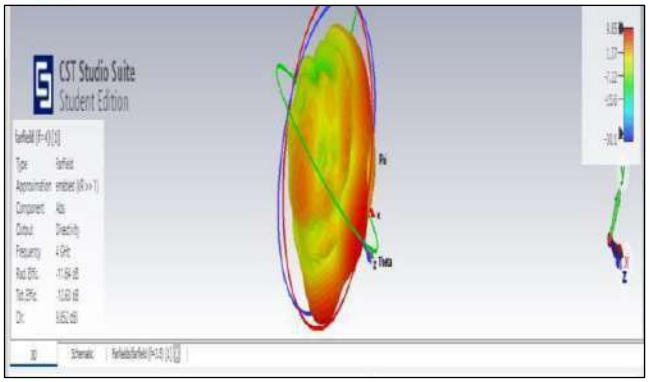

Fig. 3.3 Radiation Pattern

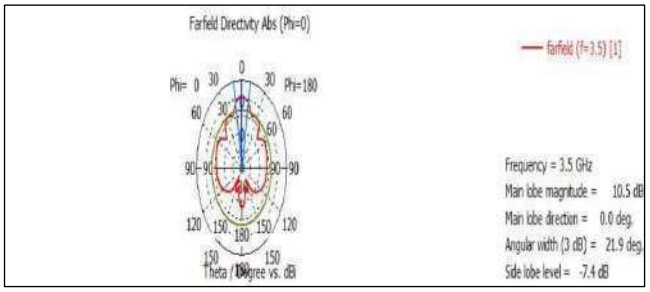

Fig. 3.4 Polar Plot

3.2 Radiation pattern of designed antenna

The representation of the radiation pattern of 4×1 patch array antenna excited by series, corporate and series corporate feeding is shown in Fig. 3.4. The polar radiation patterns of mode of 4-elements array have been illustrated in Fig. 1. The radiation pattern at 3.5 GHz is broadside with maximum gain of 9.51 dB for the main lobe. For 4- elements array, a broadside radiation pattern is also found at 3.6GHz with a maximum gain of 9.2dB. It can be observed clearly that an array antenna with corporate feed represents an improvement in radiation pattern; it has a wider beam width compared with other methods of feeding networks. The transmission line is 50 ohm and the range of the transmission line is 5 mm. Here the transmission line of70.7 ohms is used to connect the transmission line of 50 ohms to 100 ohms. This antenna is designed for a frequency ranging from3.2 GHz to 3.6 GHz. All the calculations are done with respect to3.5 GHz. The resonance was expected at3.2 GHz to 3.6 but the output we received was at 3.4GHz to 3.6 GHz which is also relatively alright. Antenna gain is the capability of the antenna to radiate more or less in any direction compared to a theoretical antenna.

1) Design of Probe Fed Rectangular Array Antenna

Design: The feeding technique used here is called coaxial cable feeding or probe feeding. Coaxial cable consists of an outer conductor and an inner conductor. Microstrip antennas are fed from underneath via a probe as shown in Figure 1. The outer conductor of the coaxial cable is connected to the ground plane, and the center conductor is soldered to the patch antenna. Its major disadvantage is that it provides narrow bandwidth. It is also difficult to construct because a hole has to be drilled in the substrate and the connector protrudes out-side the ground plane. The position of the feed can be altered to control the input impedance.

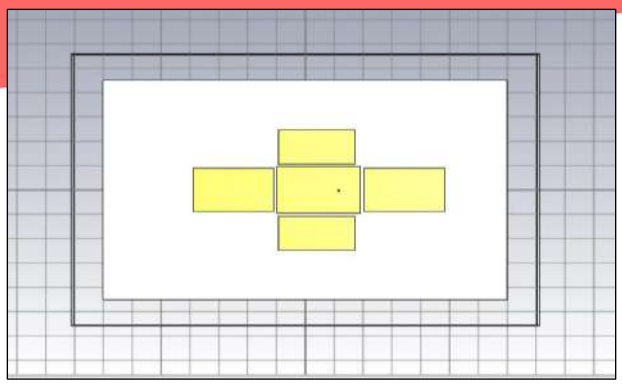

Fig. 3.5. Coax fed Rectangular Antenna

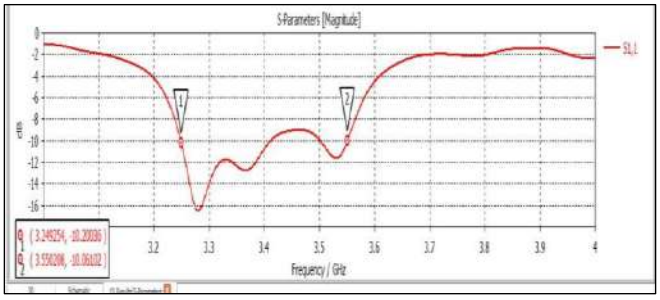

Fig. 3.6. S 1,1 Coax fed Rectangular Antenna

Fig 3.6. show the S parameter and Fig 3.7 3D Far field Plot and polar plot respectively. Fig 3.6.we can see that, at 3.2 GHz radiated minimum and maximum 3.5 ghz with -17 return loss and gain 4dB with directivity 9.064 dBi whereas in polar plot main lobe magnitude is 7.1dBi and side lobe level is –12.3 dB which is quite comparable to main lobe.

The resonance frequency of the antenna reduces close to3.2GHz with further enhancement in bandwidth. For further enhancement in its performance, an fresh resonator having is introduced in the ground plane of this antenna structure

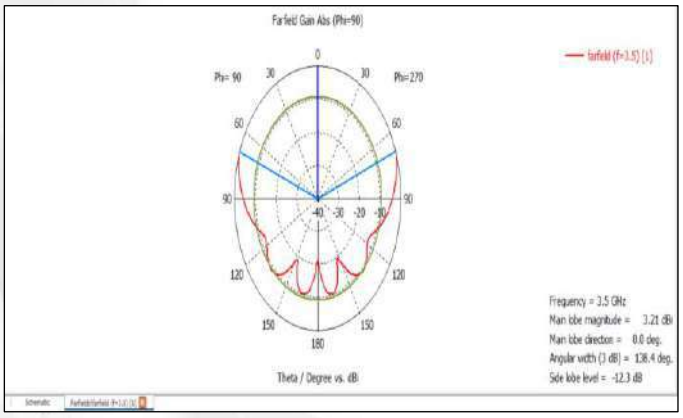

Fig. 3.7 Polar Plot

2) U shape slot Antenna

Design: U-shaped slot can act as one half-wavelength resonator. The desired frequency can be achieved by accommodating the range of the U-shaped slot. The proposed UWB antenna consists of four U-shaped slots nested together to achieve four indented bands. It can be observed that gL has a deterministic influence on the high frequency impedance matching. With the increase of gL, a better impedance matching can be attained over the high frequency band. Though there are some differences in terms of the value of VSWR being due to the fabrication accuracy on the range of the U-shaped slots, fairly good agreement is attained in terms of frequency.

$$f_r = \frac{c}{2(L_N + W_N)}\sqrt{\frac{2}{\varepsilon_r + 1}} \quad (1)$$

where L_N and W_N is the length and width of U-shaped slot. Therefore, the desired notch frequency can be achieved by adjusting the dimensions of the U-shaped slot.

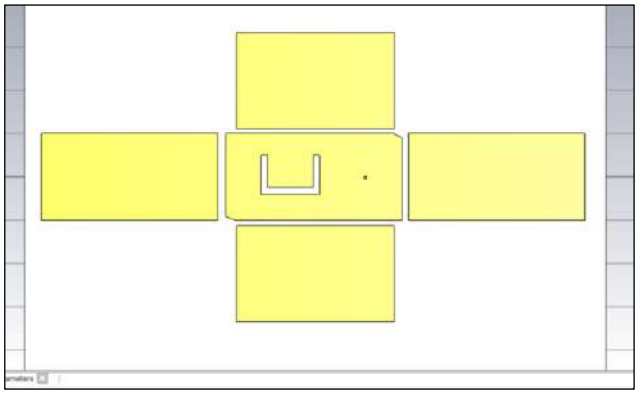

Fig. 3.8 U shape Slot

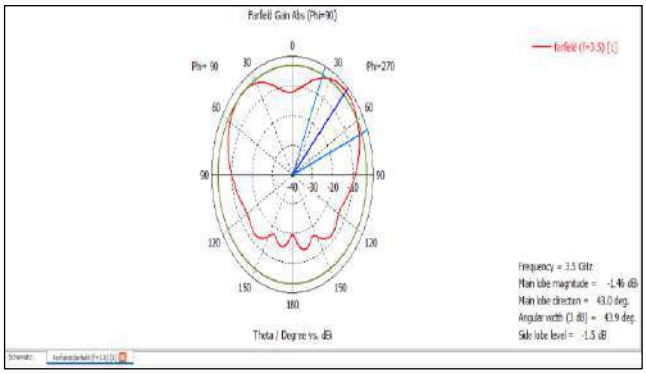

Fig. 3.9 Polar plot

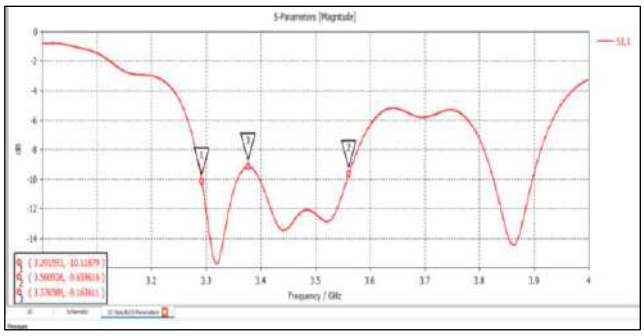

Fig. 3.10. Coax fed Rectangular Antenna

Instead of cutting a U-shaped slot in the rectangular patch, it can be cut inside the rectangular patch as shown in Figure 3.7. The patch with a U-slot is fabricated on the low-cost printed circuit board (PCB) substrate in the inverted suspended configuration. By cutting a U-slot in the rectangular MSA on a thick, low dielectric substrate, a wide BW is obtained. This antenna is most attractive as it yields a large BW without increasing the surface area and with stable radiation characteristics over the entire BW.

CONCLUSION

In this work, a microstrip patch slot antenna for 5G and satellite communication has been designed. The simulation of the design has been carried out in the CST studio simulation tool. The obtained results are found to be satisfying the requirements of the 5G antenna. The antenna works at a resonating frequency. The compact sized antenna is suitable in the smartphone. Future work includes fabrication of designed antennas for real-time 5G applications. The narrow bandwidth, low gain, low power and low efficiency of the microstrip antenna have to be taken care. However, more optimization of the antenna is required to match the real-time application scenarios and will be included.

FUTURE SCOPE

In the future we can add more features to make it more efficient and user-friendly by using CST microwave studio. It is possible to design and implement antennas for 5G smartphones. till now 6G standards are not available so researches have started to put the base for the technology that will provide these standards. This technology mostly consists of wireless access system frequency utilization ,power consumption, antenna and propagation.

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Intrusion Detection System Using Supervised Machine Learning Techniques

Rishikesh Masurkar, Sameer Yendarkar, Raunak Shirodkar

Abstract **- With the advancement of the Internet over the years, the number of attacks on the Internet has also increased. Powerful intrusion detection system (IDS) is necessary to ensure the security of the network. A new supervised machine learning system is being developed to classify network traffic as malicious or benign. To find the best model with successful detection rate, a combination of supervised learning algorithm and feature selection method was used. Through this study, it is found that machine learning based on artificial neural network (ANN) with wrapper feature selection performs better than support vector machine (SVM) technique in classifying network traffic. To evaluate the performance, the UNSW_NB15 dataset is used to classify network traffic using SVM and ANN supervised machine learning techniques.In a comparative study, the proposed model showed a higher intrusion detection success rate than other existing models.**

Keywords – intrusion, supervised, malicious, detection, **dataset.**

I. INTRODUCTION

With large amounts of data and information, the Internet has several challenges to make it a stable and secure system. While security can be provided by firewalls and software update, dynamic mechanisms can also be exploited. The intrusion detection system is one of the dynamic mechanisms along with the network analyzer. Intrusion detection defines a specific target for intrusion detection. Intrusion Detection monitors and analyzes extensive processes in a computer system or network to detect anomalies or anomalies that violate computer security policies. Given the continuous and diverse range of attacks, there are many network detection systems that identify malicious attacks to protect computers from possible harm. However, some unknown attacks remain a tough challenge for IDS. Sometimes, wherever the transmission of information is unclear or imperfect, IDS cannot distinguish between the traditional link and the suspicious link. As a result, the attack detection accuracy of the system is often degraded and thus the false positive detection rate remains high although the accuracy remains low.

II. LITERATURE SURVEY

1. Md Nasimuzzaman Chowdhury and Ken Ferens, Mike Ferens's, "Network Intrusion Detection Using Machine Learning".

In this paper, the combination of two machine learning algorithms is proposed to classify any anomalous behavior in the network traffic. The overall effectiveness of the proposed method was validated by evaluating detection accuracy, false-positive rate, false-negative rate, and time required to detect the intrusion. The proposed method proves the efficiency of the algorithm in detecting intrusion with higher detection accuracy of 98.76% and lower false positive rate of 0.09% and lower false negative rate is 1.15%, while the conventional SVM-based scheme achieves a detection accuracy of 88.03% and a false positive rate of 4.2% and a false negative rate of 7.77%.

2. Saroj Kr. Biswas et. Al," Intrusion Detection Using Machine Learning: A Comparison Study".

This paper proposes an IDS using machine learning for networks with a good combination of feature selection techniques and classifiers by studying the combination of popular feature selection and classifier techniques. Best. The critical feature set is selected from the initial feature set using feature selection techniques and then the critical feature set is used to train different types of classifiers to generate IDS Five-way cross-validation was performed on the NSL-KDD dataset to find the results. Finally, it is observed that the KNN classifier produces better performance than the others and, among the object election methods, the object selection method based on the information growth rate is preferable.

3. *Syam Akhil Repalle and Venkata Ratnam Kolluru's, "Intrusion Detection System using AI and Machine Learning Algorithm".*

In this paper, Secure automated threat detection and prevention is the more effective procedure to reduce the workload of analyst. It monitors the system continuously and responds according to the threat environment. Here suspicious activities are detected

by the help of an artificial intelligence which acts as a virtual analyst concurrently with network intrusion detection system. In its final phase where packet analysis is carried out to surf for attack vectors and then categorize supervised and unsupervised data.

