Leakage detection using Plumboat

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***Abstract*— In this project an efficient detection of leakage is done with the help of tracking system which is used for tracking the exact location of the leakage present in the pipe leaky water pipe leads to wastage of billion liters of water and pose problem for cities whenever there is a leakage problem in the underground pipe, the entire roadways are dug to detect the cracks in the pipe and also the water supply is stopped for the same amount of span causing inconvenience to the people. Plumboat is robot which will work in underground pipe and will detect the cracks present due to which there is wastage of water. THE designed Plumboat works using infrared sensors. DC motor, Global Positioning System (GPS) and Global system for mobile communication /General Packet Radio (GSM/GPRS) technology which is the best way to determine the location of Plumboat. A microcontroller (Atmega328) is used to control the IR sensors, DC motor, GPS and GSM modules. The crack in the pipe is detected with the help of IR sensors and on detection the location of the leakage is sent to a determined mobile phone with the help of GPS and GSM modules.**

Keywords—tracking,direction control,mechanism,position.

I. INTRODUCTION

Plumboat is a robot which has a huge significance because it can avoid numerous disasters which could take place. Leakage occurs due to the cracks in the pipe which can cause huge wastage of water and in order to overcome it we need a large amount of investment. Maintenance of pipe is required which is almost impossible if they are underground pipes. Soil contains large amount of chemical elements which continuously react with the pipes. Hence, the pipes must be corrode free as well as they must not react with the chemicals. Manufacturing such type of pipes requires huge investment.

A. SIGNIFICANCE

The important objectives that are associated in installing of robotic systems in industries are:

1. Saving of manpower.
2. Improved quality & efficiency.
3. Ability to work in any hostile environment.

B. SCOPE

The Japan tragedy which occurred in 2016, caused lot of harm creating of large sinkhole and in order to rebuild that it required large manpower as well as huge investment. If we analyses Mumbai and Navi Mumbai infrastructure we find that both are the cities built on the marsh land by dumping the soil. The underground pipelining system consists of number of pipes. If the pipes get damage because of the cracks, then water will spill out thus mixing with the soil. Due to this, the soil weight will increase and will settle down leading to the gap between the roads and the underground layer which will in turn lead to sink hole. This is the possibility which can happen in future. In order to avoid this tragedy, we are creating this Plumboat which will detect the cracks well in advance maintain the city infrastructure.

II. METHODOLOGY

In developing countries, people dug the road for changing the pipes if they are well aware about the duration of the lifetime of the pipe. Also in most of the cases if the crack is not detected on time then the water gets contaminated and can cause threat to human life. In order to overcome such loss of water, Plumboat is designed with the help of which we can detect the cracks present in the pipes. We can not only detect the cracks present but also helps the user who is controlling the plumboat to know the exact location of the crack present by sending the message on the cell phone. Knowing the exact location of the crack we can dug the exact position on the land, rather than digging around. Plumboat is made up of highly strong material and less weight which can increase strength as well as reduce the weight . it provide better stability under water due to conical shape of each head , which can divert the flow of water without flow resistance. The project operates on basic principles of mechatronics [1] and automation. It basically eliminates manual operation and the units involved are as follows:

1. Input Unit[1]
2. Processing [1]and control unit
3. Output Unit[1]

- Input Unit: It consist of IR sensor which will detect crack in the pipe.
- Processing and control Unit: It consists of a microcontroller which upon receiving the crack signal will give GPS signal through GSM signal.
- Output Unit: It consist of the GPS and GSM unit GPS unit will send latitude and longitude through GSM unit .

The basic system consists of the following parts:

1. Mechanical Unit [1]: It consists of rotating arm which will rotate and check crack in the pipe.
2. Electronic Unit [1] and Programming IDE: It consists of arduino microcontroller which will check for the cracks and thereby send signals through GSM and GPS. We make use of basic concepts of Embedded C language clubbed with Arduino Instruction Set.
3. Electrical Unit [1]: The electrical motors form the electrical components.

III. COMPARISON WITH EXISTING TECHNOLOGY

Shri Krishna Chaitanya Varma, Poornesh, Tarun Varma, has proposed find the vehicle accident location by means of sending a message using a system which is placed inside of the vehicle system. So in this work they used the AT 89c52 by using assembly language programming which clears the view of GPS and GSM module working. Nasir, R.Tariq, Murawwat, S and rabbani provides a solution for accident detection and prevention for human life safety. It enables the intelligent detection of an accident at any place and reports the accident on predefined number. In this project, they used an 89s51 and GSM module and GPS module with c programming language on the basis of that we learn and compare the working of GSM over assembly and c language. By taking this review we decided to use an atmega 328 which has digital as well as analog input outputs which is compatible to IR as well as acoustic sensor.

IV SENSORS AND CONTROLLER:

A. MICROCONTROLLER :

The microcontroller used is Atmega 328.The Atmel 8-bit AVR RISC-based microcontroller combines:
32 kB ISP flash memory with read-while-write capabilities
1 kB EEPROM, 2 kB SRAM,23 general purpose I/O lines, 32 general purpose working registers, 3 flexible, timer/counter with compare modes, internal and external interrupts, Serial programmable USART, A byte-oriented 2-wire serial interface , SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, five software selectable power saving modes, operating frequency of 20MHz. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS .

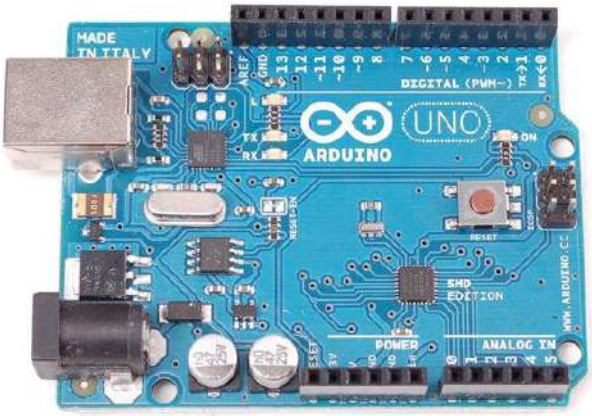

Figure 1 Atmega328 Arduino Board

B. THROUGH BEAM IR SENSOR MODULE :

2 sensor modules used basically determine the crack in the pipeline. The specifications for the same are as follows:
1.Dimension: 32mm X 11mm X height 20mm width
2. The main chip: LM393, infrared on the radio head
3. The working voltage: DC 5 V Having a signal output instruction.
4. A single-channel signal output.
5. The output valid signal is low. The sensitivity is not adjustable.
6. Can be used to count the work piece, the motor speed. The circuit board output switch

Figure 2 IR sensor module

C. DC MOTOR :

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. In this system, the DC Motor of Operational voltage and most types produce rotary motion; a linear motor directly produces force and motion in a straight line. Current: - 12V, 5A is used. The speed is 500rpm.

Figure 3 DC gear motor

D. GSM MODULE :

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities. A GSM modem exposes an interface that allows applications such as Now SMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an "extended AT command set" for sending/receiving SMS messages.

Figure 4 GSM Module

E.GPS MODULE :

The Global Positioning System (GPS) is the most significant recent advance in navigation and positioning technology .In the past, the stars was used for navigation. Today's world requires greater accuracy .The new constellation of with radius equal to the distance to the satellite. If two satellites are used, then the receiver must be on the surface of both spheres, which is the intersection of the two spheres or the perimeter of a circle. If a third satellite is used, then the location of the user is narrowed down to the two points where the three spheres intersect. Three measurements are enough for land receivers since the lower of the two points would be selected. But when in the air or space, four satellites are needed; the intersection of all four spheres will be the receiver's location. When more than four satellites are used, greater accuracy can be achieved.

Figure 5 GPS Module

V WORKING

The devices which are connected/interfaced with the microcontroller(Arduino)can be represented in a block diagram as shown below:

A .BLOCK DIAGRAM

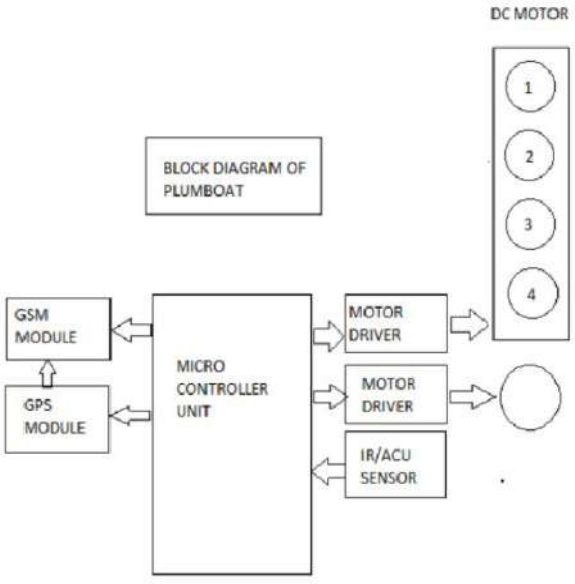

Figure 6 Block Diagram

B.FLOW DIAGRAM

The basic working of the machine can be explained with the

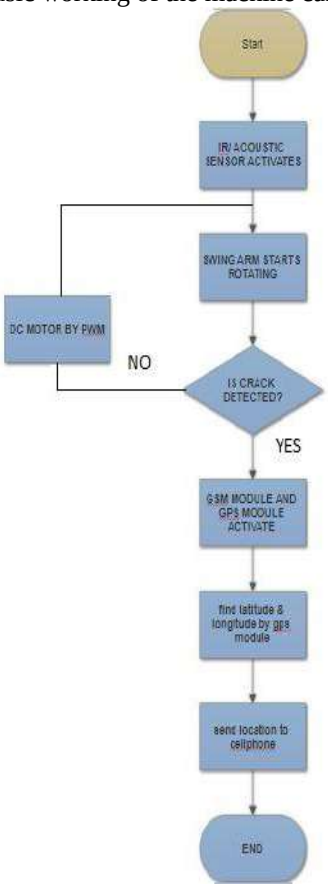

Figure 7 Flow Diagram

Here basic concept behind this plumboat is to detect cracks in pipe line .when the boat is inserted throw a pipe then it expands its try pod stand and make better grip to the wall of the pipe this try pod have the rotting dc motors assembled with gear system which increase the torque as well as locking mechanism to the well which will avoid the slippery movement in pipe. The IR/Acoustic sensor will starts as well as the rotating arm will starts rotating and finds if any crack is detected if any crack is not detected after one complete rotation the boat will move in forward direction. if crack is detected the boat will stop at that point and starts getting latitude & longitude by GPS module ,after getting coordinates it will give to GSM module and this GSM module will send to specific no registered in device this will help to get exact location where crack is detected.

VI ADVANTAGES and DISADVANTAGES

Plumboat is a robot which has a huge significance because it can avoid numerous disasters which could take place.DC motor, Global Positioning System (GPS) and Global system for mobile communication /General Packet Radio (GSM/GPRS) technology which is the best way to determine the location of Plumboat.

The machine only operates for a larger pipe. For small diameter pipe unable to detect as diameter of pipe is smaller.

VII APPLICATIONS

This type of machine can be used in petrochemical companies [1]. Government [1] establishments can use this machine for both water and sewage water treatment plant.

VIII CONCLUSION

In this project, we have used Atmega 328 IC which is our controller used to interface with GPS and GSM modules. Also with the help of IR sensors we are able to detect the presence of the crack in the pipe and with the help of GSM and GPS modules we can send the exact location of the crack present in the pipe on the cellular devices. This can be implemented in various applications like gas leakage problem, where human interaction can cause threat to life. Hence, using Plumboat we can know the exact position of the crack instead of finding the cracks manually be digging around random places.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our HOD Prof. R. H. Khade, our project guide Prof. Sneha Chikodi and our project coordinator Prof. Ujwal Harode who have significantly guided and encouraged us to proceed with this newly proposed idea. We would also like to thank our principal Dr. S. M. Joshi for providing us with all the facilities and environment to bring out the best of our capabilities.

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Autonomous Driving Car

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***Abstract*— An Autonomous Driving Car is an autonomous vehicle capable of fulfilling the human transportation capabilities of a traditional car. It is also known as self driving car or driver-less car. It senses environment and navigates without human input. The mechanism in Autonomous Driving Car is a wider application of artificial intelligence to automobiles.**

Keywords- ***autonomous, navigates, human input, mechanism***

I. INTRODUCTION

In the modern era, the vehicles are focused to be automated to give human driver relaxed driving. In the field of automobile various aspects have been considered which makes a vehicle automated. Google, the biggest network has started working on the self-driving cars since 2010 and still developing new changes to give a whole new level to the automated vehicles. The following vehicle will follow the target (i.e. Front) vehicle automatically. The other application is automated driving during the heavy traffic jam, hence relaxing driver from continuously pushing brake, accelerator or clutch. The idea described here has been taken from the Google car, defining the one aspect here under consideration is making the destination dynamic. This can be done by a vehicle automatically following the destination of another vehicle.

A. SIGNIFICANCE

This vehicle is focused to be automated to give human driver relaxed driving.

B. SCOPE

Autonomous cars include reduced mobility and infrastructure costs, increased safety, increased mobility, increased customer satisfaction and reduced crime. Specifically a significant reduction in traffic collisions; the resulting injuries; and related costs, including less need for insurance. Autonomous cars are predicted to increase traffic flow; provided enhanced mobility for children, the elderly, disabled and the poor; relieve travelers from driving and navigation chores; lower fuel consumption; significantly reduce needs for parking space; reduce crime; and facilitate business models for transportation as a service, especially via the sharing economy.

II. METHODOLOGY

Here we study and implement an autonomous car that can help google car WAYMO be more efficient. The robot is programmed to reach the destination given by the user. The camera interfaced with the processor will help detect autonomously and make the car more efficient in detecting and avoiding collisions.

III. CURRENT ADOPTION OF THE TECHNOLOGY

- Google (autonomous car)
- Cruise automation
- Tesla model d - 2014
- Ford traffic jam assist – 2012

IV.HARDWARE AND SOFTWARE:

A. RASPBERRY PI

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside its target market for uses such as robotics. It does not include peripherals (such as keyboards, mice and cases). However, some accessories have been included in several official and unofficial bundles.

Figure 1 Raspberry Pi

B. *RASPBERRY PI CAMERA*

It supports 1080p30, 720p60 and VGA90 video modes, as well as still capture. It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi. The camera works with all models of Raspberry Pi 1, 2, and 3

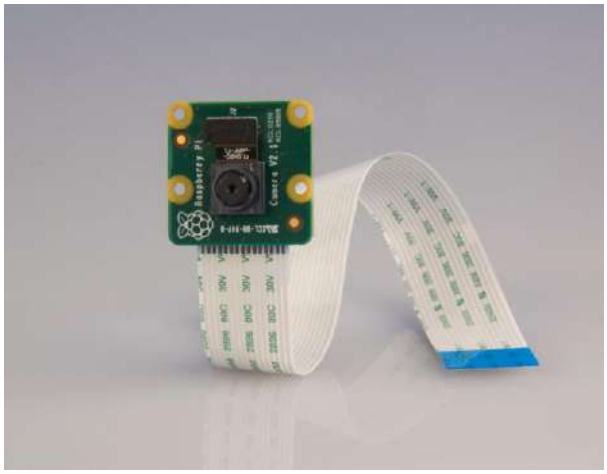

Figure 2 Raspberry Pi Camera

C. *PYTHON*

The Python programming language is actively used by many people, both in industry and academia for a wide variety of purposes.

Figure 3 Python Logo

D. *OPEN CV LIBRARY*

OpenCV (*Open Source Computer Vision*) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel, it was later supported by Willow Garage then Itzel (which was later acquired by Intel). The library is cross-platform and free for use under the open-source BSD license.OpenCV supports the deep learning frameworks TensorFlow, Torch/PyTorch and Caffe

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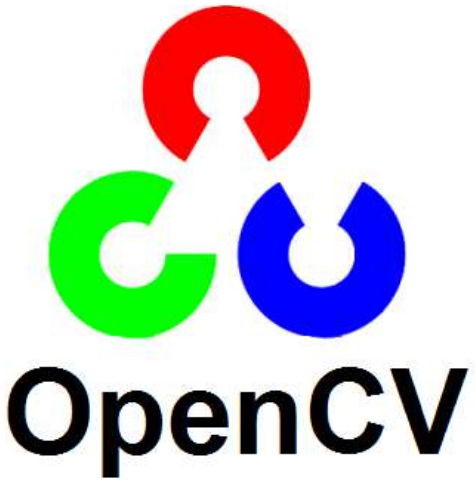

Figure 4 Logo OpenCV

D. *RASPBIAN OS*

Raspbian is a Debian-based computer operating system for Raspberry Pi. There are several versions of Raspbian including Raspbian Stretch and Raspbian Jessie. Since 2015 it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Green as an independent project. The initial build was completed in June 2012. The operating system is still under active development. Raspbian is highly optimized for the Raspberry Pi line's low-performance ARM CPUs.

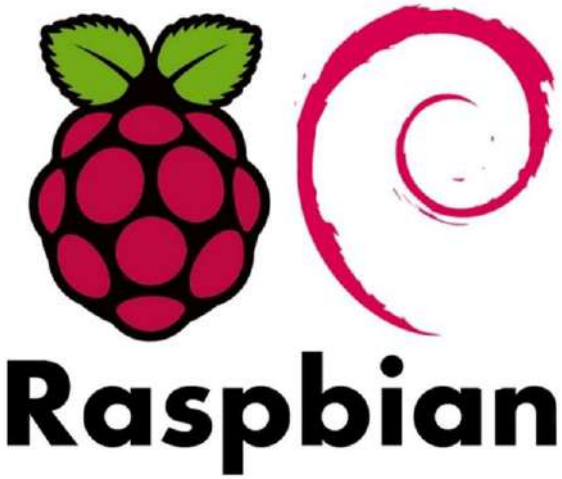

Figure 5 Raspbian OS

V.WORKING

The devices which are connected/interfaced with the Raspberry Pi can be represented in a block diagram as shown below:

A .BLOCK DIAGRAM

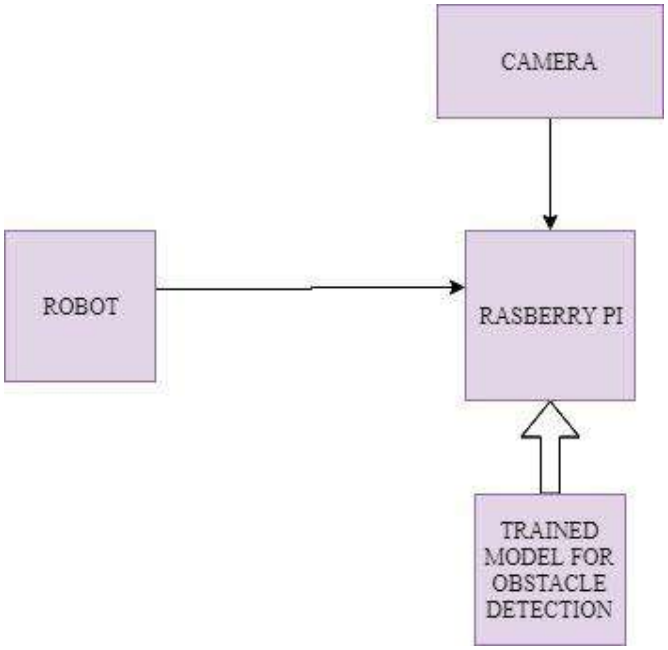

Figure 6 Block Diagram

B.FLOW DIAGRAM

The basic working of the robot(car) can be explained with the help of a flow diagram:

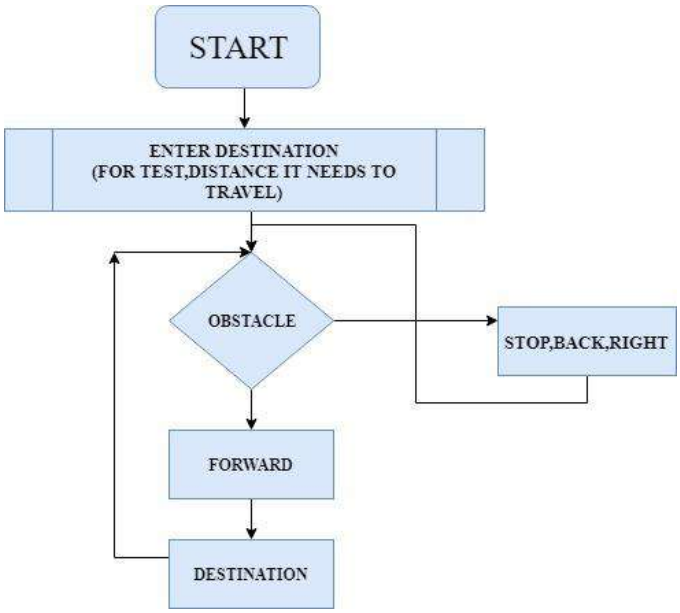

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Figure 7 Flow Diagram

1. MECHANISM OF THE CAR:

- The robot will initialize itself on startup.
- It will then check for the clear visibility via camera and check for any obstacles.
- Then it will prompt for the location (in our case how much cm to move forward and so on).
- It will then prompt a safety message and start the journey.
- The camera will be ON continuously for checking the obstacles and signals.

2. CONTROL:

- The robot is controlled by pre-defined functions feeded to it using Python script.
- The motor driver then drives the motor after receiving commands from the raspberry pi.
- The raspberry pi processes the image from the camera to detect obstacles and accordingly gives motor the command on what to do.
- This model can be incorporated with more sensors to give added benefits for efficiency and accuracy.

VI. ADVANTAGES

- There will be fewer traffic collisions.
- There will be removal of constraints on occupant's state.
- There will be reduction in the need of traffic police or vehicle insurance.
- There will be reduction in space for vehicle parking.
- People can experience a smoother ride.

VII.DISADVANTAGES

- There will be issues due to software reliability.
- There would be loss of driver related jobs.
- Temporary built zones which are not added in any local maps won't be detected.
- There are chances of liability for damage.

VIII.APPLICATIONS

- Taxi services can adopt these cars in future for a long run.
- Pick up and drop facilities to employees in firms and organizations within the area can be made possible.
- Differently abled individuals can make use of it at their convenience level.

IX.CONCLUSION

Using OpenCV library, we can not only detect obstacles but also detect signals at traffic and take actions accordingly, making the car fully autonomous. In this project we could implement the autonomous car model with object detection

using an algorithm to differentiate the pixel density with respect to a predefined image.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our HOD Prof. R. H. Khade, our project guide Prof. Seema Mishra and our project coordinator Prof. Ujjwal Harode who have significantly guided and encouraged us to proceed with this newly proposed idea. We would also like to thank our principal Dr. S. M. Joshi for providing us with all the facilities and environment to bring out the best of our capabilities.