4. B Ida Seraphim, Shreya Palit, Kaustubh Srivastava, E Poovammal's," Implementation of Machine Learning Techniques applied to the Network Intrusion Detection System".
In this paper, an in-depth study of some of the major machine learning techniques performed for intrusion detection was performed where techniques based on kmeans, k-means with principal component analysis, Random Forest machine learning algorithms, Classification techniques and algorithms like Naive Bayes algorithm, Hoeffding Tree algorithm. In addition, updated exact combinatorics, weighted precision combinatorics, support vector machines, genetic algorithms and deep learning have been studied. Now, some of these algorithms are applied on the UNSW_NB15 dataset and compared based on their accuracy.

5. Riyazahmed A. Jamadar et al," Network Intrusion Detection System Using Machine Learning".
This study proposes a model to build a network intrusion detection system using a machine learning algorithm called a decision tree. This system mainly detects intrusions based on anomalies. Methods: In this model categorical features from the 2017 Change Control Identifiers (CCIDS) dataset are encoded using a tag encoder. Using Recursive Feature Elimination (RFE), some of the best features will be selected. This data is divided into training and test data. The training data is then used to train a Decision Model where each leaf represents a possible outcome.

III. PROPOSED SYSTEM

In this paper, we will develop intrusion detection system by using supervised machine learning techniques to detect different types of popular attacks, which are DoS, Man-in - Middle (MiM) and Buffer overflow (BO). The Proposed system will be evaluated and compared according to the performance matrix.
Benefits of the proposed system: 1. Improved accuracy of results. 2.Analyze the results to identify the most network traffic and reduce the workload. 3.Machine learning methods showed that network traffic was identified through feature selection and extraction using ANN and SVM methods used to classify the dataset. 4.The advantage of using machine learning is that you can see if your code or your document is malicious in a very short time, even if you don't need sandboxing analytics to do its analysis.

IV. IMPLEMENTATION

This part describes the process to develop an intrusion detection using supervised machine learning techniques. The system includes feature selection and learning algorithms. The feature selection component is responsible for extracting the most relevant features or attributes to identify the instance for a particular group or class. The learning algorithm component builds the required intelligence or knowledge using the results found from the feature selection component. As in Figure, Using the training dataset, the model is trained and its intelligence built. The learned intelligences are then applied to the test dataset to measure the host accuracy of the correctly classified model on unseen data. Our proposed method is to use machine learning algorithms to classify standard and malicious web pages purely based on the separation function of URL and JavaScript code. In this sense, the first step is to accumulate sites that are standard and affected by the XSS attack. The next step is to remove the URL and JavaScript code from these sites. The capabilities are known and the dataset is generated using the URL and JavaScript code collected. This dataset is then used to prepare and test the selected machine learning algorithms.

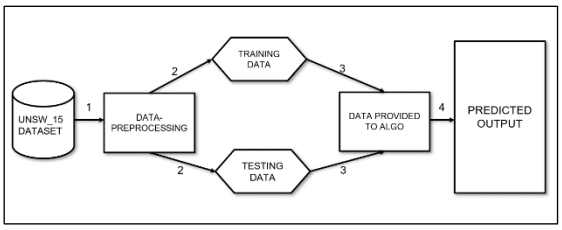

Fig 4. Proposed work's architecture

A. Deep Learning model

We implement supervised deep learning to build intrusion detection system. We selected deep learning including ANN, SVM and Naïve Bayes. The detail for each model is mentioned as follows:

1.Artificial Neural Network (ANN):

An Artificial Neural Network (ANN) is a computing model based on the structure and function of organic nerve networks. Luminous information on the network affects the structure of the year, because the nerve cell network changes or learns, in a certain sense based on this input and this output. ANN's are considered tools to model nonlinear statistics where complex relationships between modeled inputs and outputs are found or models. ANN is also called nerve cell network. ANN presents some advantages, but one of the most advantages among them is the fact that it can actually learn how to observe the data sets. In this way, ANN is used as a random functional approximate tool. These types of tools

help estimate the most expensive and ideal methods to achieve solutions while identifying computer functions or distributing. Ann samples data instead of the entire data to achieve solutions, allowing you to save both time and money. ANN's are considered a simple mathematical model to improve existing data analysis technologies. ANN's has three connection layers. The first layer consists of input neurons. These neurons send data to the second layer, which in turn sends the output neurons to the third layer.

2.*Support Vector Machine (SVM) Classifier:*

SVM (Support Vector Machine) works on the principle of supervised machine learning. SVM requires a training set and associated tokens. After training, if any test data is included, the model assigns it to one category or another. It works well with linear classifier. It can even work efficiently on nonlinear classifiers using the kernel trick by mapping the inputs into the high dimensional feature space. It constructs a hyperplane for classification of data. The hyperplane is chosen so that the distance between the nearest data point on each side is maximized.

3.Naive Bayes:

A classification algorithm under supervised learning group based on probabilistic logic. This is one of the simplest machine learning algorithms of all times. Generative algorithms from GANs are also used as classifiers, interestingly they can do much more than categorization though.

V. CONCLUSIONS

In this project, we have presented different machine learning models using different machine learning algorithms and different feature selection methods to find a better model. Analysis of the results showed that the model built using ANN and wrapper feature selection outperformed all other models in correctly classifying network traffic with a detection rate of 94.02%. We believe that these findings will contribute to further research in the field of building a detection system capable of detecting known attacks as well as new attacks. The intrusion detection system that exists today can only detect known attacks. The detection of new attacks or zero-day attacks remains a research topic due to the high false positive rates of existing systems.

ACKNOWLEDGEMENT

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Wireless Security System

Sarika Patil, Sidhhi Paradhi, Shital Zanje, Neha Pitale

***Abstact*---- As an essential constituent of many associations' security and safety precedence, video surveillance has established its importance and benefits numerous times by providing immediate supervising of possessions, people, environment and property. This project deals with the design approach of an Embedded Real-Time Surveillance System Based Raspberry Pi SBC for intruder detection that reinforces surveillance technology to provide essential security to our life and associated control and alert operations.The proposed security solution hinges on our novel integration of cameras and motion detectors into web application. Raspberry Pi operates and controls motion detectors and video cameras for remote sensing and surveillance, streams live video and records it for future playback. This research is focused on developing a surveillance system that detects strangers and to response speedily by capturing and relaying images to owner based wireless module.This Raspberry Pi based Smart Surveillance System presents the idea of monitoring a particular place in a remote area.**

Keywords --- Surveillance system ,motion detector, web application

I. INTRODUCTION

The demands on video surveillance systems are rapidly increasing in the present day. One of the first things people will want to know about their surveillance system is whether or not they have the ability to connect to it over the internet for remote viewing. In the past, security systems had to be monitored by a guard who was locked away in a room all day watching the monitors to make sure that nothing would happen. The other option was to come back and review the footagebut damage could have happened. Therefore, researchers and scientists had to come up with ways of overcoming that and thus improving security at large. Commercial spaces, universities, hospitals, casinos and warehouses require video capturing systems that have the ability to alert and record beside live video streaming of the intruder. The advancements in video surveillance technology have made it possible to view your remote security camera from any internet-enabled PC or smartphone from anywhere in the word. This encompasses the use of CCTV (DVRs) systems and IP cameras. This technology is awesome but its cost of implementation has proven to be an impediment especially for a small home application. Therefore, new innovative technology revolves around affordability of a product in terms of its cost and ease of implementation. The Raspberry Pi crosses both criteria in that it is a cheap, effective computer which can be interfaced with other modules to realize systems with immense functionality. A lot can be done on it ranging from motor speed control, automatic lighting, VPN server, security system etc.

The latter is of great interest in this project. The Raspberry Pi microcomputer is capable of implementing a cost effective security system for various applications. This new arising technology related to security provides a comfortable and safe environment for small homes. The various objectives of the system are to detect an intruder, take an image of the intruder and also convey an alert message to the facility owner. In doing so it thus allows for remote monitoring of homes from anywhere in the world. The system to be designed cannot wholly replace the role of CCTV and IP surveillance cameras especially in large commercial set ups but will make it easy for low income home owners to monitor their homes at a very affordable price. In addition to the fact that the Raspberry Pi board is cheap, the camera to be used in this case is relatively cheap compared to the others. The whole security system circuitry is simple and easy to implement.

Image processing is a term which indicates the processing on image or video frame which is taken as an input and the result set of processing is may be a set of related parameters of an image. The purpose of image processing is visualization which is to observe the objects that are not visible. Analysis of human motion is one of the most recent and popular research topics in digital image

II. LITERATURE REVIEW

In the present day, researchers and developers have come up with a wide range of surveillance systems that are used for remote monitoring, alerting as well as controlling tasks through affordable and easy to implement hardware systems. Some have so far been realized while others still remain a proposition. An embedded home surveillance system which assesses the implementation of a cost effective alerting system based on small motion detection was presented by Padmashree A. Shake and Sumedha S. Borde. They worked on implementing cheap in price, low power consumption; well utilize resources and efficient surveillance system using a set of various sensors. Their system helps to monitor the household activities in real time from anywhere and based on microcontroller which is considered nowadays as a limited resource and an open source solution compared to SBC D. Jeevanand worked on designing of a networked video capture system using Raspberry Pi. The proposed system works on capturing video and distributing with networked systems besides alerting the administration person via SMS alarm as required by the client. Their system was designed to work in a real-time situations and based on Raspberry Pi SBC. Contrasting to other embedded systems their real-time application offers client video monitor with the help of alerting module and SBC platform. Sneha Singhd and his team described IP Camera Video Surveillance system using Raspberry Pi technology. The Researchers aimed at developing a system which captures real time images and displays them in the browser using TCP/IP. The algorithm for face detection is being implemented on Raspberry Pi, which enables live video streaming. Mahima F. Chauhan and Gharge Anuradha offered to design and develop a real time video surveillance system

based on embedded web server Raspberry PI B+ Board. Their system has low cost, good openness and portability and is easy to maintain and upgrade. Thus this application system provides better security solutions. This system can be used to affect security 6 in banking halls, industry, and environment and in military arts Jadhav G. J evaluates in 2014 the use of various sensors, wireless module, microcontroller unit and finger print module to formulate and implement a cost effective surveillance system. He and his team adopted an ARM core as a basis processor of the system. PIR sensor is used to detect motion in the vision area, while vibrating sensor is used to sense any vibration events such as sound of breaking. The intruder detection technique is proposed by using the PIR sensor that detect motion and trigger a system of alerting and sending short message service. through GSM module for a specified phone number. Their work can be featured by adopting 4 numerous diverse kinds of demanding database and thus it will be more secure and difficult to hack. In 2014, Sanjana Prasad and his colleagues worked on developing a mobile smart surveillance system based on SBC of Raspberry Pi and motion detector sensor PIR. Their development boosts the practice of portable technology to offer vital safety to our daily life and home security and even control uses. The objective of their research is to develop a mobile smart phone home security system based on information capturing module combined with transmitting module based on 3G technology fused with web applications. The SBC will control the PIR sensor events and operates the video cameras for video streaming and recording tasks. Their system has the capability to count number of objects in the scene Uday Kumar worked on implementation of a low cost wireless remote surveillance system using Raspberry Pi. Conventional wireless CCTV cameras are widely used in surveillance systems at a low cost. He and his team implemented a low cost and secure surveillance system using a camera with Raspberry Pi and the images acquired have to be transferred to the drop box using a 3G internet dongle. This was successfully implemented using Raspberry Pi and 3G dongle

III. PROPOSED SYSTEM

A. Theoritical Review

With the invention of electricity, the art of home protection was greatly improved. In 1853, the first patent on electro-magnetic alarms meant that businesses and wealthy residents could secure valuables. Magnetic contacts were installed on the windows and doors that, when tripped, would send a signal through the electromagnetic wiring and sound an alarm. These groundbreaking 7 security systems were effective in deterring break-ins from occurring According to Cisco Expo, major strides have been made with regards to surveillance systems. After the alarm system, analog video camera with Video Cassette Recorder evolved. It had poor imaging and no remote access. To overcome the drawbacks of this system, digital video recorders evolved. They gave good quality pictures and enable for transmission of video signals through data networks and thus allowed for remote monitoring Network Video Recorder then emerged. They have the advantages of the DVRs but have other merits over DVRs. They give more storage options and network connection. The most superior version is the type that uses Cisco Video Surveillance Platform. They give secure remote access and control from anywhere, fail-safe redundant storage, easy integration with other systems and enterprise class storage and support Security literally means a way or method by which something is secured through a system of interworking components and devices. On the other hand, security systems are networks of integrated electronic devices working together with a central control panel to protect against burglars and other potential intruders. Security systems work on the simple concept of securing entry points into a home with sensors that communicate with a control panel or command center installed in a convenient location. The sensors are typically placed in entrances as well as easily accessible windows. A typical home security system has the following components: A control panel, which is the primary controller of a security system, door and window sensors, motion sensors, wired or wireless security cameras, high-decibel siren or alarm and window stickers. This security system project deals with the design and development of a theft control system for home, which is being used to prevent/control any theft attempt. The developed system makes use of an embedded system comprising of an open hardware microcontroller (Arduino) and a modem based on Global System for Mobile communication (GSM) technology The designed and developed system can be installed in the home. An interfacing intrusiondetector unit is also connected to the microcontroller-based security system. The system thus incorporates a passive infrared sensor (PIR) for motion detection. In case of an intrusion attempt, a warning message is being transmitted by the system (as an sms) to the owner's mobile phone, or to any pre-configured mobile phone number for further processing

B. Figures

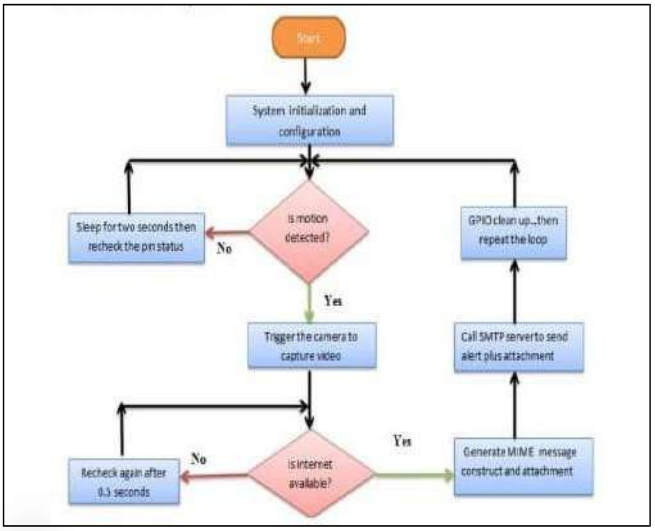

Fig 3.1: Flow Chart Implementation

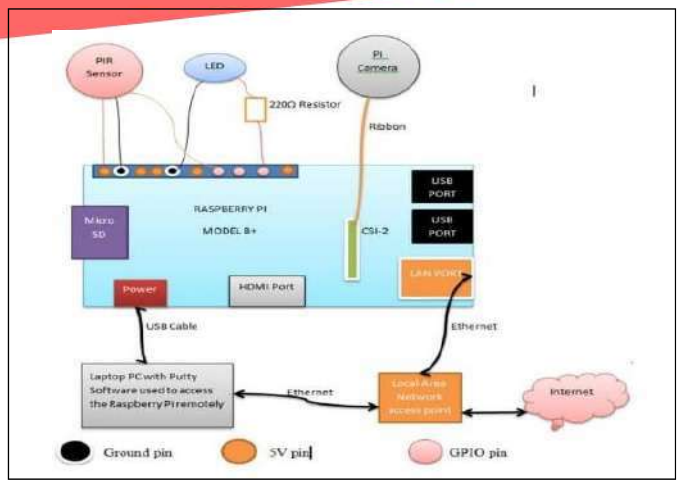

Fig 3.2: Circuit Diagram

PIR sensor is used to detect motion in the vision area, while vibrating sensor is used to sense any vibration events such as sound of breaking. The intruder detection technique is proposed by using the PIR sensor that detect motion and trigger a system of alerting and sending short message service. through GSM module for a specified phone number. Their work can be featured by adopting 4 numerous diverse kinds of demanding database and thus it will be more secure and difficult to hack. In 2014, Sanjana Prasad and his colleagues worked on developing a mobile smart surveillance system based on SBC of Raspberry Pi and motion detector sensor PIR. Their development boosts the practice of portable technology to offer vital safety to our daily life and home security and even control uses. The objective of their research is to develop a mobile smart phone home security system based on information capturing module combined with transmitting module based on 3G technology

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IV. HARDWARE & SOFTWARE SPECIFIATIONS

OPENCV – PYTHON VIDEO PROCESSING

OpenCv is a very powerful tool used to analyze images and video files. The basic processing procedure to be followed is detailed in the flowchart below. Thresholding as a technique of image processing was chosen for the implementation of motion detection and tracking in video streams. The choice to script using OpenCv – Python was because Python on its own does not support video processing. There is so far no video processing library in Python. OpenCv thus provided the necessary platform to achieve image processing. The following flowchart was used for this implementation.

Name of the Component	Specifiaction
Raspberry Pi Model B+ controller	• Quad Core 1.2GHz • Broadcom BCM2837 • 64bit CPU • 1GB RAM • 100 Base Ethernet. • 40-pin extended GPIO • 4 USB 2 ports
PIR motion sensor	• Input Voltage : DC 4.5V ~ 20V • Static Current : <50uA • Sensing Range : 7 meters (120 degrees cone) • Dimensions24mm*32mm*25mm(Height with lens)
Pi camera module	• Photo Resolution : 2592 x 1944 Pixels • Video : 1080p @ 30fps, 720p @ 60fps and 640x480p 60/90 • Size : 25mm x 23mm x 8mm
Micro SD card	• Capacity : 4GB-32GB • Size : 11mm × 15.0mm
LED and 220 Ohms resistor	• Resistance: 220 Ohm. • Max. Working Voltage: 350 V.
USB powered cable	• USB 2.0 5V

Table 4.1-Hardware components

V. CONCLUSION

In this report, the study of Wireless Security System is mentioned. It is architectured with motion detection using a PIR sensor, video capturing using a Pi Camera and sending out an alert through e-mail. The different hybrid approaches also described. The comparative study of various techniques mentioned above is presented in this report. This project system can be successfully used to monitor the places to prevent any intruders access by some an alert mechanism, image processing ,emailing or SMS to company's owner and to keep an eye on people enter and leave the premises using the pi camera. The performance measures like precision and recall are described in this report. The different standard datasets or variable inputs are defined that may be used in experiment for this domain systems. The applications of this domain is identified and presented.

ACKNOWLEDGMENT

The satisfaction and bliss accompanying the partial completion of our project would be incomplete without the mention of the people who made it possible. We would like to acknowledge our Principal Dr.Sandeep Joshi for encouraging us and providing this opportunity. We also sincerely thank our Head of

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Wearable Location Tracker During Disaster

Pooja Salunkhe, Pratiksha Solanke, Rutuja Suryawanshi, Minal Mangaonkar

***Abstract*— In this paper we have designed and proposed a Wearable Location Tracker During Disaster based on Global Positioning System(GPS) and Global Service for Mobile Communication(GSM). Location is one of the most common things that people look for, whether it's the location of a specific person, a vehicle, or a specific location. People are always looking for them to meet heir own needs at various times. GPS (Global Positioning System) is a network of orbiting satellites that send precise position data back to Earth and track the exact location of the GPS receiver. It is possible to track the whereabouts of a gadget mounted on a vehicle or even on a person in the form of washable devices in times of need.**

***Index term*- Disaster, GPS, GMS, Location Tracking**

I. INTRODUCTION

PS trackers are used in nearly every communication technology, including mobile. Location is one of the most important aspects of any living being on Earth, and it is especially important during any disaster situation that raises the question of life and death for a specific person. GPS devices receive signals from more than one receiver. The signal can be converted to a geographic location using online tools such as Google. Trackers should be built into a specific device that is available to all of us. A person should be tracked during earthquakes, fires, the collapse of buildings and bridges, and any medical emergencies. The specific gadget might be miniature watches or should be embedded in our wearables, such as wristbands, neckties, and waist belts, among other things. The primary mission of the WLTD system is keeping track of the current location and movement of people. The primary goal of this tracking is to provide quick assistance in emergency or unexpected situations. The WLTD consists of a basic GPS based tracking system. WLTD assign individuals to tasks and facilitates management of people, places, and things that are important in disaster relief.

II. LITERATURE REVIEW

This article proposed a system that acts as a wearable location tracker in the event of a disaster. If you are involved in a disaster such as an earthquake, fire, collapse of a building or bridge, or emergency medical care, you should follow up in the above situation. Each device can be a mini watch and should be installed on a wearable like the wrist watch Then, when user presses a button, the individual is sent to the next rescue team.Rescuing the tracked victims from the area of disaster(Soumyajit Boral, Abhisek Das, Aditya Khare, Ambalika Gupta, Chaitali Bhattacharyya,Susmita Das-2020). This page provides details on the Design and Implementation of Android Based Wearable Smart Locator Band for People with Autism, Dementia, and Alzheimer wearable smart locator

based on Android. The developed device is used to access a location. In this device, an Android-based application is developed that automatically opens the wearer's location on Google Map in a fraction of seconds when it receives a message containing latitude and longitude, eliminating the need for caregivers to manually open it as in other existing devices. The major goal of this research is to track persons with disorders including autism, dementia, and Alzheimer's, as well as elderly people. (Isha Goel, Dilip Kumar-2014).

This propose system shows Android mobile platform is becoming more popular to the users for its multi-dimensional purposes. As a result, this proposed system, named GPS-based Location Tracking System via Android Device, makes use of GPS and any Android-based mobile phone to track the location of a person whenever necessary. (Md. Palash Uddin, Masud Ibn Afjal, Masud I, Md Nadim-2013).

This proposed system of Smart Life Tracking and Rescuing Disaster Management System.. They used GSM, GPS and RF technology. Heart beat sensor which used to detect pulse of victim which enable us to understand the victim is alive or died. They made a one software which includes registering, monitoring and assigning rescuers to pick up point and people to shelter. (Nagashree C, Kavya Rao B, Maria Jyothi Lobo, Harshita B S and Antony P J-2012)

III. TOOLS AND TECHNOLOGY

i. Raspberry Pi

Fig 3.1 Raspberry Pi

The system has been designed using Raspberry Pi3, GPS, and GSM. Design of this device consists of Raspberry pi board to which we are supplying 5V power.

A sensor is utilised for taping, and an authorised individual receives notification via SMS or email based on the input provided by the user. By using this rescue team can track the victim location.

ii. Global Positioning System(GPS)

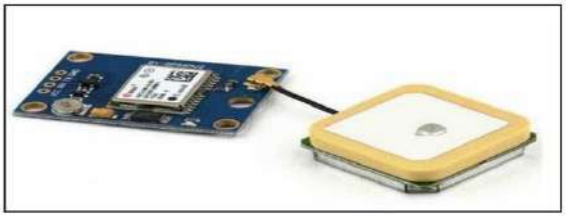

Fig 3.2 GPS Module

GPS is based on a global navigation satellite system for determining speed, position, direction, and time. It uses a constellation of 24/32 active satellites in orbit to send accurate microwave signals through a GPS receiver on the ground. GPS receivers require at least three or four satellites and their two dimensions to calculate the distance. Latitude and longitude, or 3D, or NS. Latitude, longitude and elevation position.

iii. Global System for Mobile Communication (GSM)

Fig 3.3 GSM Module

The GSM modem, which acts as a mobile phone, accepts SIM cards from GSM network operators with their own phone numbers. This SIM900A GSM modem can communicate and develop embedded applications for SMS-based remote control, such as sending and receiving SMS, making and receiving voice calls. It can also be used for data logging applications connected to the Internet in GPRS mode. Due to its dual band 850/1900MHz, it is a flexible connector and suitable for long-distance data transmission. Its worldwide roaming capabilities is a plus, as is the longer battery life and data speeds of up to 9600 bps.

iv. The Python Programming Language

Python is a high-level, popular programming language. His design philosophy emphasizes the readability of the code by using clear indentation. Its language structure and object-oriented approach are designed at assisting programmers in writing logical and clear code for both large and small projects. Python is the favourite language on Raspberry Pi because everything is already included. You get all of Python's prerequisites, as well as an IDE, as soon as you install your system.

v. Programming Languages and Tools

Various latest demanding programming language and sup- porting tools used to develop the system are below:

• Python

This is the block diagram for Wearable Location Tracker Device. It includes Raspberry pi, GPS, SIM900A GSM, LCD Display.

The microcontroller is assumed to be heart of “Project since it controls all devices being interface with each other through this controller according to the program written in it. Raspberry pi converted into GPS receiver with the GPS receiver chip. After connecting Raspberry pi with GPS module. It processes information which got from GPS and sends it to GSM module. Admin can see the location of the user with the help of VNC viewer.

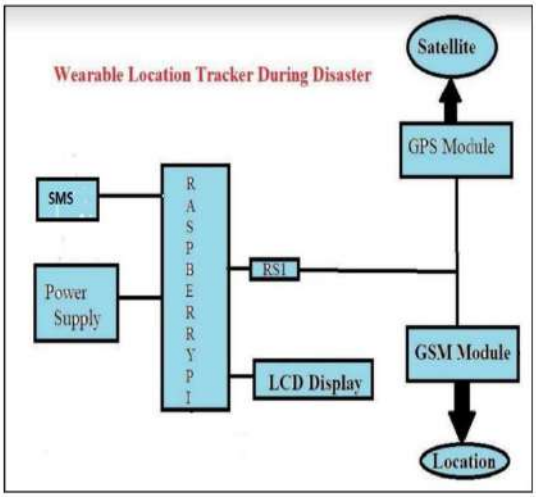

Fig 3.4 Block Diagram

The GPS tracking system uses 24 satellites and 12 Ground stations. This module determines the position of user having a GPS receiver by the reception of user having a GPS receiver by the reception of three signals from four satellites using a method called trilateration.

GSM is a digital cellular communication system which is used to a comprehensive range of services and features to the users not available on analog cellular. In this system GSM module is to send the information to the admins mobile phone. Here, we have use LCD LM016L custom, which is used for displays message received from user side GPS module.

TABLE I
HARDWARE COMPONENTS

Components	Specifications
Processor	2 GHZ Intel
HDD	180 GB
RAM	4 GB
Raspberry pi	3b+
GPS	Neo-6M
GSM	SIM900A
LCD	16*2
Buzzer	5v Active Buzzer
Battery	9v

TABLE II
SOFTWARE COMPONENTS

Components	Specifications
Operating System	Windows 10
Programing Language	Python
Software	VNC Viewer

V. RESULT

A GPS tracking system can function in a variety of ways. According to GPS devices are commonly used in the commercial sector Keep track of the user's location.

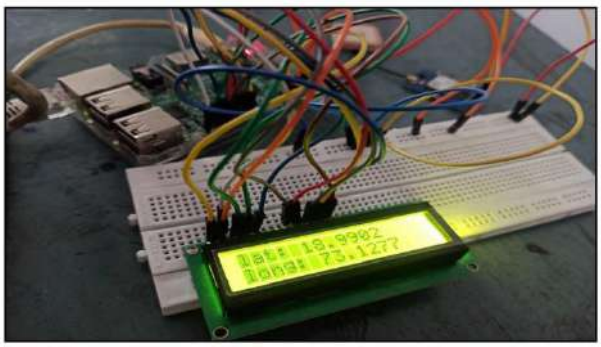

Fig 5.1- Result

An active GPS tracking system is also known as a real-time system because it automatically sends data from the GPS system to a central tracking portal or system as it occurs. This system is better suited for commercial GPS use. A GPS tracking system can function in a variety of ways. According to GPS devices are commonly used in the commercial sector Keep track of the user's location.

VI. CONCLUSION

Rescuing victims from disaster sites has become easier and more sophisticated in recent years. Using latitudes and longitudes to pinpoint the precise location or position of a person or object. This will make it easier and more convenient for us to track down lost objects using the stored database. The proposed SLTR is currently in prototype form. The system is easily expandable to a real-world application for dealing with natural disasters. The proposed system could be very useful in the current situation, where natural disasters occur on a regular basis. The GPS device will obtain the current location from a satellite. We will find the location again if certain conditions are met. We may count the location again after a certain distance has passed.