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OBJECT TRACKING AND FOLLOWING ROBOT

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***Abstract*— Image processing is a rapidly evolving trend now a days. Techniques of image processing are used in a variety of applications. Use of Image processing in robotics is an emerging trend. A major part of robotic vision comes under image processing. Image processing on android phones is a new concept and is developing as Android OS continues to evolve. A good quality camera is needed for real time video and image processing. Camera on today's Smartphones are one of the most important features of the phone and they are improving day by day. Processors speed and Main memory on phones are quite large today. Therefore, modern day Android phones are well equipped with the necessary hardware required for heavy tasks of image processing. Image Processing on android is mostly done using OpenCV image processing library for Android platform. This library should be included in the Android Application project and then can be used in that application. In robotics the movements of a robot are controlled by a semiconductor device called as microcontroller. An android phone can be connected to the microcontroller using a Bluetooth module. After connection the phone can send data or control signals to the microcontroller which can then drive the robot according to the control signals. So in case of real time image processing the android application running on android phone will take input images from the phones camera and process the image to detect some object or some pattern in the image. Based on the object or pattern the application will send appropriate controlling signals to the microcontroller. The micro controller can then drive the electronic actuators of the robot such as motors, sensors, etc. Thus an android phone can be used for robotic vision.**

Keywords -tracking, bluetooth

I. INTRODUCTION

A. Literature Survey

Image processing is used in a growing number of applications in our daily lives as well as in research. Image processing is utilized for medical images, radar images, natural images, seismic data etc. in addition to robot vision. Thus, an understanding of classical image processing is useful in many fields. Elements from both traditional image processing and computer vision are used to construct systems for robot (machine) vision. There is a rapid development in this field and applications are found in both industry and research. There are also many products with camera and software for processing of visual data. Android phones today comes with lot more processing power than ever. They are equipped with all the necessary features required for fulfillment of controlling a robot. They can be used a master controller of a robot. Sensors such as Gyroscope, Proximity, Light intensity sensor, Camera, Accelerometer, etc. can be used to control a robot via a slave microcontroller. Real time Image processing requires a good quality hardware support. Almost every android phone today comes with at least 1GB RAM and 1GHZ and a good quality camera. In robotics image processing is mostly done on minicomputer boards like Raspberry pi, Odroid c2, etc. Such boards a costly. Instead of using such boards our own android phone combined with a slave microcontroller can be used for the same tasks. Android applications for image processing tasks can be built using opencv library for image processing. This document describes how opencv library on an android phone can be used for robot vision. This document also specifies how a robot can be built which follows an object detected by android phone's camera.

B. Problem Statement

The robot follows the object that is assigned to it. The code in the controller contains the configuration of the object that is to be followed. The phone camera processes the real time image and also processes the data through android app and through bluetooth the data is sent to controller. Controller according to the data directs the robot in the direction of that object. And GPS is used to give position of the robot. GSM is interface with the microcontroller and message will be given to the mobile user

II. METHODOLOGY

A. HC05-Bluetooth module

This is a wireless Bluetooth connectivity device which works on serial communication. HC05 connects with Android phone's Bluetooth and receive control data which based on the image processed by the phone.Knowing the address of the Bluetooth module HC05 a Bluetooth connection can be established using the connect() method. A Bluetooth socket connection is established between phone and robot's microcontroller.

Control signals or data can be sent to the microcontroller for robot's movement by using sendData() function once a Bluetooth connection is established.

Figure 1 HC05 Bluetooth module

B. AVR Microcontroller

An AVR microcontroller is a type of device manufactured by Atmel, which has particular benefits over other common chips, but first what is a microcontroller? The easiest way of thinking about it is to compare a microcontroller with your PC, which has a motherboard in it. On that motherboard is a microprocessor (Intel, AMD chips) that provides the intelligence, RAM and EEPROM memories and interfaces to rest of system, like serial ports (mostly USB ports now), disk drives and display interfaces. A microcontroller has all or most of these features built-in to a single chip, so it doesn't need a motherboard and many components, LEDs for example, can be connected directly to the AVR. If you tried this with a microprocessor, bang! AVR microntrollers come in different packages, some designed for through-hole mounting and some surface mount. AVRs are available with 8-pins to 100-pins, although anything 64-pin or over are surface mount only. Most people start with a DIL (Dual In Line) 28-pin chip like the ATmega328 or the 40-pin ATmega16 or ATmega32.

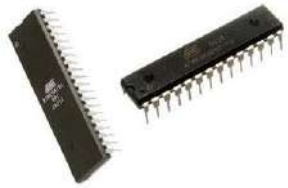

Figure 2 AVR Microcontroller IC

C. GPS

The Global Positioning System (GPS), originally Navstar GPS, is a space-based radionavigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites .The GPS system does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver .The GPS concept is based on time and the known position of GPS specialized satellites. The satellites carry very stable atomic clocks that are synchronized with one another and with the ground clocks. Any drift from true time maintained on the ground is corrected daily. In the same manner, the satellite locations are known with great precision. GPS receivers have clocks as well, but they are less stable and less precise. GPS satellites continuously transmit data about their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities (three position coordinates and clock deviation from satellite time).

D. GSM

GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose.

A GSM/GPRS MODEM an perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

Figure 3 GSM Module

E. LCD

The principle behind the LCD's is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass and also causes a change in the angle of the top polarizing filter. As a result a little light is allowed to pass the polarized glass through a particular area of the LCD. Thus that particular

area will become dark compared to other. The LCD works on the principle of blocking light. While constructing the LCD's, a reflected mirror is arranged at the back. An electrode plane is made of indium-tin oxide which is kept on top and a polarized glass with a polarizing film is also added on the bottom of the device. The complete region of the LCD has to be enclosed by a common electrode and above it should be the liquid crystal matter.

Figure 4 LCD module

III. IMPLEMENTATION

3.1 Hardware and Mechanical Design

A. Design

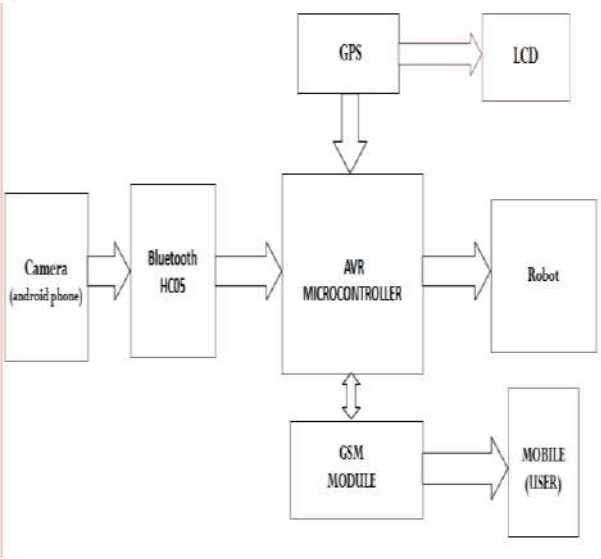

Figure 5 Block diagram

As shown above block diagram the object tracking and following robot is consist of four main components AVR Microcontroller, GSM Module , GPS Module, and LCD module

B. Assembly

We are having one robot chassis , on which we are assembling the project. We made two AVR microcontroller kit to work in real time. One will control transmitting the data and other will work as receiver. Again we are having LCD and GSM and GPS modules for displaying data, sending messages and giving location respectively.

3.2 Software Design

A. Algorithm

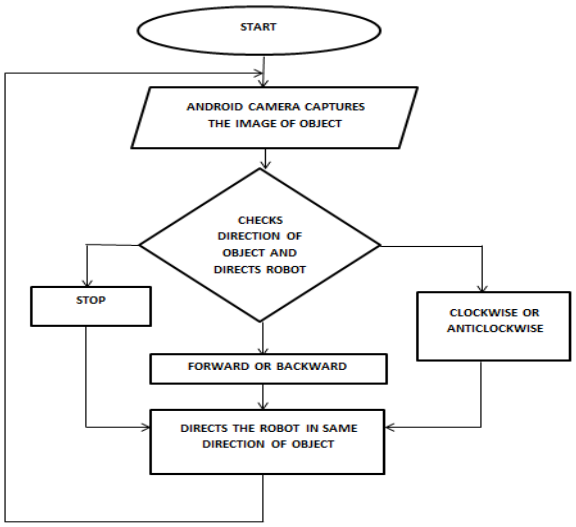

Figure 6 Flowchart of working of android application and motor

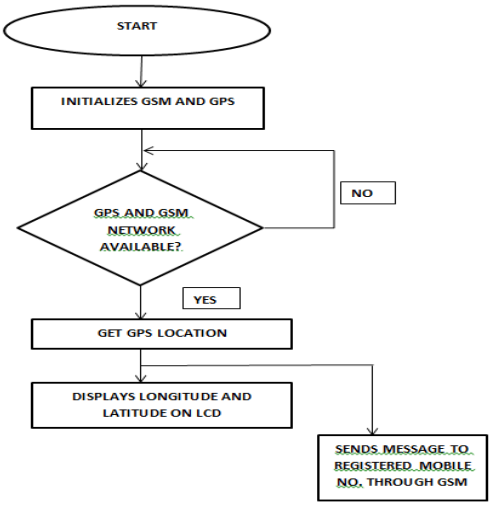

Figure 7 Flowchart of working of GSM and GPS

B. Software Required

OpenCV is the most popular and used machine vision library with open-source code and comprehensive documentation. Starting with image processing, 3D vision and tracking, fitting and many other features, the system include more than 2500 algorithms. The library interfaces have support for C++, C, Python and Java (in work), and also can run under Windows, Linux, Android or Mac operating systems. Image processing on android is relatively a newer technology. Android device by default comes with the necessary hardware required for image processing. Customized Applications can be created and installed on an android device for performing image processing using OpenCV library.

Atmel Studio

Atmel Studio is the integrated development platform (IDP) for developing and debugging Atmel SMART ARM-based and Atmel AVR microcontroller (MCU) applications.

Android Studio

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development.

IV RESULT AND APPLICATIONS

A Object tracking and following robot will follow the specific object that is the object is clicked by android application and GPS will provide the location of robot LCD will display longitude and latitude.etc GSM is used to send and receive the message to or from user. The applications are

- Object detection
- Aapplications for security and surveillance
- Defense applications
- Used by autonomous vehicle or mobile robots for navigation

V CONCLUSION

Modern generation Android phones are packed with powerful hardware such as high resolution cameras, faster CPU/GPU, large amount of RAM, sensors, etc. Instead of buying costly minicomputer boards like Raspberry-Pi, these phones can be used for heavy tasks of Image processing. Image processing with the help of common day phones is an upcoming new technology which can bring a revolution in robotic vision and eventually in robotics.

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Unmanned Aerial Vehicle (Quadcopter) for weather monitoring

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***Abstract*—The quadcopter will be able to fly via wireless communication and monitor the surrounding and gather information about the weather. The scheduler program makes the following tasks: controller's input, sensor data received from flight controller, also another sensor data received for gathering weather conditions. The wireless transceivers use SPI to send control signals to the microcontroller on the quadcopter from the handheld controller unit. The accelerometer/gyroscope and magnetometer both use I2C to send the amount of acceleration, stabilization, and the direction vector.To achieve flight, to turn and to ascend or descend, motors need to apply particular forces. The sensors for weather monitoring collect information in analog form and that data is processed by the raspberry pi. The main use of this project is for surveillance and monitoring of the weather where the human interference is least possible.**

Keywords- quadcopter,flight contol,ESC,motors,sensors.

I. INTRODUCTION

A quad-copter is an aerial vehicle that uses four motors for lift, steering, and stabilization. Unlike other aerial vehicles, the quad-copter can achieve vertical flight in a more stable condition. The quad-copter is unaffected by the torque issues that a helicopter experiences because of the main rotor. Moreover, due to the quad-copter's cyclic design, it is easier to construct and maintain. As the technology becomes more advanced and more accessible to the public, many engineers and researchers have started designing and implementing quad-copters for different uses.

Various groups such as the military, engineers, researchers, and hobbyists have been developing quad-copters to understand different technical areas. For example, quad-copters can be used for research and collecting data. This could range from searching for survival victims in a disaster area to checking the state of electrical power lines. Many radio operators have designed and built their own multi-copters. Universities, such as MIT, have been studying and doing research for the quad-copter over the past few years.

A. SIGNIFICANCE

The quadcopter will store the aerial data about the weather conditions and the data can be read and analysed by the user.

B. SCOPE

There are many advantages to quad-copters compared to other aircrafts. A quad-copter does not require a large area to obtain lift, like a fixed wing aircraft does. The quad-copter creates thrust with four evenly distributed motors along its frame. A helicopter suffers from torque issue due to its main rotor. The design of the quad-copter does not suffer from the same torque issues as the helicopter. The counter balancing forces of the spinning motors cancel out the torque forces caused by each motor causing the quad-copter to balance itself . Because the quad-copter uses four rotors instead of one main rotor, it requires less kinetic energy per rotor for the same amount of thrust when compared to the helicopter. Due to this and its symmetrical design, quad-copter maintenance and manufacturing costs are relatively lower than other aircrafts.
.

II. METHODOLOGY

The quadcopter must be built and controlled in a way that it should be able to take stable flight.
It should be able to move in forward, backward, right, left, up and down direction according to the signal applied by the user. Frame should be rigid enough to retain its shape in case of collision or inappropriate landing.

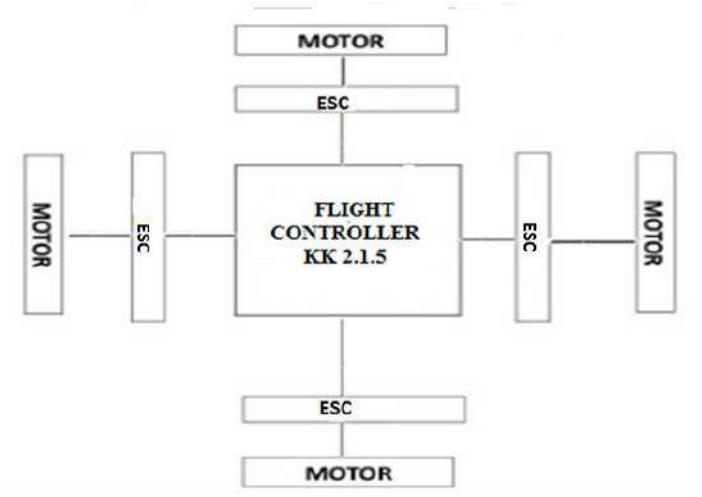

Figure 1 Basic block diagram of a Quad-copter

To achieve flight, two of the motors must apply downward force and the other two motors have to apply an upward force. To turn, one pair (left or right side) of motors slows down to turn the copter. To ascend, all motors will increase in speed, and will all decrease in order to descend. To move forward, the front two motors will decrease while the back two motors will increase. And vice versa in order to move in a backwards direction.

III. FLYING MECHANISM OF QUADCOPTER

A quad-copter consists of four motors evenly distributed along the quad-copter frame as can be seen in Fig. 2 below. The circles represent the spinning rotors of the quad-copter and the arrows represent the rotation direction. Motors one and three rotate in a clockwise direction using pusher rotors. Motor two and four rotate in a counter-clockwise direction using puller rotors. Each motor produces a thrust and torque about the center of the quad-copter. Due to the opposite spinning directions of the motors, the net torque about the center of the quad-copter ideally zero, producing zero angular acceleration. This eliminates the need for yaw stabilization. A vertical force is created by increasing the speed of all the motors by the same amount of throttle. As the vertical forces overcome the gravitational forces of the earth, the quad-copter begins to rise in altitude.

Fig. 2 shows the vertical movement of the quad-copter. As above, the circles represent the spinning rotors, the larger arrows represent the direction the rotors are spinning, and the black arrows represent the forces caused by the spinning rotors. Pitch is provided by increasing (or decreasing) the speed of the front or rear motors. This causes the quad-copter to turn along the x axis. The overall vertical thrust is the same as hovering due to the left and right motors; hence only pitch angle acceleration is changed.

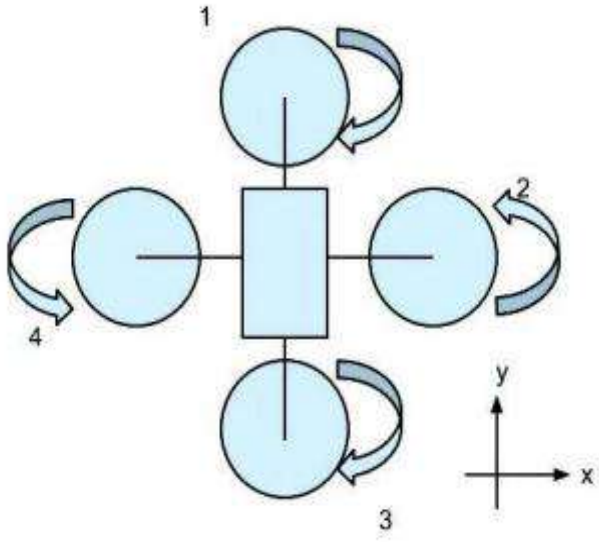

Figure 2 Quad-copter: Motor rotation directions

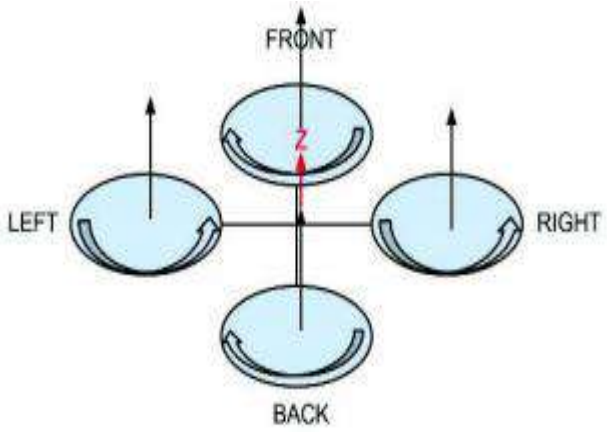

Figure 3 Quad-copter: Vertical thrust movement.

Fig. 3 shows an example of pitch movement of a quad-copter. As the front motor slows down, the forces created by the corresponding rotor are less than the forces created by the back rotor. These forces are represented by the blue arrows. These forces cause the quad-copter to tip forward and this movement is represented by the red arrow. Roll is provided by increasing (or decreasing) the speed of the left rotor speed and right motors. This causes the quad-copter to turn along the y axis. The overall vertical thrust is the same as hovering due to the front and back motors; hence only roll angle acceleration is changed.

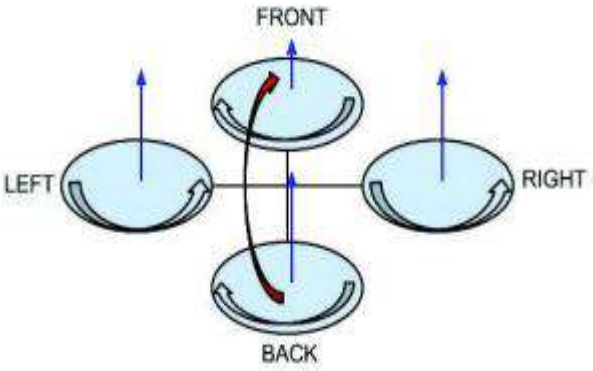

Figure 4 Quad-copter: Pitch movement

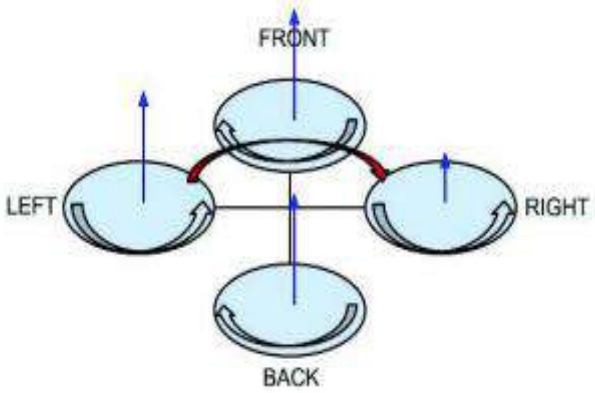

Figure 5 Quad-copter: Roll movement

Fig. 4 shows an example of roll movement of a quad-copter. As the right motor slows down, the forces created by the corresponding rotor are less then the forces created by the left rotor. These forces are represented by the blue arrows. This causes the quad-copter to tip to the right and this movement is represented by the red arrow.

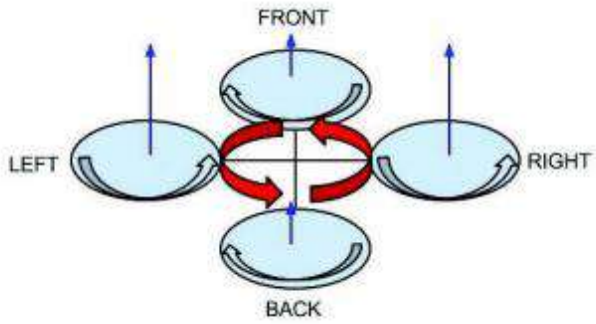

Figure 6 Quad-copter: Yaw movement

Yaw is provided by increasing (or decreasing) the speed of the front and rear motors or by increasing (or decreasing) the speed of the left and right motors. This causes the quad-copter to turn along its vertical axis in the direction of the stronger spinning rotors. As the front and back motor slows down, the forces created by the corresponding rotors are less than the forces created by the left and right rotors. The quad-copter will begin to rotate in the same direction as the faster spinning rotors due to the difference in torque forces. This movement is represented by the red arrow.

IV. WEATHER MONITORING

There is an increased focus on the changing weather and climate conditions.It is necessary to monitor the weather and to be prepared for changing weather.The weather conditions can be monitored by studying the changes in factors like temperature,humidity,light intensity etc. This data can be studied and analysed by the user to understand the weather better.

In this project Raspberry pi 2 is used for weather monitoring. The sensors are interfaced with the raspberry pi.The sensor data can be either sent to the user or can be stored in the raspberry pi itself. Raspberry pi has 900 MHz ARM Cortex A7 CPU and 1GB memory.17 GPIO peripheral pins makes it easy to interface the sensors.It requires 5V as supply.

The sensors used are LDR for measuring light intensity,DHT11 for temperature and humidity measurement..The sensors are interfaced with raspberry pi and the data can be viewed on serial monitor or can be stored in the raspberry pi or memory card or can be sent to user over wireless interface like wifi or internet.

V. ADVANTAGES AND DISADVANTAGES

Advantages:

- The Quadcopter can reach places where humans can't reach.
- Various sensors can be used for monitoring and analyzing data.
- It is easy to learn and control the UAV.

Disadvantages

- The flight time depends on the battery capacity and the range depends on the transceiver range,both of them are limited

VI. APPLICATIONS

- During a natural calamity,the quadcopter can be used to survey and monitor the affected area.
- There are various educational,military and even outer space applications of the quadcopter.

VII. CONCLUSION

The project focuses on the designing and building of the quadcopter.There are other ways for weather monitoring which are being used, but use of quadcopter will provide simple and easy way for the users for analysis of weather as it can be controlled with ease and can access remote locations.

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Digital image inpainting using single image

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***Abstract*—Image Inpainting or Image completion is technique which is used to recover the damaged image and to fill the regions which are missing in original image in visually plausible way. There are various approaches to reconstruct images using inpainting. Based on the efficiency of the technique it was decided to implement the patch based inpainting algorithm having isophote driven patch-based texture synthesis at core. In this work, the algorithm of inpainting using patch matching is presented that attempts to replicate the basic techniques used by professional restorators[2]. After the user selects the regions to be restored, the algorithm automatically fills-in these regions with information surrounding them. Patch-based filling improves execution speed. The fill-in is done in such a way that structure information arriving at the region boundaries is completed inside. A new method of filling and updating the target region is introduced. We call it as patch based inpainting. It overcomes the disadvantages of earlier approaches. Numbers of examples on real and synthetic images demonstrate the effectiveness of our algorithm. Robustness with respect to the shape of selected target region is also demonstrated. Our results compare to those obtained by existing techniques.**

Keywords: Object removal, region filling, patch-matching, patch based inpainting, simultaneous texture and structure propagation, isophote.