ACKNOWLEDGMENT

We would like to express our gratitude to Prof. Sonali Kathare who has helped us throughout the project and during the time of need. In spite of their busy schedules, it was very kind of them to spare some of their precious time and give us some valuable suggestions which form heart of this report. Prof. Dr. Avinash Vaidya (H.O.D-Electronics and Telecommunication) was a great source of inspiration for us. I also extend our thanks to our department professors for their valuable guidance. I would also thank our entire Electronics and Telecommunication Department for supporting and guiding us. And at last I would like to thank our Principal Dr. Sandeep Joshi for outstanding encouragement.

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Real Time Face Recognition And Analysis Using Deep Learning

Vishlesha A. Mortale, Neha D. Pokharkar

***Abstract*—In the current modern world, most people are using the roadways for transportation purposes. According to the survey of the government, almost 1.5L of people lost their lives in road accidents. Usage of roadways increases by one side; on the other side the road accidents are also escalating. The increase in number of vehicles is also giving rise to increase in thefts day-by-day. The current situation shows that the reasons for the road accidents are mostly due to driver's incompetency and faults. Hence to track the activities of such drivers, provide safe riding and prevent thefts this project has been proposed. This report presents a model for real time drowsiness detection system with an alert system. The drivers face will be first recognized from the database and if the drivers face is detected to be drowsy an alert will be given for him to awake. Thus, the proposed work would help to avoid accidents caused by drivers.**

***Keywords*—transportation, accidents, incompetency, real time drowsiness detection system, alert system.**

I. INTRODUCTION

The aim of this project is to design and implement a real time face detection system that can help its driver drive safely. The objective of the project is to develop a reliable real time face detection system so that the drivers face can be detected in real time preventing chances of this as well knowing his emotional knowhow to detect drowsiness and get rid of this by giving him an alert. By doing so the vehicle owner can reduce chances of accident caused by drowsiness. The project will be of great help in decrementing the road accidents. The most crucial feature of the system is that real time face is detected. No need of physical interference as all the role of sensors and algorithm. The system is completely free from human interference. In the current modern world, most people are using the roadways for transportation purposes. According to the survey of the government, almost 1.5L of people lost their lives in road accidents. Usage of roadways increases by one side; on the other side the road accidents are also escalating. The increase in number of vehicles is also giving rise to increase in thefts day-by-day. The current situation shows that the reasons for the road accidents are mostly due to driver's incompetency and faults. Hence to track the activities of such drivers, provide safe riding and prevent thefts this project has been proposed. This report presents a model for real time drowsiness detection system with an alert system. The drivers face will be first recognized from the database and if the drivers face is detected to be drowsy an alert will be given for him to awake.

The main objectives of this project are,

a.First, it will recognize drivers face for security concerns.

b.The vehicle safety will be ensured from thefts because of this

c. No system hindrance as mobile not used.

d. The driver will stay alert minimizing accidents.

II. PROPOSED SYSTEM

A. Software Requirement

Visual Studio with Python Tools: - Working with Python in Visual Studio Code, using the Microsoft Python extension, is simple, fun, and productive. The extension makes VS Code an excellent Python editor and works on any operating system with a variety of Python interpreters. It leverages all of VS Code's power to provide auto complete and IntelliSense, linting, debugging, and unit testing, along with the ability to easily switch between Python environments, including virtual and anaconda environments.

B. Modules / Packages / Libraries Requirement

1) OpenCV

OpenCV is the huge open-source library for the pc vision, machine learning, and image processing and now it plays a serious role in real-time processing which is extremely important in today's systems. By using it, one can process images and videos to spot objects, faces, or maybe even handwriting of a person. When it integrated with various libraries, like NumPy, python is capable of processing the OpenCV array structure for analysis. To spot image pattern and its various features we use vector space and perform mathematical operations on these features. It has C, C++, Java and Python interfaces and supports Windows, Linux, Mac OS, iOS and Android. When OpenCV was designed the foremost focus was real-time applications for computational efficiency. All things are written in optimized C/C++ to require advantage of multi-core processing.

Features of OpenCV Library

Using OpenCV library, you can –

a. Read and write images
b. Capture and save videos
c. Process images (filter, transform)
d. Perform feature detection
e. Detect specific objects like faces, eyes, cars, within the videos or images.
f. Analyze the video, i.e., estimate the motion in it, subtract the background, and track objects in it.

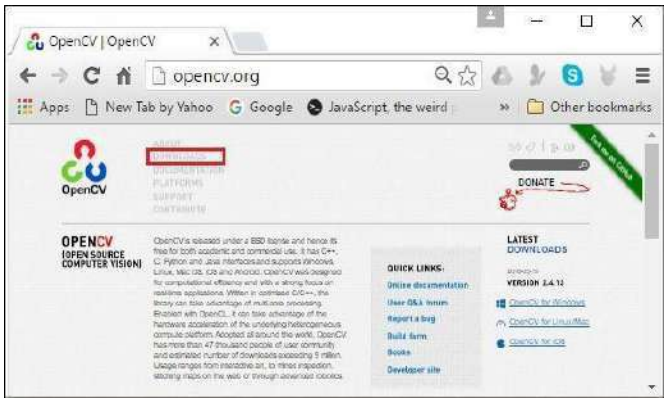


Fig.2.1. Open CV Environment

2) Haar Cascade Classifier

Haar Cascade classifiers is an efficient way for object detection. This method was proposed by Paul Viola and Michael Jones in their paper Rapid Object Detection using a Boosted Cascade of Straight forward features. Haar Cascade is a machine learning-based approach where a tons of positive and negative images are used to train the classifier. Confirm you've python, Matplotlib and OpenCV installed on your pc.

a. Positive images – These images contain the pictures which we would like our classifier to spot.
b. Negative Images – Images of everything else, which don't contain the thing we wish to detect.

3) Dlib

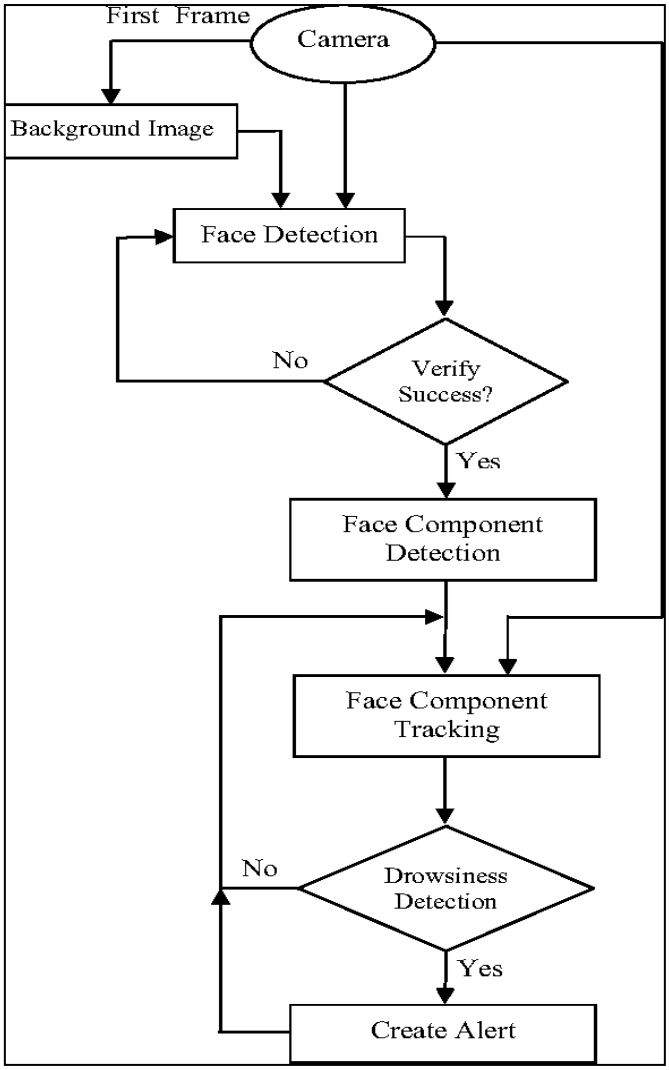
Dlib (Digital Library) is an open source C++ toolkit library implementing a spread of machine learning algorithms including Classification, Regression, Clustering, Data Transformation and Structured prediction. Dlib is an open source suite of applications and libraries written in C++ under a permissive Boost license. It is often used for tutorial or even industry purpose work. Dlib offers an honest range of functionality across a number of machine learning sectors, including classification and regression, numerical algorithms like as quadratic program solvers, an array of image processing tools, and diverse networking functionality, among many other facets.

4) eSpeak

eSpeak is an open source speech synthesizer that supports quite hundred languages and accents. eSpeak uses a "formant synthesis" method. This permits many languages to be provided during a allite size. The speech is obvious, and should be used at high speeds, but isn't as natural or smooth as larger synthesizers which are supported human speech recordings. It also supports Klatt formant synthesis, and therefore the ability to use MBROLA as backend speech synthesizer.

III. WORKING

A. Flowchart of the System



B. Working Methodology

The method proposed in this project is a prototype to first detect the face of the driver for security purposes and then detect drowsiness with emotion analysis technique.Firstly, to drive a car driver has to go through detection of his face, if driver gets drowsy while driving there is drowsiness detector which will analyses drivers EAR (Eye aspect ratio) and MAR (Mouth aspect ratio) for yawning. Face recognition and drowsiness is achieved using Open CV and Deep learning used for it is as follows:

1) Finds face in an image.
2) Detects the eye area and mouth area
3) Calculates EAR & MAR for 30 frames & 20 frames respectively
4) Displays results & gives alarm

a. EAR (Eye Aspect Ratio)

$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}$$

Fig. 3.2. Eye Aspect Ratio Formula

The Eye Aspect ratio can be calculated using the formula shown in Fig.3.

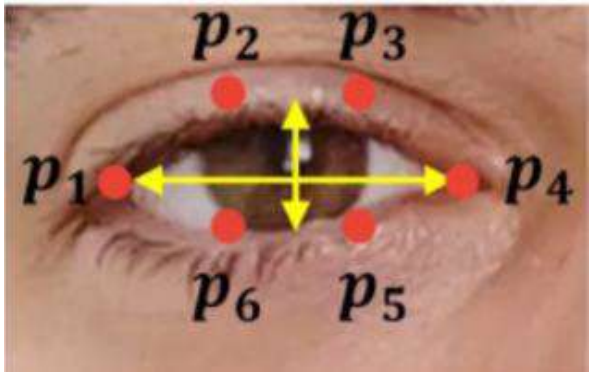


Fig.3.3. Open Eye Aspect Ratio

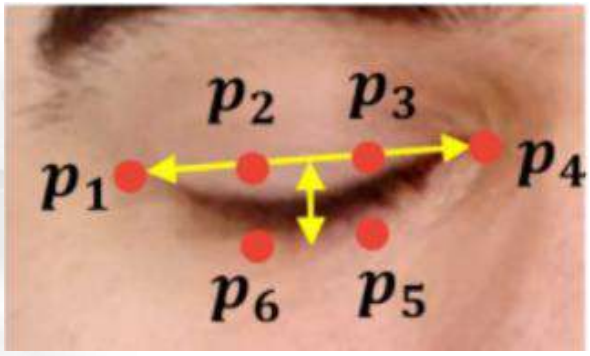


Fig.3.4. Closed Eye Aspect Ratio

The detector detects face from our frame, as it finds the face it will pass to predictor.

After finding the face the predictor gives different landmarks location of eye, lips, eyebrows etc…shapes as shown in Fig no.3.3 for open eye and Fig no.3.4 for closed eye. The shape is an array or list which consists co-ordinates of all those points which helps in getting location of shape. Then it converts shape into numpy array by using numpy library so that we can access easily and then gets passed to EAR AND MAR function through which we get EAR and MAR for both eyes as well as mouth. If the EYE is open the value increases and if the EYE is closed the value decreases i.e. if the value is less than threshold, then the eye is closed.

```
if EAR <= SOME_THRESHOLD:
      EYE_STATUS = 'CLOSE'
```

Fig.3.5. Eye Threshold

b. MAR (Mouth Aspect Ratio)

$$\text{MAR} = \frac{\|p_2 - p_8\| + \|p_3 - p_7\| + \|p_4 - p_6\|}{2\,\|p_1 - p_5\|}$$

Fig.3.6. Mouth Aspect Ratio

The Mouth Aspect Ratio can be calculated by using Formula as shown in Fig.7.

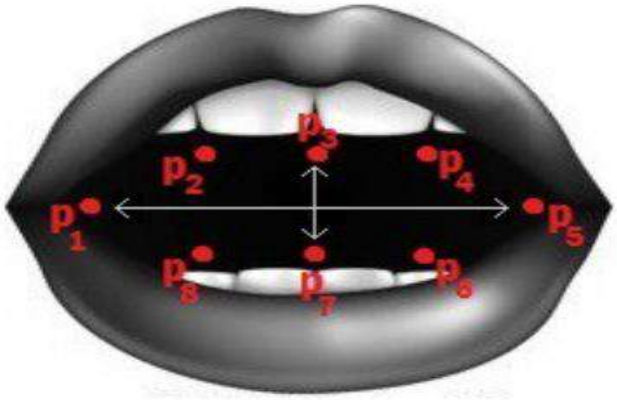


Fig.3.7. Open Mouth Aspect Ratio

As for the MAR the distance between upper lip and lower lip depends on the distance between webcam or the camera and user. As the distance between user and camera increases the distance between lips decreases. Therefore, depending on camera and user we have to decide the threshold value. If the value is greater than threshold, then the person is yawning.