I. INTRODUCTION

Inpainting, the technique of modifying an image in an undetectable form, it is art which is used from the ancient year. Applications of this technique include rebuilding of damaged photographs & films, removal of superimposed text, removal/replacement of unwanted objects, red eye correction, image coding. In image inpainting technique the user first selects the region which we want to recover and then he selects the portion from the source region which is more promising in the sense of matching the information and closely identical to the original image, the selected region is also called as patch[1]. The selected patch is applied to damaged image, after that we get the result which we want. In past the inpainting was performed by two classes of algorithms (i) "diffusion based inpainting" and (ii) "texture synthesis". If we are trying to define the inpainting technique then the first thing come in to mind is that this algorithm try to fill the regions by collecting the information from the available environment of that source region, it is trying to form the image which is nearly identical to the original image and found the close identity to the original image. The image design with this technique is alternative to the original image but this technique is such accurate that the person who is unaware of original image will not able to detect that we have reconstruct the image. Inpainting is not only to recover the images which got damaged but also the technique to remove unwanted objects from the image. This technique remove the cracks from the image, fills the missing part from the image, remove the text, dates etc.

A. SIGNIFICANCE

This algorithm not only recovers the images which got damaged but also removes unwanted objects , cracks, dates etc from the image, fills the missing part from the image.

B. SCOPE

Inpainting is used for reconstructing lost or deteriorated parts of images and videos. Used in computer graphics, in preserving the historical heritage and eliminating the unwanted objects.

II. METHODOLOGY

Exemplar based inpainting is the approach is used for inpainting. In this approach the missing region is filled with the information from surrounding known region at patch level.
It follows three steps:

1. Priorities of each patch are computed.
2. Selection of the best patch.
3. Filling order.

The block diagram is as shown in the figure 1. At input of the digital processor original image is taken, then a target region is being selected and this target region is inpainted using features around it. And then desired inpainted image is obtained at the output of the processor.

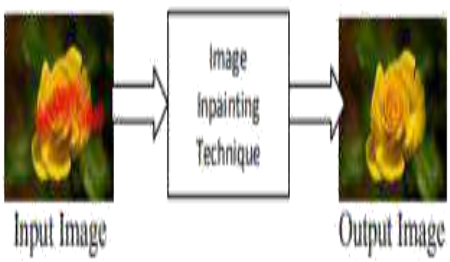


Figure 1 Image inpainted method

The core of the algorithm is an isophote-driven image-sampling process. It is well-understood that patch-based approaches perform well for two-dimensional textures. But, we note in addition that patch-based texture synthesis is sufficient for propagating extended linear image structures. A separate synthesis mechanism is not required for handling isophotes[3]. Here we calculate the confidence and data terms. The confidence term measures how sure a pixel is of its own value. This is computed from the confidence of surrounding pixels that have already been filled (or weren't in the fill region to begin with). The Data term is a function of the strength of isophote hitting the front boundary at each iteration[5]. The simple formulation for computation of the confidence term can be as

$$\text{Confidence term} = \frac{\text{Pixels already filled in the patch}}{\text{Total no. of pixels in the patch}}$$

Next step is to compute the isophote values in the image.

$$\text{Isophote } (I_p) = \frac{\text{Gradient rotated by } 90^{\circ}}{\alpha}$$

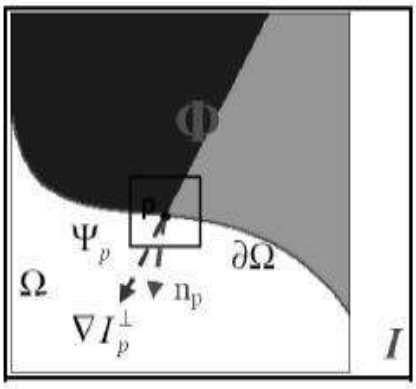


Figure 2 Notation diagram.
Given the patch ψ_p , n_p is the normal to the contour $\partial\Omega$ of the target region Ω and ∇I_p is the isophote (direction and intensity) at point p. Source region is denoted by ϕ. The entire image is denoted with I.

III. FLOW CHART

Figure 3 Flow Chart of patch based inpainting

IV. ALGORITHM

1. Read original image and inpainting mask.

2. Select the pixels to be filled.

3. Calculate gradient = differences in x and y directions.

4. Compute isophote values Ip = Gradient rotated by 90 degrees /Alfa.

5. Loop until entire fill region has been covered.

a. Find contour and normalized gradients at the fill front.

b. Calculate normal to border of fill region as normalized gradient.

c. Compute confidences along the fill front.

i. Find the patch around the fill front.

ii. Find an array of pixel indices which are already filled in the given patch.

iii. Confidence = pixels already filled in patch/total pixels in patch.

d. Compute data term as data term = abs of Ip * normal. e. Compute patch priorities = confidence term * data term.

f. Find patch with maximum priority.

g. Find patch that minimizes error.

i. Extract the inputs.

ii. Reject the patches having a region to be filled.

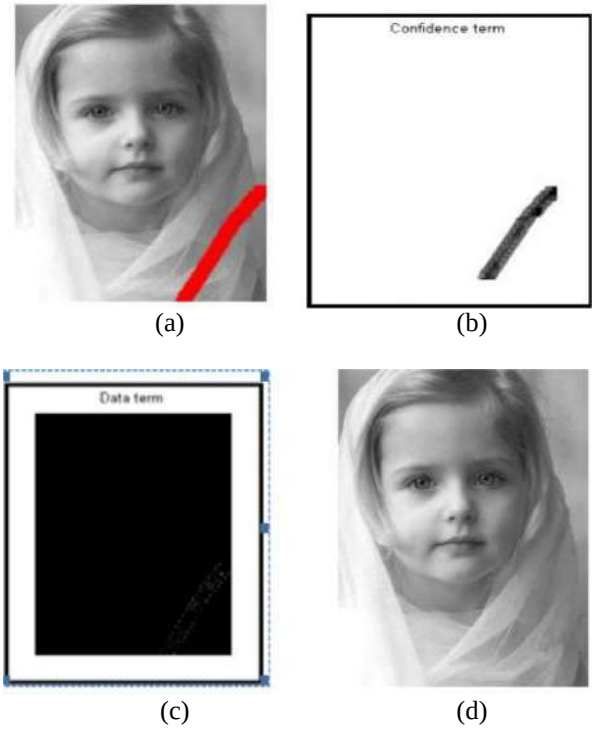
iii. Find the patch which minimizes the sum squared error (SSE) between two patches.

h. Copy image data from patch that minimizes error to patch with maximum priority.

i. Update fill region.

j. Propagate confidence and isophote values.

V. RESULTS



(a) (b)

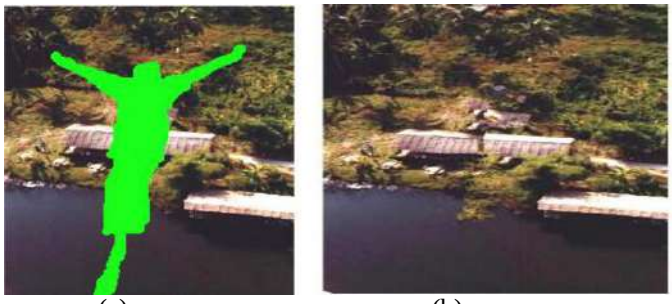
(c) (d)

Figure 4 Result of inpainted image

(a) Mask image. (b) the confidence term (c) the data term (d) resulting image of filling all packets.

(a) (b)

Figure 5 Removal of an object from the picture

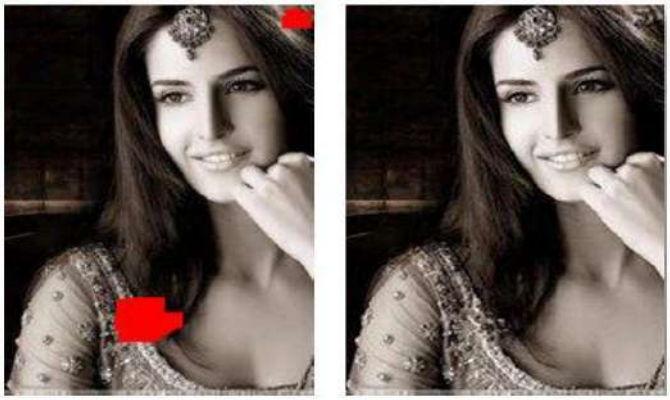


(a) (b)

Figure 6 Removal of the unwanted object.

(a) (b)

Figure 7 Image Reconstruction.



(a) (b)

Figure 8 Removal of logo from the image

VI. COMPARISON WITH EXISTING TECHNOLOGY

The previous techniques that were used in inpainting includes Total Variational (TV) Model which uses an Euler-Lagrange equation coupled with anisotropic diffusion to maintain the isophotes directions. It is very important to know the Curvature-Driven Diffusion (CDD) model enhances the

TV method to drive diffusion along the isophotes directions and thus allows inpainting of thicker regions. But these methods mainly deal with structure reconstruction in the images. They fail to restore the images containing more textured areas. The Patch based Inpainting which is currently used technique is more appropriate. It solves the inpainting problem by combining the two approaches- structure and texture inpainting. Simultaneous propagation of texture and structure information is achieved by a single, efficient algorithm. The success of structure propagation, however, is highly dependent on the order in which the filling proceeds. It is a best-first algorithm in which the confidence in the synthesized pixel values is propagated in a manner similar to the propagation of information in inpainting[4]. Hence, we have studied in detail about the algorithms which were being proposed for the digital image inpainting and also comparison with the existing techniques in which the patch based inpainting is more suitable for image inpainting. This algorithm results in preservation of edge sharpness, no dependency on image segmentation and balanced region filling to avoid overshooting artifacts.

VII. ADVANTAGES

- This implementation needs only the image with marked fill region compared to the earlier implementations which required degraded image and inpainting mask image with marked fill region as input images.
- Algorithm is robust towards changes in shape and topology of the target region as demonstrated in results section, together with other advantageous properties such as preservation of edge sharpness, no dependency on image segmentation and balanced region filling to avoid over-shooting artifacts.
- Patch-based filling helps achieve speed efficiency, accuracy in the synthesis of texture and accurate propagation of linear structures.

IX. APPLICATIONS

- Some of the common applications are removal of superimposed text like dates, subtitles, or publicity, image restoration, scratch removal. This can be used for removal of entire objects from the image as presented in results. Image compression is one of the new emerging application of inpainting. Image can be transmitted removing some data and can be reconstructed at receiver using inpainting. It can be also used in security applications for hiding important places in satellite images.

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VOICE GUIDING SYSTEM FOR DISABLED PERSON USING ULTRASONIC SENSOR

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***Abstract*— The paper describes ultrasonic blind stick with GPS tracking system. Traditionally visually impaired people used a stick to find out if any obstacles are present in front of them. But this stick is inefficient in various aspects and the person using it has to face several problems. The objective of this project is to provide the visually impaired abetter navigational tool. The ultrasonic blind walking stick is way more advanced than the traditional walking stick as the use of sensors makes object detection easier.GPS system provides the information regarding to his current location. Thus this system allows for obstacle detection as well as getting the live GPS data on server for tracking blind person. This paper discuss about how this stick is built and how it will help blind people. There are various methods to do it and we are using helpful concepts from each paper.**

Keywords- Ultrasonic, GPS

1. INTRODUCTION

In the study of previously developed systems and analysis of it, let us to define a newly equipped system which could overcome the disadvantages of the previous systems. So therefore using the existing technologies we provide a better solution to the stated problem.

There are so many blind people in the society, who are suffering from exercising the basic things of daily life and that could put lives at risk while travelling. There is a necessity these days to provide security and safety to blind people.

There have been few devices developed so far to help the blind people. The blind stick is integrated with ultrasonic sensor along with GPS. Our proposed project first uses ultrasonic sensor to detect obstacles without touching it using ultrasonic waves. On sensing obstacles the sensor passes this data/8 to the microcontroller. The microcontroller then processes this data and calculates if the obstacle is close enough. If the obstacle is far the circuit does nothing but If the obstacle is close the microcontroller sends a signal to sound a Voice module in any language.

Thus this system allows for obstacle detection as well as finding stick if misplaced by visually disabled person. Ultrasonic sensor is used to detect any obstacle in front of blind person. It has Detection Distance of 2cm-450cm so whenever there is some obstacle in this range it will alert the blind person. So person can be aware of it & Voice module will ring and person can get idea where the stick is placed. One more feature is that the GPS systems which can use for tracking the blind person location which feeds live data on server.

Figure 1 Blind Person Crossing Road

Figure 2 Need of Help

II. METHODOLOGY

A. *Ultrasonic Sensor*

Ultrasonic transducers: Generating, detecting & processing ultrasonic signals Ultrasonic sensor is produce the sound waves above the frequency of human hearing and can be used in a different variety of applications such as, sonic rulers, proximity detectors, movement detectors, liquid level measurement. Ultrasonic Sensor Ranging Module Ultrasonic sensor module

HC - SR04 provides 2cm - 400cm non-contact measurement facility, the ranging accuracy can reach to 3mm. The modules contain ultrasonic transmitters, receiver and control circuit.

The basic principle of work:

(1) Using IO trigger for at least 10us high level signal,

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time×velocity of sound (340M/S) / 2

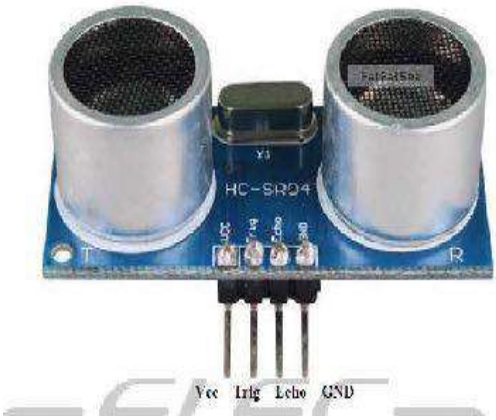

Figure 3 Ultrasonic transducers.

B. *GPS*

The Global Positioning System (GPS), originally Navstar GPS, is a space-based radionavigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites .The GPS system does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS system provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver .The GPS concept is based on time and the known position of GPS specialized satellites. The satellites carry very stable atomic clocks that are synchronized with one another and with the ground clocks. Any drift from true time maintained on the ground is corrected daily. In the same manner, the satellite locations are known with great precision. GPS receivers have clocks as well, but they are less stable and less precise. GPS satellites continuously transmit data about their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities (three position coordinates and clock deviation from satellite time).

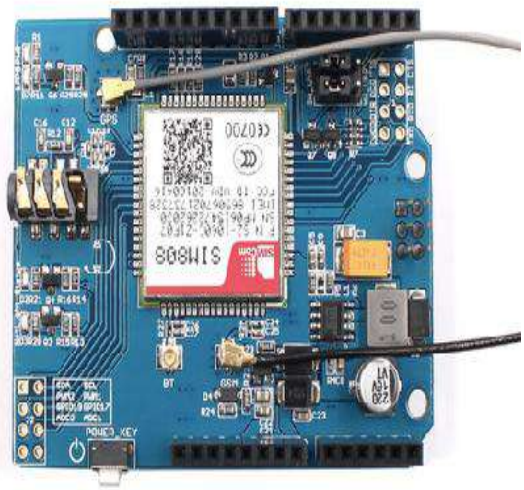

Figure 4 GPS Module

C. *Wi-Fi Module (ESP8266)*

ESP8266 is high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement. ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to increase the performance of the system in such applications.

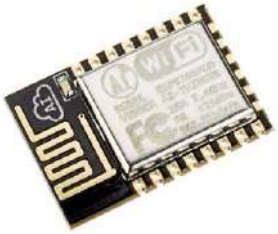

Figure 5 Wi-Fi Module (ESP8266)

D. Voice Recording Module

Voice Record Module is base on ISD1820, which a multiple-message record/playback device. It can offers true single-chip voice recording, no-volatile storage, and playback capability for 8 to 20 seconds. The sample is 3.2k and the total 20s for the Recorder. This module use is very easy which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, ChipKit etc. Frome these, you can easy control record , playback and repeat and so on.

Figure 6 Voice Recording Module

III. IMPLEMENTATIOM

3.1 Hardware and Mechanical Design

E. Design

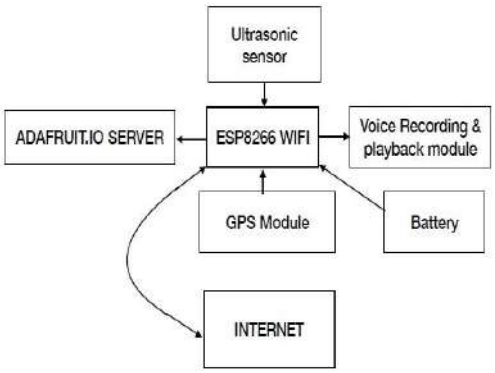

Figure 7 Block diagram

As shown above block diagram the object tracking and following robot is consist of four main components AVR Microcontroller, GSM Module , GPS Module, and LCD module

3.2 Software Design

A. Algorithm

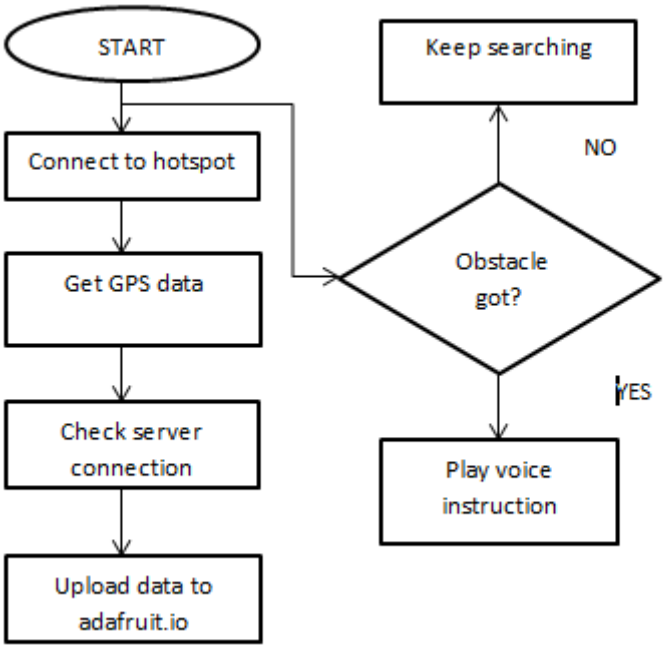

Figure 8 Flowchart of working of gsm and gps

B. Software Required

ARDUNIO 1.8.5

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open Source software. This software can be used with any Arduino board.

KiCad

KiCad is a free software suite for electronic design Automation (EDA). It facilitates the design of schematics for electronic circuits and their conversion to PCB designs.
It features an integrated environment for schematic capture and PCB layout design. Tools exist within the package to create a bill of materials, artwork, Gerber files, and 3D views of the PCB and its components.

IV. RESULT

A Object tracking and following robot will follow the specific object that is the object is clicked by android application and GPS will provide the location of robot LCD will display longitude and latitude..Etc GSM is used to send and receive the message to or from user.

V. CONCLUSION

All the studies which had been reviewed show that, there are a number of techniques for making a ultrasonic blind stick for blind people. The aim of this paper is to get familiar with the work done in making walking stick smarter and more helpful. The literatures related to this topic were reviewed and analysed. As technology improves these smart sticks need to be modified. The simulation results are expected for the ultrasonic sensors, Voice recording module, GPS and ESP8266. So in this paper wide survey of the work related to this project is done and we have shortlisted some useful aspects from each project. This will also help to decide designing approach.

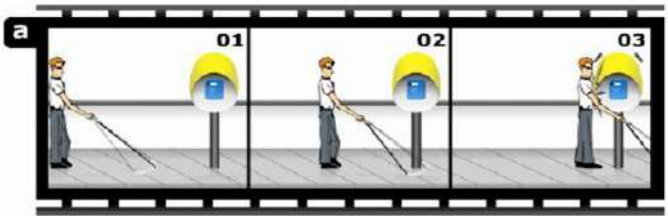

Figure 9 Using ordinary Cane

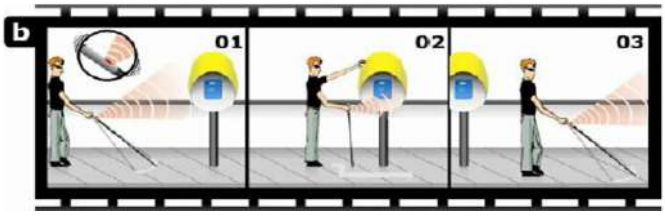

Figure 10 Comparison of Ordinary & Electronic Stick

VI. APPLICATIONS

- Voice guided vehicles for handicapped
- Smart wheel chair based on voice recognition for handicapped
- GPS guided shoes for visually impaired
- Military applications

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HAND MOTION CONTROLLED ROBOTIC ARM

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***Abstract*—nowadays, robots are increasingly being integrated into working tasks to replace humans especially to perform the repetitive task. In general, robotics can be divided into two areas, industrial and service robotics these robots are currently used in many fields of applications including office, military tasks, hospital operations, dangerous environment and agriculture. Besides, it might be difficult or dangerous for humans to do some specific tasks like picking up explosive chemicals, defusing bombs or in worst case scenario to pick and place the bomb somewhere for containment and for repeated pick and place action in industries. Therefore a robot can replace human to do work. There are certain techniques being implemented to control the movement of a robotic arms like Motion sensors & markers, vision systems etc. Use of accelerometer as a gesture recognition device is becoming quite popular due to its small size and low moderate cost.**

Keywords--Gestures, robotic arm, accelerometer.

I. INTRODUCTION

Robotics is a current emerging technology in the field of science. Robotics is the new emerging booming field, which will be of great use to society in the coming years. These days many types of wireless robots are being developed and are put to varied applications and uses. This robot is operated & controlled wirelessly with the help of hand gestures which transmits signals to the robot through an auto device fixed on the gloves put on hands rather than controlling it manually through a conventional remote controller. The Robot moves and acts in the manner depending on the gestures made by the fingers and hand from a distance. The robot moves in up, down, left or right directions and picks up objects from one place and keeps at another desired place as directed by the movements of fingers and hand. The project is based on wired communication.

A SIGNIFICANCE

This machine performs whatever we want to do recognizing our gestures thereby reducing human efforts and time.

B SCOPE

The project is built on a wired model. It could further be developed to work on wireless communication, thus allowing the user to move in an even easier unrestricted manner. A clamper can be connected on the motor M6 which will allow the movements of the palm and allow picking and placing of objects. Currently the accelerometer signal is being processed via a digital computer; this could be eliminated by using a fast microprocessor such as ARMv7, etc. It could also be possible to eliminate the ATmega32 altogether when ARMv7 is being used. The microprocessor could take the input from the accelerometer and smoothen it and then generate the corresponding PWM signal itself to actuate the servo motors.