IV. RESULT

A. Testing of Project: -

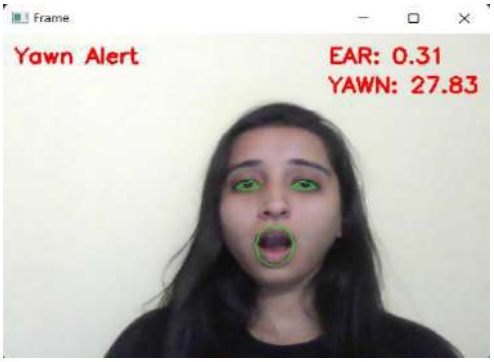


Fig.4.1. Frontal Face Yawn Detection

As the given threshold is 20 for yawn detection, if the distance between upper lip and lower lip is more than 30 frames then it

prints “YAWN ALERT” and then the alarm plays “TAKE SOME FRESH AIR SIR/MADAM”.

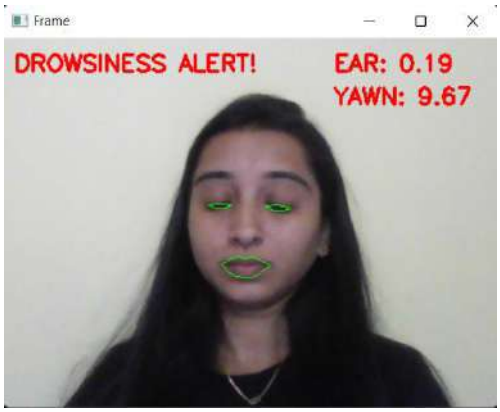


Fig.4.2. Frontal Face Drowsiness Detection

As the given threshold for eye is 0.3 for drowsiness detection, if the eyes are closed for more than 20 frames then it prints “DROWSINESS ALERT” and alarm plays “WAKE UP SIR/MADAM”.

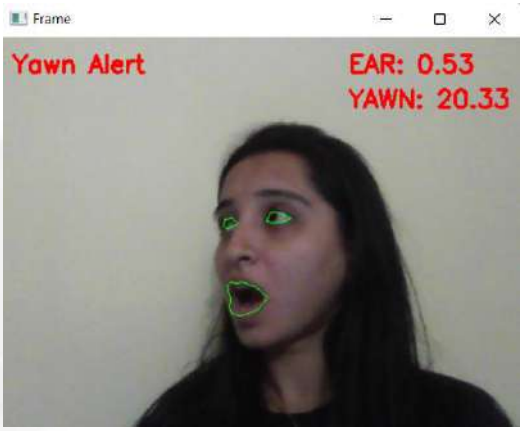


Fig.4.3. Side Angle Face Yawn Detection

Even if the face is turned towards left/right direction, it works similar as shown in Fig no 4.1 As the given threshold is 20 for yawn detection, if the distance between upper lip and lower lip is more than 30 frames then it prints “YAWN ALERT” and then the alarm plays “TAKE SOME FRESH AIR SIR/MADAM”.

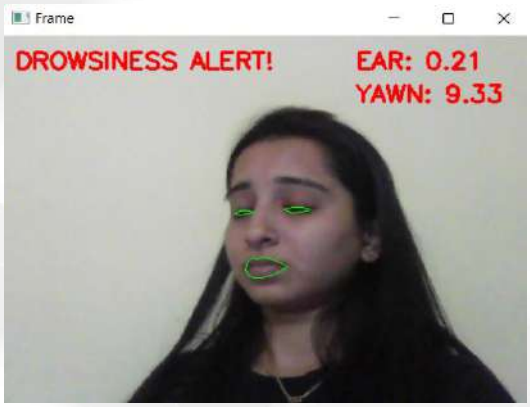


Fig.4.4. Side Angle Face Drowsiness Detection

Even if the face is turned towards left/right direction, it works similar as shown in Fig no 4.2. As the given threshold for eye is 0.3 for drowsiness detection, if the eyes are closed for more than 20 frames then it prints “DROWSINESS ALERT” and alarm plays “WAKE UP SIR/MADAM”.

V. APPLICATIONS

i. Safety Driving

This project is often utilized in every day-to-day vehicle currently on road to make sure the security of individuals and reduce the very chances of an accident thanks to due to drowsiness or distraction of driver. One can use a face recognition for automobiles employing a face to exchange a key as a way of starting car. Being an honest and safe driver means being alert, always driving to the conditions and rules of the road environment and being ready to take action at any time in every possible situation. Whether you’re an experienced person, older or new driver, a passenger, bike rider or pedestrian.

ii. AID Forensic Investigations

Facial recognition is available hand for investigations by automatically recognizing an individual’s information in security photos, or footage or the other videos. Face recognition software also can identify dead or unconscious individual’s persons faces at crime scenes. It agencies automatically organize all data, uncover important key evidence, and find hidden connections which makes easy to seek or recognize one.

iii. Support service feedback systems

A customer feedback system — which these days usually takes the shape of a software package or application — helps businesses manage what customers are saying on multiple feedback platforms and channels, as well as gain all the data-driven insights which are essential to enhance overall customer experience.

i*v. Track Student Attendance*

In addition to make schools, Colleges safer, face recognition has the potential to trace student’s attendance. Face recognition can work not only for student’s attendance purpose but also for tracking the log in and sign off timings for teachers at Schools and colleges. Face recognition surveillance systems can instantly identify when expelled students, dangerous parents, drug dealers or other individuals that pose a threat to high school safety enter school grounds. By alerting security guards of school, high school in real time, face recognition can reduce the danger of violent acts. This technique can also come in handy for companies at what time their employees or workers show up for work.

v. Means of Access Control

Face recognition can work as a way of access control to make sure that only authorized individuals get into facilities like labs, boardrooms, bank vaults, training centers for athletes and other sensitive locations. This is often one of among simplest system for Banking purpose as number of customers show up for

transactions, withdrawal or to deposit cash etc. It makes easier to acknowledge authorized person through face detection which saves tons of your time and makes an individual liberal to their work as early possible without letting them to face during a queue.

VI. CONCLUSION

The main motto of the project is to scale back the amount of road accidents. The proposed model will be able to recognize faces correctly. The advantage of this model is that it is able to recognize blurred images and side face images also which other traditional models are incapable of recognizing in such case. In future, this can be extended to acknowledge persons using video capture which can be helpful in getting identities from CCTV cameras which will police to spot the person in no time. In our application if the theft detected the spot and theft can directly be addressed to owner via message.

ACKNOWLEDGEMENT

No Project is ever complete without the guideline of those expert who have already traded this past before and hence become master of it. We would like to take this opportunity to thank all those individuals who have helped in visualizing this project. The success and final outcome of this project required a ton of guidance and assistance from many people and that we are extremely privileged to possess got this right along the completion of our project. All that we've done is only due to such supervision and assistance and that I wouldn't forget to thank them. We are thankful and fortunate enough to get constant encouragement, support and guidance from all Teaching staffs of Electronics and Telecommunication Engineering which helped us in successfully completing our project work. We would like to thank Prof. Suchitra Patil who was our project guide for giving us valuable guidance and timely suggestions throughout the report and supporting us to meet our needs and it shall carry us a long way in the journey of life on which we are about to embark. We would like to express our sincere thanks to our H.O.D. Dr. Avinash Vaidya for giving us his constant support and encouragement. We respect and are grateful to our principal of the institution Dr. Sandeep Joshi for providing us with an environment to complete our project successfully. Last but not least we would like to thank all the members of Electronics & Telecommunication Department who helped us directly or indirectly in our project.

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GSM Based Non-Invasive Blood Glucose monitoring system

Shubham Walunj, Ninad Nilegaonkar, Gaurav Pandey, Suraj Singh

***Abstract*: People suffering from diabetes need to check their blood glucose level on daily basis throughout the day which traditionally needs blood sample each time of their check up. Our aim is to help the patient to check his/her glucose level non-invasively and get the information on the mobile**.

***Keywords*- Non-invasive, mobile, traditional method.**

I. INTRODUCTION

Diabetes is a metabolic disorder.The normal human glucose level ranges between 90-140 mg/dL. Insulin is a type of hormone that's produced within the body to balance glucose levels. In diabetic patients, body doesn't have enough insulin or the prevailing insulin is unable to properly perform its duty. This resistance causes the blood glucose levels to rise.The diabetic population round the world is on the increase due to poor diet, obesity, and lack of physical activity. According to Google,382 million people had diabetes in 2014. The count continues to be increasing with this rate, the number of people with diabetes will reach to 590 million by 2035. People Suffering from need to keep a balance between the three important aspects of diet, exercise, and medicine in their daily lives. Therefore, continuous monitoring of blood sugar level is crucial for the treatment of diabetes.Control of glucose, lipids, and vital sign with lifestyle change can improve the patient's health with diabetes.Uncontrolled Diabetes (high blood glucose level increases the danger of long-term complications like coronary heart disease, stroke, microvascular disorder, resulting in blindness, amputations, with loss of functional status and emotional disorders. On the opposite hand, hypoglycemia (low glucose level) could cause convulsions, coma, arrhythmia, and cardiac failure.Therefore, controlling the blood sugar is incredibly important.

There are various methods to determine blood glucose. Glucose sensors are of two types (1) point sample glucose sensors and (2) continuous glucose sensors. Point sample glucose sensors are administered out by finger prick glucometer or urine dipstick. However, continuous glucose monitoring is split into three categories of invasive, minimally invasive, and noninvasive. Microdialysis and intravenous implantable are two forms of invasive sensors. Minimally invasive glucose sensors includes micropore and microneedle. Noninvasive methods offer painless and safe alternative for measuring glucose. Noninvasive glucose sensors are divided into two varieties of transdermal and optical sensors. Optical sensors include various types like near-infrared (NIR) spectroscopy, mid-infrared spectroscopy, fluorescence, Raman spectroscopy, and thermal infrared.In this study, the NIR spectroscopy method is employed which will be introduced within the following.

NIR spectroscopy measures the change in intensity of light beam when a light ray with 750–2500 nm wavelength is transmitted and reflected on the 1–100-mm skin tissue. With the recent advances within the field of microelectronics, NIR spectroscopy has become a preferred method for monitoring many physiological parameters since this method provides a uncomplicated affordable, safe, and accurate measurement.Three bands exist within the NIR range: (i) the mix overtone band (2000–2500 nm), (ii) the first overtone band (1400–2000 nm), and (ii) the second or higher overtone band (750–1400 nm).

II. LITERATURE REVIEW

The objective of this review was to measure blood glucose using NIR spectroscopy was been presented in 1997 used NIR diffuse reflectance Spectra method within the range of 800–1350 nm to measure glucose from finger. The cross-validation root Mean square error of prediction (RMSEP) obtained is from 1.02 mmol/L (18.4 mg/dL) to 1.88 mmol/L (33.8 mg/dL).Later in 1998 they used NIR diffuse reflectance with partial least square (PLS) Regression and analysis of radial basis function (RBF) neural network. They used 800–1350 nm NIR Light and measured glucose from the center finger. The RMSEP obtained is 2.0 mmol/L (36 mg/dL).Later in

2004 they used NIR diffuse reflectance method which consisted of a light source, A fiber optical measuring head, and an NIR spectrometer. The NIR light with a wavelength of 900–1700 nm was used, and therefore the measurement is disbursed from the finger. during this study, the coefficient of correlation values obtained are under 0.744 and RMSEP values obtained are over 0.89 Mmol/L (16 mg/dL).Later in 2005 they reported an optical measurement condition reproduction Technique to cater to the difference in measuring locations and phone contacts. Their proposed System consists of light-emitting diodes (LEDs)or lighting, fiber probe, spectrometer, CCD camera, Three-dimensional servo device, and a brocket. They used NIR diffuse reflectance spectra within the range Of 1100–1800 nm to live glucose from palm. The obtained RMSEP ranges from 0.8 to 1.1 mmol/L (15–20 mg/dL), and also the correlation is larger than 0.8.Guevara and González in 2010 Jointed NIR (700–1000 nm) and impedance spectroscopy (1–200 MHz). They measured glucose from the forearm and tested technique on 10 nondiabetic individuals under controlled temperature and Humidity conditions. The RMSEP obtained was 1.2488 mmol/L (21.96 mg/dL).Later in 2013, they proposed an optical noninvasive method to obtain the blood sugar by a 940-nm light which was emitted on finger. The signaling can be digitized, amplified, and Processed in an exceedingly microchip with a special algorithm designed to detect blood glucose levels. However, The proposed method has not been evaluated. This paper concludes that noninvasive blood sugar Measurements within the near future are often an honest alternative to plug glucometers.Later in 2014, they investigated the event of noninvasive methods for measuring glucose and Hemoglobin using occlusion-NIR spectroscopy. The circuit consists of two NIR sensors using an 870-Nm beam for detecting hemoglobin and a 1000-nm beam for detecting glucose. During this study, the device Is tested on peoples with different glucose and hemoglobin levels. The minimum photodiode voltage Was same for all participants, but maximum photodiode voltage changed within the range of 3–3.8 V.Yadav in 2014 also tried to make a system for continuous and noninvasive glucose Measurements.

III. PRINCIPLE OF BLOOD GLUCOSE MEASUREMENT

The light is scattered as well as absorbed by the body tissues when the rays are passed through it. Due to the difference in the refractive index of the extracellular bodily fluids and the membrane of the cell the light rays get scattered when passed through a body tissue.The intensity of the light scattered ,changes with the glucose concentration in the blood. Beer-Lambert Law tells about absorbance measurement which states that absorbance of light through any solution is proportional with the concentration of the solution and the length of the path traveled by the light ray . Light transport theory describes light attenuation as

$$I=Io.e^{-\mu eff L} \quad (1)$$

where, I = reflected light intensity,

Io= incident light intensity

L= optical path length inside the tissue.

Attenuation of light inside the tissue depends on the coefficient known as effective attenuation coefficient (μeff), which is given by

$$\mu eff = [3\mu s (\mu s + \mu s')]^{1/2} \quad (2)$$

The absorption coefficient (μa) is defined as the probability of absorption of photons inside the tissue per unit path length, which is given by

$$\mu a = 2.303 \in C \quad (3)$$

∈= molar extinction coefficient, C=tissue chromophore concentration and the reduced scattering coefficient (μs') is given by equation 4.

$$\mu s' = \mu s (1-g) \quad (4)$$

where g=anisotropy and μs=scattering coefficient.

Hence from the equations (1) to (4) it can be concluded that μa depends on the glucose concentration in blood.Therefore as the concentration of glucose increases ,the scattering ability of the blood reduces.

IV. BLOCK DIAGRAM OF PROPOSED WORK

For this project an optical method is used called NIR spectroscopy.The NIR spectroscopy is based on the absorption of the EM wave radiation,the wave are of wavelength ranging between 780 to 2500 nm .The light ray of wavelength of 940 nm are found to be most

suitable for measuring blood glucose level.In this technique the light interacts with the blood sample or (part of the body where the detector is placed) and the detector measures the transmittance and absorbance of the light.The sensing unit consists of NIR emitter and NIR receiver (photodetector).In NIR method are of two types viz 'Intruder' and 'Reflector', and we in this project are using the later technique.In reflector technique both emitter and receiver are placed side by side and the site of detection(normally finger) is placed above them.The emitted light rays collide on the finger and the reflected rays are received by the receiver ,hence the name "Reflectro".The amount of light reflected depends on the glucose concentration in the blood and so does the absorbed light.

Our analog output is in the form of light intensity.This is measured by the photodetector. The output current of the photodetector is converted into voltage signal and then filtered and amplified. This amplified signal is fed into the PIC16F877a microcontroller.

The inbuilt ADC block is employed for converting the received analog signal to digital form. The glucose value is displayed on the LCD display. A GSM module is employed within the system that permits the detected glucose level information to be shared to the user via SMS on his/her mobile .

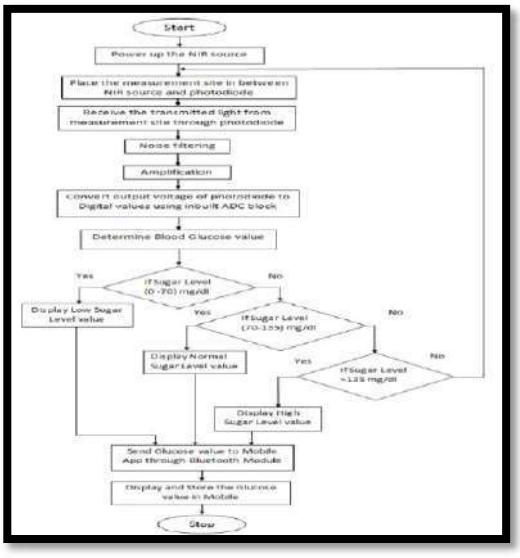

fig 1.

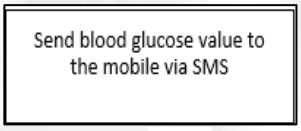

fig1.1

V. SYSTEM DESIGN

The circuit diagram of the designed system consists of a filtering stage and amplification stage. The electrical current obtained from the photodetector is converted into the voltage by placing the load resistance R4= 50kΩ at the anode side of the photodiode. The cut-off frequency of high pass filter and low pass filter are designed as 2.34 Hz and 1.59 kHz respectively.

Cut off frequency of LPF = 1/ (2πR1C1) = 1/ [2π (1*103) (100*10-9)] = 1.59 kHz

Cut off frequency of HPF = 1/ (2πR2C2) = 1/ [2π (68*103) (1*10-6)] = 2.34Hz

Voltage gain = 1 + (Rf / Rin) = 1 + [(680*103)/ (68*103)] = 101

The amplified output voltage is connected to analog pin A0 of PIC 16F877a microcontroller for converting the analog signal into digital values. This digital value corresponds to the glucose level. From this digital value, the particular glucose level is set using a polynomial equation. This equation is created from the glucose levels obtained from the laboratory using invasive measurement. A SMS message is sent to the user via the GSM module. Once the GSM Module is switched ON and also the user places his finger on the detector, the results are displayed on the lcd and his/her blood sugar level info are going to be sent to the user's mobile via SMS.

VI. CONCLUSION

Invasive methods of glucose measurement are painful, costly and there is a lot of blood loss. It also has a risk of infection and cannot be used for continuous monitoring. So to overcome these disadvantages, a noninvasive method for blood glucose measuring near-infrared LED is proposed in this paper. The glucose level in the blood which is obtained from the photodetector is displayed in the LCD display and even sent to the mobile of the user via SMS. The proposed method is validated using error grid analysis. This portable noninvasive blood glucose monitor provides a very effective means for helping the health care management of diabetic patients. This can be used for monitoring blood glucose level of the patients in the home as well as in hospitals,health care centers,etc.

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FGPA Based Robotic Arm Controller

Ameya Sawant, Jui Yezarkar, Shivani More, Arsh Shaikh, Prof. Seema Mishra

***Abstract*- In two axis robotic arm the hardware and software co-design perform pickup and place operation by controlling speed and position using jaw motor, arm motor, FPGA motor control. FPGA technology has minimalized distinction between hardware and software by the hardware functional block designed in software module with Verilog coding.it is difficult to obtain command over control through software without disturbing the hardware.**

***Keywords*- FPGA, Robotic Arm, Position Control, Hardware and Software Co-Design.**

I. INTRODUCTION

The robotic arm controller is highly used in industrial fields for highly demanding and challenging activities and in military. With the help of FPGA, the difference between hardware and software has been minimalized. The flexibility to configure the gate level interconnectionof hardware circuit after manufacturing opens new application of digital circuit. This designed project is the basic educational based concept of robotic arm.

The current paper involves the main part like Robotic arm model with DC motor. FPGA is a software part which provide free environment to user interface. One motor isconnected to the one end of the FPGA and another is connected to another end of the FPGA.

The FPGA provides free environment to user interface with design.to build an efficient motor controller FPGA provides a platform to which you can add the necessary inputs to suit the requirement. FPGA can add new features to the design of a robort like hardware use lower cost, fault requiring, hardware reuse, software hardware co-designed.

II. FPGA CONTROLLER (FIELD PROGRAMMABLE GATE ARRAY)

2.1 Overview

A field programmable gate array consists of logic blocks which are programmable, reconfigurable interconnects and a input output pad. Field-programmable gate arrays are in many ways similar to programmable read-only memory chips. However, unlike programmable read-only memory chips, which are limited to hundreds of gates, a field-programmable gate array can support several thousand gates. Another salient features of field-programmablegate arrays is the ability to be reprogrammed, unlike application-specific integrated circuit which are manufactured for specific tasks.

Field-programmable gate arrays are used in a wide range of applications, and in markets such as aerospace, defense, data centers, medical and wireless communications.

Fig.1: FPGA

2.2 Spartan 6-Xilinx Spartan-6

FPGA offers advance power management technology. This Xilinx,Spartan-6 FPGA family delivers an optimal balance of low risk, low cost, low power, and performance for cost-sensitive application.

2.3 Four Way Relay Module

It can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load.

It is designed to interface with microcontroller such as Arduino, pic and etc. The relays terminal(COM, NO, and NC) is being brought out with screw

terminal.

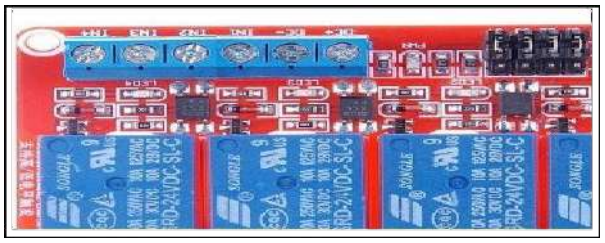

Fig.2: Optocoupler Relay Module

2.4 Motor

DC motor is an electrical machine that converts electrical energy into mechanical energy.in a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.

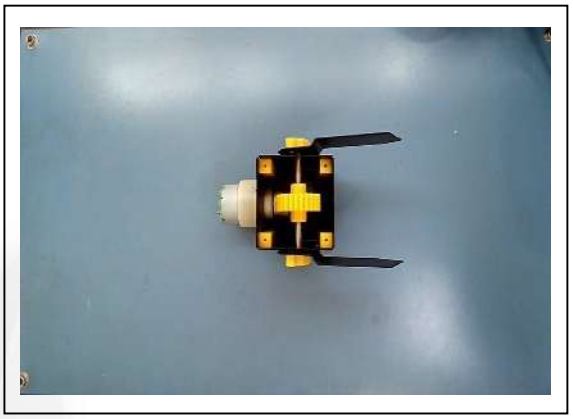

Fig.3: DC Motor

Fig.4: Robotic Arm

2.5 Robotic Arm

Robotic arms of all kinds are used today at every scale for manufacturing, from minutely detailed circuit board assembly to large-volume heavy industries such as automotive production lines, as well as in huge range of pick and place application. Unimate introduced its first robotic arm in 1962.
The arm was invented by George Devol and marketed by Joseph Engelberger. The first industrial arm was installed at the general motor plant in Ternstedt, new jersey, for automated diecasting.

III. WORKING

There are two boards, one is Relay and the other is FPGA. FPGA can take up to 5v but the controller inside it can take up to 3.3v so we use a regulator and with help of our laptop we control the values and 12 voltage is passed to Relay. The optocoupler will get 3.3v from the FPGA then up to coupler will make Relay work. When we connect the controller to the PC the pins status is by-default high. SPI based memory is used to store (Serial peripheral interface) the program logic. There is pick controller which is going to actas a bridge between the external which is Laptop and FPGA. When we power on the FPGA the pick controller will store the code logic in SPI (Serial peripheral interface) and then the code gets uploaded in FPGA. The pick controller needs crystal to work. Since FPGA does not have circuit we need external clock source (crystal oscillator) and crystal is component of oscillator. Couple of keys are connected to the board tocontrol the movements of the arm and the jaw. The movements of the Arm and Jaw are limited due to locking of the gearbox. FPGA doesn't have any memory there is no RAM or ROM in it because it's a logical GATE array which is connected in runtime and have built a circuit for you.

IV. CIRCUIT DIAGRAM

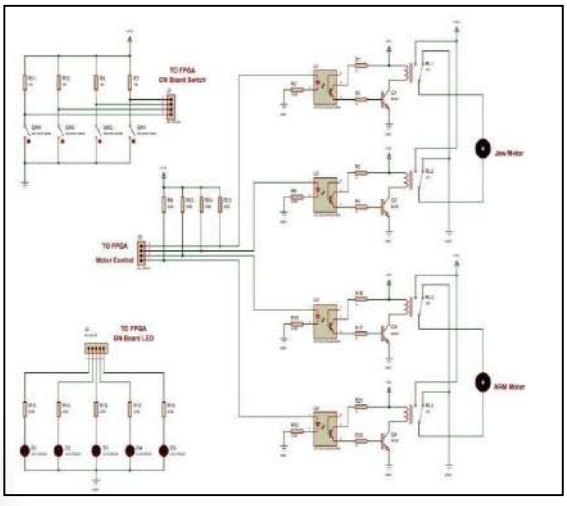

Fig.5: Circuit Diagram

IV. SOFTWARE (XILINX)

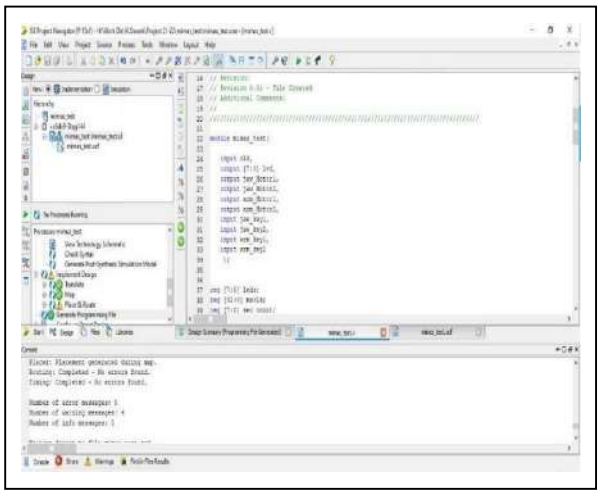

Fig.6: Code Output

Xilinx serves the aerospace and defense industry with commercial, industrial, military, and space grade products.

Emulation & Prototyping with FPGAS enables fast and accurate Soc system modeling and verificationof embedded software. Verilog is a Hardware Description Language (HDL).itis a language used for describing a digital system like a network switch or a microprocessor ora memory or a flip-flop.

It means, by using a HDL we can describe any digital hardware at any level. At input we use 4 keys and at output we use 4 pins to control Two motors. Each motor needs two pins to control the motor in both directions.

IV. LITERATURE SURVEY

5.1 Dimitris Ziouzios, Pavlos Kilintzis

This paper provides an overview of the publications regarding different robotic FPGA application fields as well as the most commonly-used robot types usedfor those applications for the 10-year period of 2010- 2019.

5.2 Ritu Tiwari

This paper concludes with research gaps and proposed work. Robotic arm uses in the different fields like a household, workplace, and working station. In this paper a robotic arm controller is designed and implement using the spartan-3 kit FPGA architecture. Calculate of the angles if the motors is carried out using MATLAB software with a GUI interface. The angles are sent to the FPGA using serial implement using the spartan-3 kitFPGA architecture.

5.3 Johannel Romoth, Mario porrmann, Ulrich Riickert

This paper provide an overview of the different topics FPGA have been used for in the last 15 yearsof research and why they have been chosen over other processing units like eg : cpu's

V. CONCLUSION

In the current report our design FPGA based robotic armcontroller the various details have been specified. The aim of our project was to create a robotic arm to pick and drop objects using two motors. Theapplication of robotic arm can be highly used for industrial purposes which require high labor. Safety control and training are key areas required to enable the successful use of robotic systems. Hence robotic arm has wideband range of use inour daily life.

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Design, Simulation, and Fabrication of RF Components in Microstrip/CPW configurations for various applications.

Irfan Shaikh, Ashutosh Singh, Shrishti Shetty, Preeti Thite

***Abstract*— The most introductory properties of an antenna are its radiation pattern, gain, impedance, and polarization. These properties are identical for direct unresistant antennas used either as a transmitter or receiver by virtue of the reciprocity theorem. The radiation pattern is defined as the spatial distribution of a volume that characterizes the electromagnetic field generated by an antenna. The field intensity of the propagating wave decrements by 1/ R with distance R from the source. To understand how an antenna radiates, consider a pulse of electric charge moving along a straight conductor. A static electric charge or a charge moving with a steady velocity doesn't radiate. However, when charges are accelerated along a conductor and are decelerated upon reflection from its end, radiated fields are produced along the line and at each end.**

Keywords*— *frequency, slots, antenna, bandwidth

I. INTRODUCTION

THIS chapter has been included in this report to give an overview of all the effects that this design aims to achieve and how exactly it would fulfil its pretensions. The figure of the proposed CPW-Fed antenna and the best result has been attained using this CPW- fed antenna. The proposed antenna has a single subcaste metallic structure on one side of the FR4 substrate subcaste whereas the other side is without any metallization. On each side of the CPW feed- line, two equal finite ground aeroplanes are placed symmetrically. The basis of the proposed antenna structure is a indirect patch, which has dimensions of length and range, and is connected at the end of the CPW feed- line. Communication systems are getting compact in size and hence compact antennas with improved performance are needed for these communication systems. Microstrip antennas may give very useful structures for these handsets, if their bandwidth performance improves. Conventional microstrip antennas have narrow bandwidth, low gain and operate at a single resonance frequency corresponding to their dominant mode.