II. METHODOLOGY

In this Project, the hardware and software function are combined to make the system reliable. The Arduino will be interfacing the robot with the sensor i.e. 3 axis accelerometer and the actuators i.e. servo motors which will control the movement of the robot respectively. The model consists of the transmitting and receiving units. Main components used are as Follows –

1. Accelerometers (Sensor)
2. Servo Motors (Actuator)
3. Arduino Nano (Data Acquisition)
4. Arduino UNO (Controller)

3-axis wireless accelerometer mounted on a glove is used to capture human hand behaviors, and microcontroller acquired the values in analog form. The 3-axis accelerometers (ADXL330, Analog Device) is physically rated to measure accelerations over a range of at least +/- 3g, with a sensitivity of 300 mV/g and sensitivity accuracy of 10%. The analog readings from accelerometer can be displayed on a LCD and analyzed to create a mathematical relation with the PWM control of motors. The advantage of the accelerometer is that the values do not change unless there is a change in position. But the problem with the accelerometer is that it contained

high level of noise which makes the values inaccurate. So, to make these values accurate Gyroscope sensor.

III. OBJECTIVE

The main objective of this project is to investigate the characteristic and performance of the development of robotic arm to mimic the human hand on manipulating the objects by introducing the PIC based wireless system. Followings are the additional objective proposed system:

A. To fabricate robot hands, which is capable of applying independent forces to a grasped object?

B. To produce a wireless artificial robotic hand which mimic the human hand on manipulating the objects as well as contribute to the solution of robot end effectors grasping problem and robot reprogramming difficulty.

C. To control the movement by using glove to integrate with hand and teleoperate by RF wireless module.

D. To design control parts of the robot hand by PIC/AVR/ARM family midrange microcontroller as controller.

IV.SENSORS AND CONTROLLER

A)SERVO MOTORS(4):

Servo motors are a type of electromechanical actuators that do not rotate continuously like DC/AC or stepper motors; rather, they are used to position and hold some object. They are used where continuous rotation is not required so they are not used to drive wheels (unless a servo is modified). Servos also employ a feedback mechanism, so it can sense an error in its positioning and correct it. This is called servomechanism.

Figure 1 Servo Motors

B)ACCELEROMETER

A kind of sensor works by giving analog data in x, y, z directions

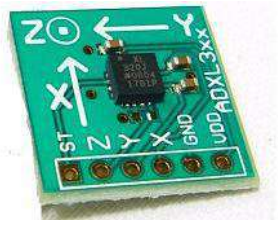

Figure 2 Accelerometer

C)FLEX SENSORS

Strip of carbon material having metal pads inside it. Measures amount of deflection or bending.

Figure 3 Flex Sensors

D)ARDUINO BOARD

Microcontroller board based on ATMEGA328P. It has 14 digital input/output pins.

Figure 4 Arduino Board

V.WORKING

In this project, a mobile robot that is controlled by the gestures made by the hand is designed. The working of the robot is explained here. As mentioned earlier, the gesture controlled robot is a wireless operated robot and has two parts: Transmitter and Receiver. When the robot is powered on, the transmitter part, which consists of Arduino, Accelerometer, Encoder and RF Transmitter, will continuously monitor the accelerometer sensor. This data is captured by the Arduino, which transmits appropriate data to the Encoder, based on the orientation of the Accelerometer. The parallel data received by the encoder is converted into serial data and this serial data is transmitted by the RF Transmitter. At the receiver section, the RF Receiver receives the serial data and transmits to Decoder IC. The Decoder will convert the serial data to parallel data and this parallel data is given to the motor driver IC. Based on the data, the movement of the motors, and hence the movement of the robot is defined. Working is divided into 2 parts-

INPUT SIDE

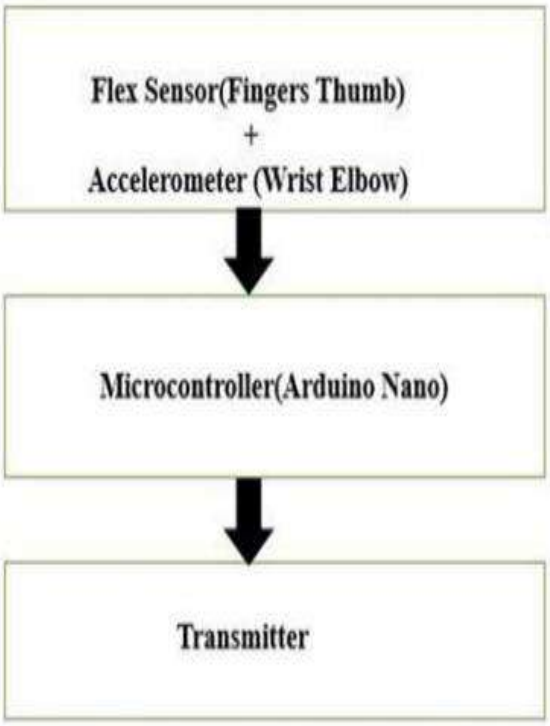

Figure 5 Input Side

OUTPUT SIDE

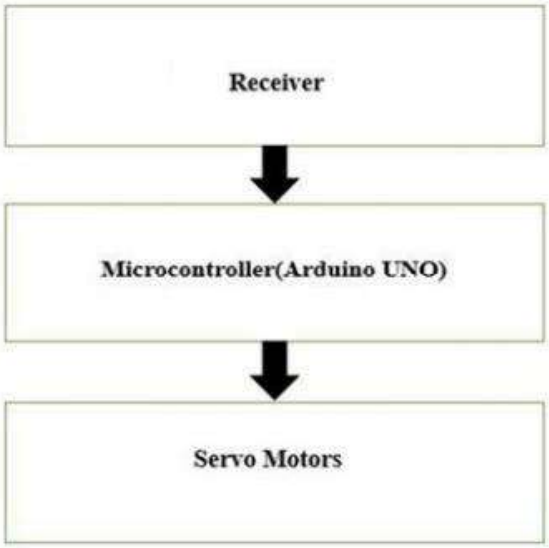

Figure 6 Output Side

FLOW DIAGRAM:

The basic working of the machine can be explained with the help of a flow diagram:

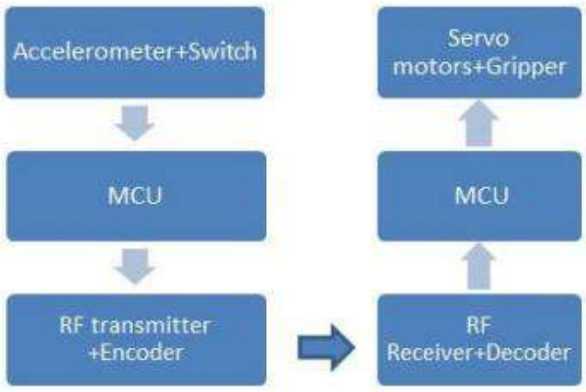

Figure 7 Flow Diagram

The transmitting unit, as shown in figure- 5 is at human end can be mounted on a glove which is worn by human hand. The unit contains an accelerometer, a arduino for processing the signals and analog values from accelerometer and a RF transmitter to transmit codes against different ADC values from MCU (arduino).

The values are being transmitted wirelessly at receiving end, which consists of a RF receiver, & a arduino for controlling servo motors. The whole arrangement is placed on a mobile platform with wheels to facilitate movement from one place to another. The mobile platform can be controlled using a wireless remote control.

VI. ADVANTAGES

- It is easy to design as all components are easily available.
- It is portable & can be placed anywhere.
- Due to wireless communication data rate is faster & ease of operation.
- Microcontroller can be reprogrammed if any modification is required.
- There is no need of lengthy wires.

VII.DISADVANTAGES

- Precise programming is needed.
- It replace human workers so unemployment increases.
- Robot will only respond when you move your hand.

VIII.APPLICATIONS

- It is useful for moving heavy loads from one place to another.
- It is general purpose device for better leaving.
- It is useful in Military applications.
- It plays a major role in helping very weak people in their daily life.
- It can be used as a assistance for physically challenged people.

IX.CONCLUSION

The objectives of this project has been achieved which was developing the hardware and software for an accelerometer controlled robotic arm. From observation that has been made, it clearly shows that its movement is precise, accurate, and is easy to control and user friendly to use. The robotic arm has been developed successfully as the movement of the robot can be controlled precisely. This robotic arm control method is expected to overcome the problem such as placing or picking object that away from the user, pick and place hazardous object in a very fast and easy manner.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our HOD Prof. R. H. Khade ,our project guide Prof. Padmaja Bangde and our project coordinator Prof. Ujwal Harode who have significantly guided and encouraged us to proceed with this newly proposed idea. We would also like to thank our principal Dr. S. M. Joshi for providing us with all the facilities and environment to bring out the best of our capabilities

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Spinning LED Display using Arduino

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***Abstract*— A spinning display is a device that creates a stable image which is constructed by a stick turning around its center which is filled with led. By this way, using limited number of LEDs, we can construct an image in the form of normal displays. As far as the conventional led displays are concerned, the revolutionary approach pursued by this type of display can be noticed remarkably. This type of display will create images using one or small number of columns of LED(s) placed on a plate. The plate is attached to a motor which will cause its turn around a circular orbit. By this way, the LED(s) turning around this orbit will create an image for human eye, using the fact that the human eye is not able to clearly distinguish movements beyond a particular frequency.**

Keywords—spinning, display, LED, motor, eye

I. INTRODUCTION

Spinning LED Display consists of LED(s) on a clad turning around an orbit to create 24-bit colored display. The Persistence Of Vision (POV) as a visual art form, using an array of lights, waved back and forth in space, with the lights controlled by wearable computer. POV is the commonly used term to describe the optical illusion whereby multiple discrete images blend into a single image in the human mind and believed to be the explanation for motion perception in cinema and animated films.

A. SIGNIFICANCE

This machine displays designs or patterns given generated for certain applications like displaying time or advertising purposes.

B. SCOPE

The scope of this system can be seen in a few numbers of fields:

1. Advertisement: In this modern era there is a growing need of advertising the products and services. People get influenced by good advertisement. Persistence of vision proved to be very effective method for providing a visual image to attract the consumers. Advertisement can be made much more attractive by two dimensions or three dimension visual image.

2. Entertainment: Persistence of vision plays a very vital role in entertainment point of view. It can be used in shopping malls for displaying messages. It can also be used in film industry. Motion pictures are based on the principles of persistence of vision. The display is like any complex toy. We can make it for fun and diversion by using this application in games and toys.

3. Animation: The persistence of vision is the basic principle of animation. This technique is also used in cartoon animation. Cartoon movies are also result of persistence of vision.

4. Education: If persistence of vision is used in education field it will provide a better way for interactive education. Many concept need to be explained in three dimension view that can be easily demonstrated by the help of this persistence of vision.

II. METHODOLOGY

The main aim of the vending machine is to provide a display according to the pattern given to its input . The Main Part of the propeller clock is ARDUINO board, which is placed on the base of rotating assembly. When the zero position is represented by the hall sensor, which is placed on the rotating PCB, it will generate a low pulse on the interrupt pin of ARDUINO which results in the generation of desired pattern. Since we are making use of internal program execution EA (External Access) pin has to be made high with the help of VCC.. The anodes of LED(s) are joined together and connected to 5v supply. The spinning display shows things or patterns like digital clock, messages, etc.