II. LITERATURE SURVEY

A. CPW Antenna

1) AissatH., etal.'s A circularly polarized CPW fed antenna" accepted and published by IEEE IN 1997.

According to this paper, an antenna which utilizes the combined excitation of the patch by an inclined slot and the CPW feed line termination. The asymmetrical characteristics of the excitation involve the excitation of both the odd and the even modes in the CPW line.

2) Jen C. I. et al.'s

Another CPW fed array is presented in which the array elements are placed in the direction transverse to the feeding CPW line and are excited by a couple of 100 ohm slot lines, which are combined to form the 50 ohm feeding CPW. The circularly polarized radiation is attained by placing analogous anxiety parts to each of the array elements.

B. Microstrip Antenna

1) Nita K., et al's Review of Microstrip Patch Antenna Using UWB for Wireless Communication Devices accepted and published in the year 2015.

As per Microstrip Patch antenna (MPA) give low profile and low volume, so it's used in currently communication devices. In this paper study of past many time shows that utmost of the labour on MPA is targeted on planning compact sized microstrip antennas.

C. Low Pass Filter

1) Muhammad Z. Abbasi, Muhammad B. Rafaqat, Awais Aurengzeb, Bilal Ijaz, and Khurram S. Alimgeer's Low-Pass Filter Implementation Using CPW-Fed UWB Antenna.

According to this paper, a low pass sludge perpetration using CPW fed ultra-wideband antenna. Imperfect ground aeroplane approach is used to attain the low-pass filtering characteristics. Simulation of the proposed design showed good results in the UWB range depicting the utility of the antenna for wireless dispatches operations similar as GPS, GSM, and WLAN.

D. Dipole Antenna

1) Suci Rahmatia, Enggar Fransiska, Nurul Ihsan Hariz Pratama, Putri Wulandari, Octarina Nur Samijayani's Designing dipole antenna for TV application and rectangular microstrip antenna working at 3 GHz for radar application.

According to this paper, experimenters have successfully designed and probe the performance of a dipole antenna using aluminium and iron. After doing performance disquisition from the result of simulation it can be conclude that Iron is better to be used for large bandwidth with value of directivity and gain is bigger than aluminium except for upper frequency. On the other hand, aluminium is better to be used for advanced frequency with the small bandwidth since the directivity and the gain of aluminium in upper frequency is bigger than iron. Both aluminium and iron have no significant difference for HPBW but in the centre frequency.

III. PROPOSED SYSTEM

1) Dipole Antenna

Design: This is the proposed Dipole Antenna designed in CST software. The frequency range used for this design is over to 2 GHz. It's reverberated at a frequency of 900 MHz. The total length of the dipole is 150 mm, the gap is 5 mm, the compass is 1 mm. Pick Face Centre. Both ends of the rod are connected using a separate harbourage at the centre.

Expected Output: The figures below represent the expected output. The above graph of S parameters show frequency

resonating at -16dB. It is resonating at a minimum frequency of 870 MHz which is close to 900 MHz. So, the output received is quite good.

2) High Pass Filter in CPW Antenna

Design: This is the proposed Low pass filter in CPW antenna designed in CST software. The frequency range used is from over to 3 GHz. The total length of the antenna is 80 mm and the range of the antenna is 45 mm. The range of the transmission line is 4.25 mm and the gap is 0.5 mm. Pick Face. To add a waveguide port the transmission line is set as a positive port and both the ground planes are set as a negative port.

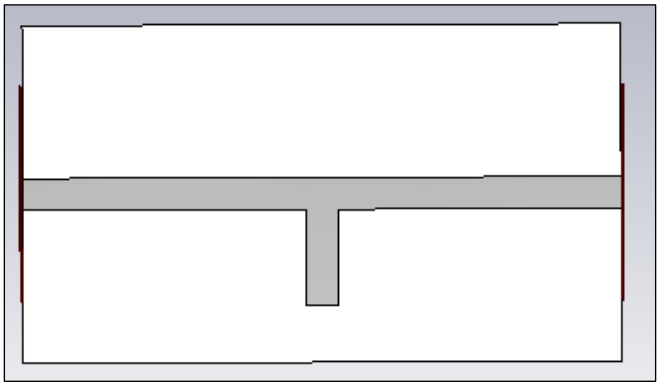

Fig 1. High Pass Filter

Expected Output All the inputs are for-10 dB. The output obtained is relatively good.

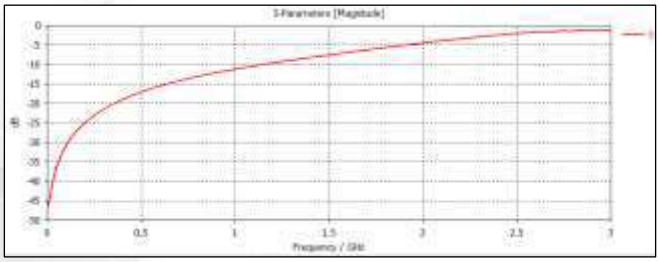

Fig 2. S 1,1 High Pass Filter

A high-pass filter is a filter that passes signals with a frequency higher than a selected cut off frequency and attenuates signals with frequencies higher than the cut-off frequency. The exact frequency response of the filter depends on the filter design. The filter is occasionally called a high-cut filter, or treble- cut filter in audio applications. A low-pass filter is the complement of a high-pass filter. However, also the low pass filter can be converted to a High Pass Filter, If the end in the Low Pass filter is made short with the ground with any copper wire.

3) Quarter Wave Transmission in CPW Antenna

Design: This is the proposed Quarter Wave Transmission in CPW antenna designed in CST software. The transmission line is 50 ohm and the range of the transmission line is 5 mm. Here the quarter- wave transmission line of70.7 ohms is used to connect the transmission line of 50 ohms to 100 ohms. This antenna is designed for a frequency ranging from0.5 GHz to 3 GHz. All the calculations are done with respect to2.45 GHz. The resonance was expected at2.45 GHz but the output we received was at1.4 GHz and2.71 GHz which is also relatively alright. Antenna gain is the capability of the antenna to radiate more or less in any direction compared to a theoretical antenna. However, it would radiate equally in all directions, If an antenna could be made as a perfect sphere. Such an antenna is theoretically called an isotropic antenna and doesn't in fact exist. Still, its fine model is used as a standard of comparison for the gain of a real antenna. Directional antennas can be configured with gains. Directional antennas can be configured with gains up to further than 20 dB.

4) Monopole CPW with circular patch Antenna

Design: The proposed antenna started with the design of a conventional circular patch antenna with patch radius10.5 mm is designed on Glass epoxy FR-4 substrate having relative permittivity Er = 4.4, substrate height h = 1.59 mm. These dimensions were named to design an antenna to reverberate in the frequency band allocated for the lower band for UWB applications. This selection of antenna is based on the computation work carried out through our own developed code grounded on cavity model based modal expansion technique. Instead of the inset feed considered in that code, we applied a 50ohm CPW line having length 32 mm and width 4 mm for feeding purposes. In this a CPW fed circular antenna with a finite ground plane shown in Figure is simulated using CST software.

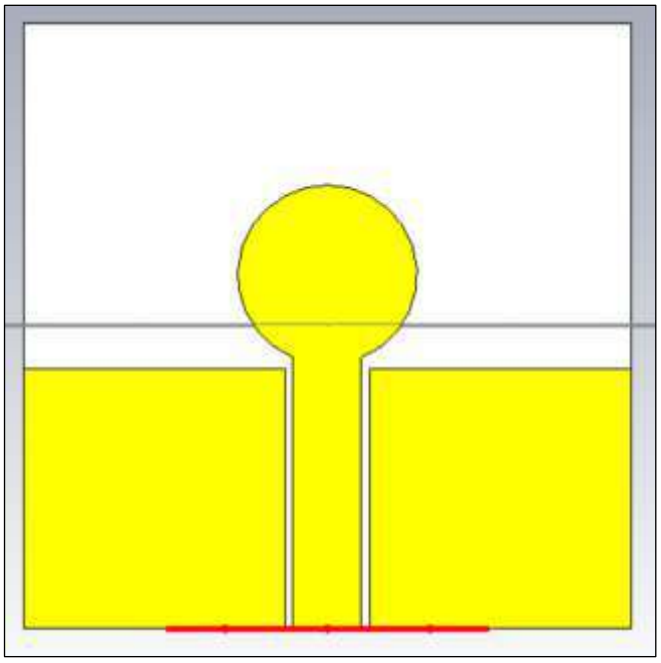

Fig 3. Circular Patch Monopole Antenna

With preface of this notch, the current in the ground plane is further modified and that change in tum modifies the performance of the antenna. The resonance frequency of the antenna reduces close to2.45 GHz with further enhancement in bandwidth. For further enhancement in its performance, an fresh resonator having is introduced in the ground plane of this antenna structure. With this preface, an fresh resonance frequency close to2.45 GHz is realized. The return loss angles corresponding to these two frequencies are very close to each other hence their superposition resulted into a broadband. The maximum gain achieved is 2.8 dB. The simulation results shown indicate that the antenna resonates effectively at frequency2.45 GHz. The bandwidth presented at this frequency is very wide, while gain of the antenna is close to 2.8 dB.

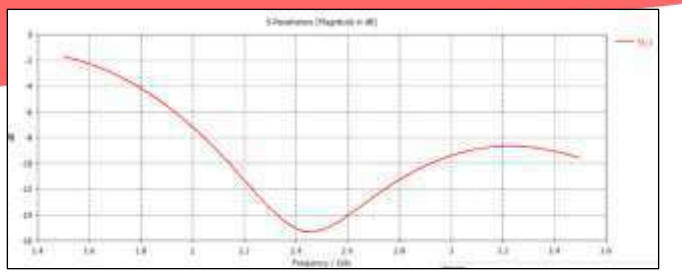

Fig 4. S 1,1 Graph of circular patch antenna

5) Monopole CPW with circular patch and U shape slot Antenna

Design: Each U-shaped slot can act as one half-wavelength resonator. The desired notch frequency can be achieved by accommodating the range of the U-shaped slot. The proposed UWB antenna consists of four U-shaped slots nested together to achieve four indented bands. It can be observed that gL has a deterministic influence on the high frequency impedance matching. With the increase of gL, a better impedance matching can be attained over the high frequency band. Though there are some differences in terms of the value of VSWR being due to the fabrication accuracy on the range of the U-shaped slots, fairly good agreement is attained in terms of frequency.

$$f_r = \frac{c}{2(L_N + W_N)}\sqrt{\frac{2}{\varepsilon_r + 1}} \qquad (1)$$

where L_N and W_N is the length and width of U-shaped slow. Therefor, the desired notch frequency can be achieved by adjusting the dimensions of U-shaped slot.

Meanwhile, the quad band- indented UWB antenna can be reconfigurable by shorting the corner point of the single U-shaped slot and the corresponding notched band is removed with the remain band notched frequency nearly invariable.

IV. CONCLUSION

In this report, the varied details of our design "Design, Simulation, and Fabrication of RF Components in Microstrip/ CPW configurations for various applications", have been described. The aim of this design is to configure and fabricate various types of RF components. All the aspects of our antennas have been pertained to and been systematically included in the literature review. Various types of antennae similar as Dipole, CPW, Microstrip, Low pass filter, Quarter-wave CPW transmission line are designed and simulated and their corresponding outputs have been attached. Eventually, this report conveys the wideband operations of this design in our day-to- day life.

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Overview of Image Processing for Satellite Imagery

Aditee Chandrakant Pachpande, Romita Pandurang Pawar, Vismaya Prakasan, Dr.Suman Wadkar, Prof Yogesh kene

***Abstract*- In this paper, we produce effective image processing methods for satellite imagery along with the modification and enhancement of the images are discussed. This document provides a brief introduction to image pre-processing. Following techniques are described -basic operations, edge detection, filtering, canny detector, feature extraction and classification are used. Image processing is always an interesting field as it gives enhanced visual data for human simplification and processing of image data for transmission and illustration for machine perception. Digital images are processed to give better solution using image processing.**

***Index terms*- image processing, pre-processing, digital image, edge detection, canny detector, feature extraction.**

I. INTRODUCTION

1.1 Image Processing

Image processing is a method to get an enhanced image or to extract some useful information from that particular image. It is a signal processing type in which input is image and output may be image or characteristics/features associated with that image.

Digital image processing interacts with digital image manipulation with a digital computer. It is a subset of signals and systems but is very focused on images. DIP focuses on building a computer system that can process image processing. The input of that system is a digital image and the system process that image using active algorithms, and renders the image as output.

Image processing pertains to the alteration and analysis of pictorial information. Common case of image processing is the adjustment of brightness and contrast controls on a television set by doing this we enhance the image until its subjective appearing to us is most appealing. The biological system (eye, brain) receives, enhances, and dissects analyzes and stores mages at enormous rates of speed.

1.2 Digital Image Processing

Processing of digital images by means of digital computer refers to digital image processing. Digital images are composed of finite number of element of which has a particular location value. Picture elements, image elements, and pixels are used as elements used for digital image processing.

Digital Image Processing is concerned with processing of an image. In simple words an image is a representation of a real scene, either in black and white or in color, and either in print form or in a digital form i.e., technically a image is a two-dimensional light intensity function. In other words, it is a data intensity values arranged in a two dimensional form, the required property of an image can be extracted from processing an image. Image is typically by stochastic models. It is represented by AR model. Degradation is represented by MA model.

Other form is orthogonal series expansion. Image processing system is typically non-casual system. Image processing is two dimensional signal processing. Due to linearity

property, we can operate on rows and columns separately. Image processing is vastly being implemented by “Vision Systems” in robotics. Robots are designed, and meant, to be controlled by a computer or similar devices.

while “Vision Systems” are most sophisticated sensors used in Robotics. They relate the function of a robot to its environment as all other sensors do.

1.3 Grayscale Image

Grayscale image has only one channel and the pixel size varies from 0 (black) to 255 (white). It usually has shades of gray. The image of grayscale (or gray level) is the only one where the only colors are shades of gray. The reason for distinguishing such images from any other type of colored image is that less information needs to be provided per pixel. In fact the `gray 'color is one in which the red, green, and blue segments all have the same dimension in the RGB space, so it is only necessary to determine the maximum intensity of each pixel, as opposed to the three intensity required to specify each pixel in full color image.

II. PROPOSED MODEL

2.1 Dataset Description

We used the Indian Pines dataset, which is freely available online. The Indian Pines (IP) site has 145 145 pixels and 224 spectral bands with wavelengths ranging from 400 to 2500 nm, with 24 spectral bands covering the water area eliminated. The available ground truth is organized into 16 sections or classes.

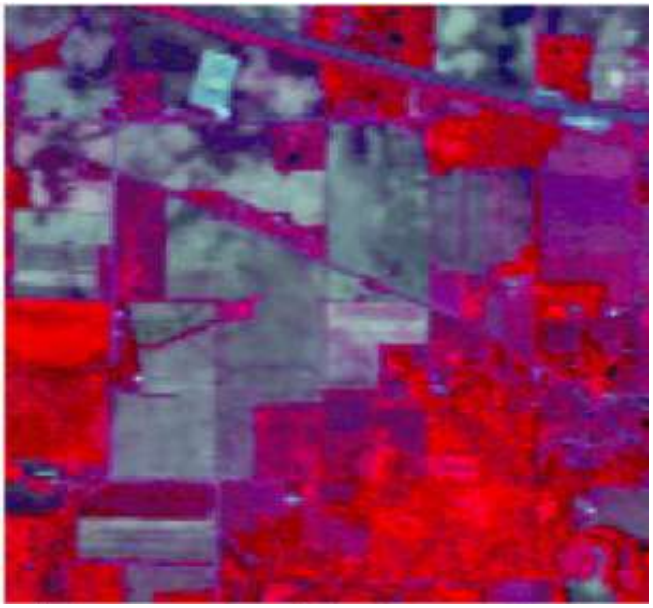

Fig.1: Satellite Image of Indian Pine Dataset

2.2 Dilation

Dilation adds pixels to the boundaries of objects in the image, number. of additional pixels depending on the size and shape of the editing element. Increase the size of objects. It connects areas separated by a space smaller than a building object. Increases the brightness of objects. Used before closing operation. The elevation process is similar to the transition process, i.e., a building element is displayed and moved from left to right and from top to bottom, in each shift; the process will look for any similar pixels scattered between the editing element and the binary image.

If there exists an overlapping, then the pixels under the centre position of the structuring element will be turned to 1 or black.

$$dilation(x,y)= max\{ f(x-i, y-j) * B(i,j)\}$$

where b(i,j) is the structuring element.

Fig.2: Dilation Result

2.3 Erosion

Erosion reduces no. of pixels from the boundary of objects and number. of additional pixels depending on the shape and size of the editing element. Reduce the size of objects. Reduces the brightness of bright objects. Removes objects smaller than a structural element. Used later in closing operation.

$$erosion\ (x, y) = min\ \{f\ (x-i, y-j) * B\ (i, j)\}$$

where b (i, j) is part of a structure.

In the central area, indicated by the editing feature center, the process will check if there is a complete overlap with the editing element or not. If there is no complete overlap, then the center pixel displayed in the center of the element will be set to white or 0.

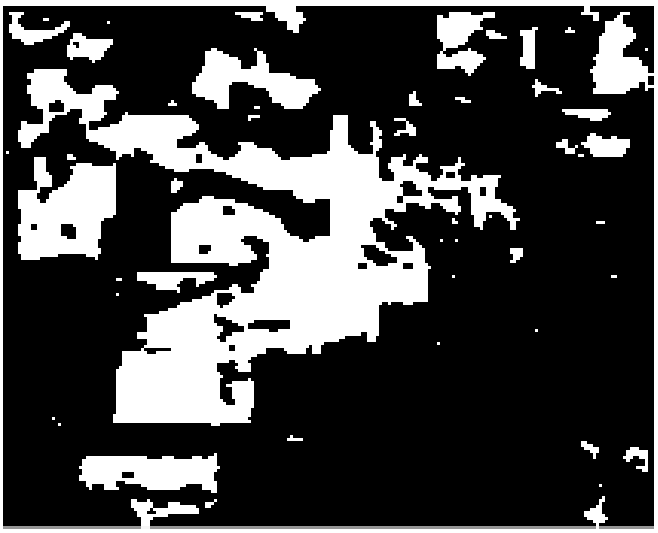

Fig.3: Erosion Result

2.4 Opening

Morphological openings are basically erosion followed by stretching using the same structural element. opening helps remove bridges. It is used to smooth the contours of the image and is used to break down small bridges and eliminate small protrusions.

$$opening\ (A, B) = D\ (E\ (B))$$

Image B erosion occurs and the resulting image magnification is taken to determine the image aperture. The opening is used to remove the internal noise of the detected image.

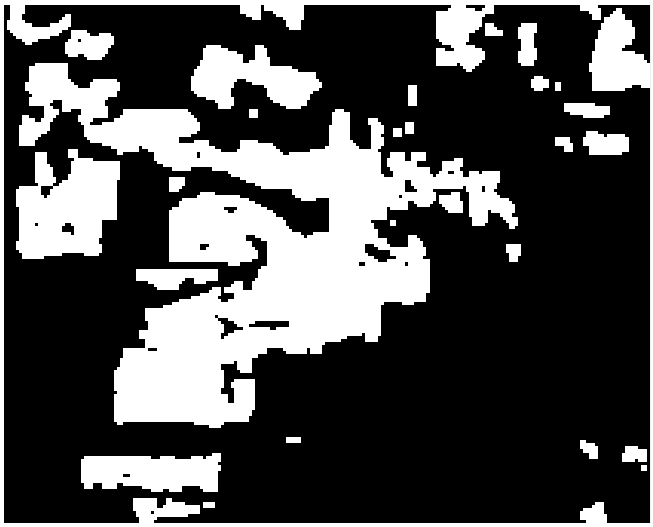

Fig.4: Opening Result

2.5 Closing

Morphological opening is basically dilation followed by erosion using the same structuring element. closing helps in joining the bridges. It is used to roughen the contours of the image also used to join narrow bridges and it does not eliminate thin protrusions.

closing(A,B)= E(D(B))

The dilation of an image B takes place followed by the erosion to obtain the closing of an image. this is done using the same structuring element i.e A. Closing is used for contour smoothness and for combining small breaks.

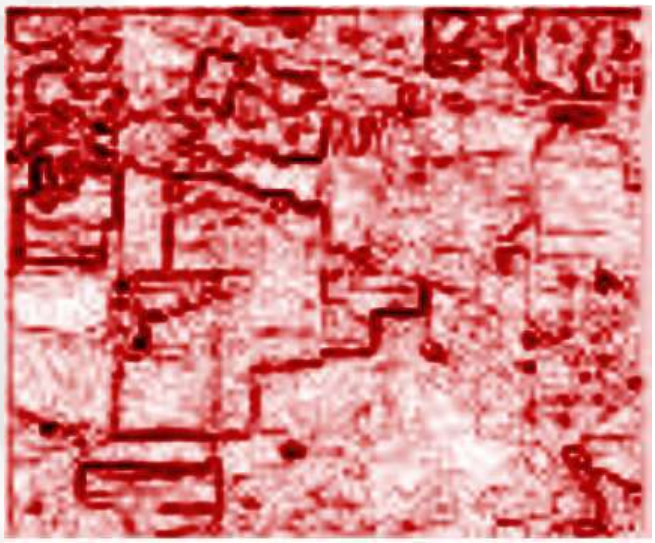

Fig.6: Edge Detection Result

2.7 Median Filtering

Median Filter in Image Processing is often used to reduce noise in an image, as a description filter. Median filter is a simple and powerful linear filter. It is used to reduce the amount of variation between each pixel. The filter considers each pixel in the image and looks at its immediate neighbors

Fig.5: Closing Result

2.6 Edges

Any unexpected change of discontinuities or gap in an image is called as edges. Significant transitions in an image are called as edges. The types of edges are generally three; Horizontal, Vertical and Diagonal. Most of the shape data of an image is enclosed in edges. So first, one should detect these edges in an image and by using these filters and then by enhancing those areas of image which contains edges, sharpness of the image will grow and image will become brighter.

Masks for the edge detection are: Prewitt Operator, Sobel Operator, Robinson Compass Masks, Krisch Compass Masks, Laplacian Operator. These mentioned filters are Linear filters or can also be called as smoothing filters.

to determine whether or not it represents the surrounding area.

Median is calculated by first sorting all the pixel values from the surrounding area to the sequence of numbers and then returning the pixel assumed to the median pixel value.

If your edge is sharp, the median filter function ensures that it stays sharp, while the bottom pass line only blurts this edge in some cases. If you have a sharp noise, the median filters do an excellent job of smoothing it out.

Fig.7: Median Filtering result

2.8 Mean Filtering

Mean Filter: The mean filter is nothing but the sliding-window spatial filter that put backs the center value in the window with the average or mean of all the pixel values in the window. The window, or kernel, is generally a square but it can be any shape. Mean filter, or an average filter is windowed filter of linear class, that smoothens image. The filter operates as a low-pass filter. The basic idea behind the filter is for any element of the image take an average across its neighborhood. A special case needs to be made for an edge pixel. The mean filter makes the picture a bit blurry, but it reduces the noise in the image. This filter has an effect of eliminating the pixel values which are unrepresentative of their surroundings.

Fig.8: Mean Filtering Result

2.9 Standard Deviation

Image is a collection of data points in light intensity. The standard deviation of the image implies a gross measure of the imprecision/variation about the target value of light intensity, at each such data point. The standard deviation can also be used to measure gray level intensity dispersion in a black and white image.

If the normal deviation is near zero, the rated values are close to the mean and are converging. But when the Normal deviation is high, Values or data are scattered and at the same time far from the mean.

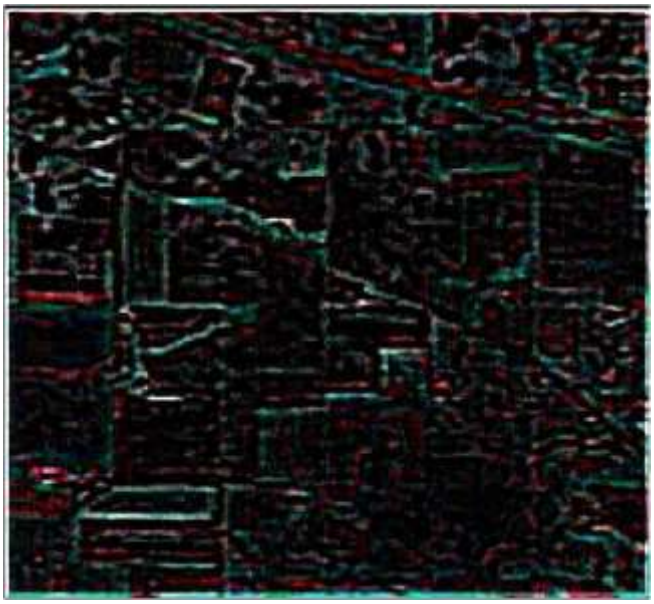

Fig.9: Standard Deviation Result

2.10 Max Pooling

Max pooling is an operation that is often added to CNN following individual layers, it follows a down sampling strategy. It calculates the maximum number of feature map patches, and uses it to create an integrated feature map. In max pooling addition of translation invariance happens - which means that translating an image with a small amount does not significantly affect the value of multiple combined effects, thereby resulting in having a high resolution that reduces image size by reducing the number of pixels per output of convolution layer.

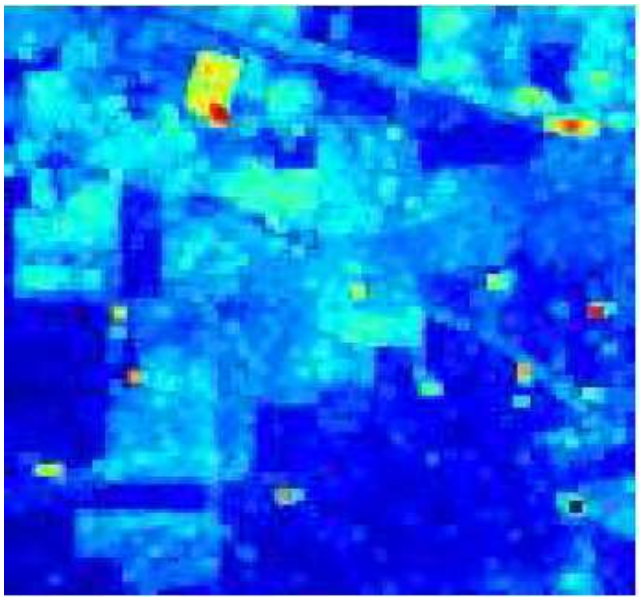

Fig.10: Max Pooling result

III. SYSTEM REQUIREMENTS

The experiment setup is carried out on a computer system which has the different hardware and software specifications as given in Table (1) and Table (2) respectively.

Processor	2.3 GHz Intel i5
GPU	Intel
RAM	4 GB

Table (1): Hardware Components

Operating System	Windows 10, 64 bit
Programming Language	Python 3.9
IDE	Google Colaboratory

Table (2): Software Components

3.1 Python

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse.The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

3.2 Google Colaboratory

Colaboratory, or "Colab" for short, allows you to write and execute Python in your browser, with - Zero configuration required - Free access to GPUs - Easy sharing Whether you're a student, a data scientist or an AI researcher, Colab can make your work easier.

IV. CONCLUSION

In this paper, we performed morphological processing as well as image segmentation and enhancement

From these operations, we are able to extract image components that represent and describe shapes in the image. By doing this, we are also able to accurately democratize border-separated regions of image components.

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