III. COMPARISON WITH EXISTING TECHNOLOGY

This project started with a simple principle which is frequently encountered in our everyday life, which is Persistence of Vision. This phenomenon makes one feel fast moving/changing objects to appear continuous. A television is a common example; in which image is re-scanned every 25 times, thereby appear continuous. Further, a glowing objects if rotated in a circle at fast speed, it shows a continuous circle. But if these LED(s) are switched at precise intervals, a steady display pattern can be shown. Existing systems do employ POV principle, but for displaying each pixel, individual LED is used. This results in a huge number of LED(s) even for small sized displays. By using a propeller type display, LED count can be kept to a bare minimum. Even 15 LED(s) can perform a task of over 525 LED(s).

Figure 2 Bluetooth module

IV.SENSORS AND CONTROLLER:

A. MICROCONTROLLER:

The microcontroller used is Nano Atmega 328. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source.

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x) or ATmega168 (Arduino Nano 2.x).

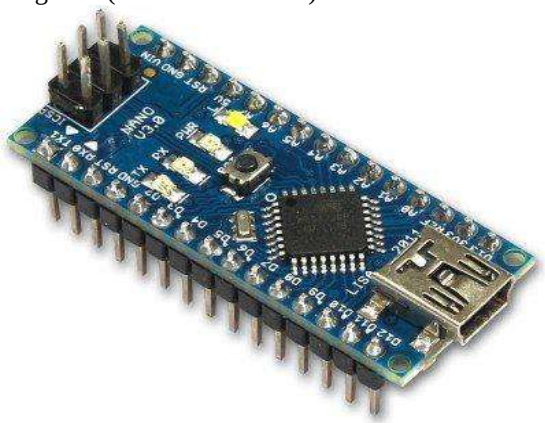
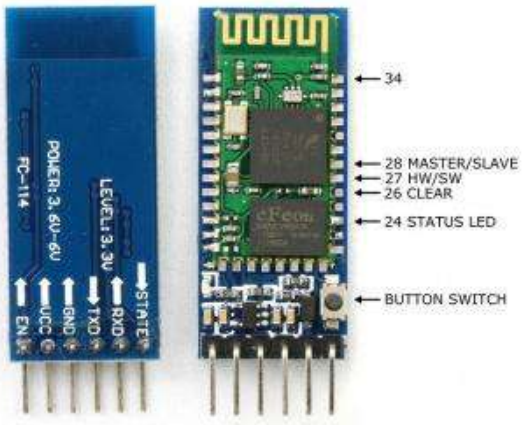


Figure 1 Nano Atmega328 Arduino Board

B. BLUETOOTH MODULE:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc.



C. DC MOTOR:

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. In this system, the DC Motor of Operational voltage and most types produce rotary motion; a linear motor directly produces force and motion in a straight line. The speed is 3000rpm.

Figure 3 DC gear motor

D. RTC MODULE:

The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of NV SRAM. Address and data are transferred serially through an I²C, bidirectional bus. The clock/calendar provides seconds, minutes, hours, day, date, month, and year information. The end of the month date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with AM/PM indicator. The DS1307 has a built-in power-sense circuit that detects power failures and automatically switches to the backup supply. Timekeeping operation continues while the part operates from the backup supply.

Figure 4 RTC Module

E. HALL SENSOR MODULE:

This module is based on the A3144E Hall switch sensor and it is designed to be used in applications requiring magnetic field sensing. It can be used for sensing motor speed, position and more. It features two outputs: AO, the analog signal output and DO, the digital output, after being passed through a voltage comparator LM393. The Hall sensor outputs a low level voltage when magnetic field is detected. The LM393 series was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, the LM393 series will directly interface with MOS logic where their low power drain is a distinct advantage over comparators.

Figure 5 Hall Sensor Module

V.WORKING

The devices which are connected/interfaced with the microcontroller (Arduino) can be represented in a block diagram

As shown below:

A .BLOCK DIAGRAM

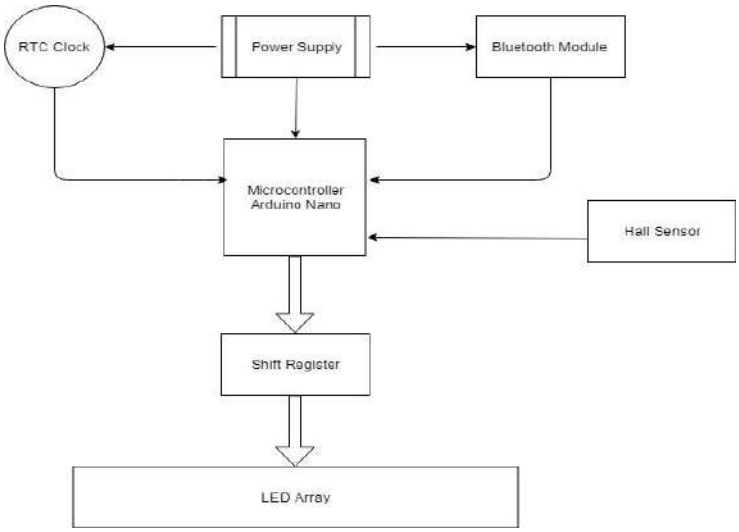


Figure 6 Block Diagram

B.FLOW DIAGRAM

The basic working of the machine can be explained with the help of a flow diagram:

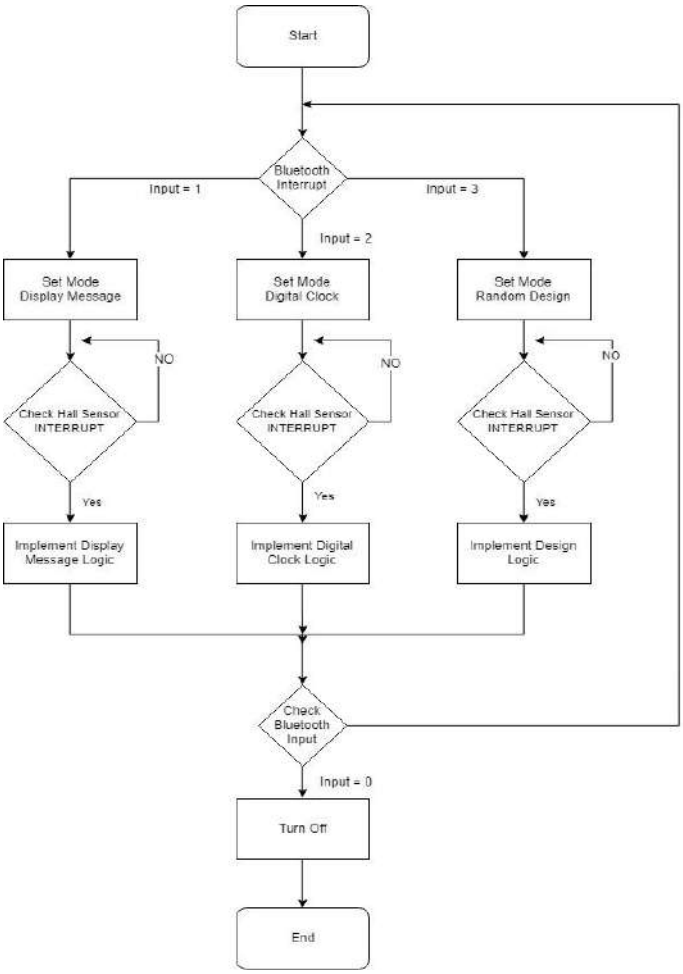


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Figure 7 Flow Diagram

- The Spinning LED Display works on the principle of Persistence Of Vision (POV)
- When the motor starts rotating, the whole board rotates with it.
- The LEDs start to blink in the pattern provided by the Arduino board.
- The rotation of the motor causes a particular pattern to be observed.
- The RTC module is used to provide real time values for patterns like time, date, etc.
- The Bluetooth module helps in deciding the display pattern wirelessly.
- A magnet is used to check the zero position or the starting point via the Hall Sensor.

VI. ADVANTAGES

- The Rotating Display is portable in size.
- Eliminates the necessity to use many LEDs which can lead to overlapping of patterns.
- Low circuit complexity

VII.DISADVANTAGES

- Error in coding can cause abrupt patterns.
- Change in speed of the motor would cause the improper or no formation of the pattern.

VIII.APPLICATIONS

- Advertisements
- Propeller Clocks
- Shopping Malls

.

IX.CONCLUSION

Although digital clocks and other systems are being used widely nowadays, using this type of display can help in making the advertising and other system more desirable and innovative. This type of machine reduces analog circuit dependency and also provides accurate results.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to our HOD Prof. R. H. Khade, our project guide Prof. Ravi. K. Biradar and our project coordinator Prof. Ujwal Harode who have significantly guided and encouraged us to proceed with this newly proposed idea. We would also like to thank our principal Prof. Dr. S.M.Joshi for providing us with all the facilities and environment to bring out the best of our capabilities

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Automated Irrigation System

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***Abstract*—the project aims to develop an irrigation system keeping a touch with modern technology. The system would be automatic so as to provide ease to the user and the project will incorporate various sensors, raspberry pi, arduino & zigbee. Agriculture is one of the most important branch of science directly concerning human survival yet it is one of the least technically advanced fields. Our project aims to optimize irrigation so as the user not only experiences ease but also can make informed decisions based on the data provided by our system. A wireless sensor network is setup in the field. The network will include sensors like, moisture sensor, pyranometer, water level sensor, and soil temperature sensor and rainfall detector. The data from the WSN will be sent to the raspberry-Pi module using zigbee communication which will control the pump nozzles. The user will also get data via GSM module. The irrigation system will provide water to the crops using pumps. The water requirement will be decided by refreshing the data provided by the WSN. The irrigation system will be fully automated but the user can choose to manually control the system if user wishes. The system will not only provide the user with an efficient irrigation system but will also give in depth data analysis based on which information can be made.**

Keywords-Irrigation, Rasberry pi

I. INTRODUCTION

A. Literature Survey

In India, water resource is in severe shortage and agricultural water consumption accounts for about 70% of the total water consumption. One important way to improve the utilization rate of irrigation water is to implement precise controlled information on the basis of water crops demand data. In the modern irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved. At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land from time to time. This process sometimes consumes more water and time. Automatic irrigation scheduling consistently has shown to be valuable in water use efficiency with respect to manual irrigation based on direct soil water measurements. The aim of the implementation is to demonstrate that the automatic irrigation can be used to reduce water use. The implementation is a automated irrigation system that consists of a distributed wireless network of soil moisture and temperature sensor. Automated Irrigation System is one of the methods that saves water.

B. Problem Statement

The project aims to develop an irrigation system keeping a touch with modern technology. The system would be automatic so as to provide ease to the user and the project will incorporate various sensors, raspberry pi, arduino & RF module. A wireless sensor network is setup in the field. The network will include sensors like, moisture sensor, water level sensor and rainfall detector. The data from the WSN will be sent to the raspberry-Pi module using RF communication module which will control the pump nozzles. The user will also get data via GSM module.
The irrigation system will provide water to the crops using pumps. The water requirement will be decided by refreshing the data provided by the WSN. The irrigation system will be fully automated but the user can choose to manually control the system if user wishes.

II. METHODOLOGY

A. (RPI). Raspberry pi

Figure 1 Raspberry Pi

The Raspberry Pi is credit-card sized computer. It is capable of doing everything you'd expect a desktop computer to do. There are different models of Raspberry Pi from Raspberry Pi 0 to Raspberry Pi 3. In this project we are using Raspberry Pi Model 3 B+. A Raspberry Pi with smaller size and reduced input/output (I/O) and general-purpose input/output (GPIO). All models feature a Broadcom system on a chip (SoC), which includes an ARM compatible central processing unit (CPU) and an on-chip graphics processing unit (GPU, a Video Core IV).

B. ARDUINO

Figure 2 Arduino uno board

The Arduino UNO is a widely used open-source microcontroller board based microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards. The board features 14 Digital pins and 6 Analog pins. The Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX)

C. GSM MODULE

Figure 3 GSM module

GPRS/GSM Module is an ultra compact and reliable wireless module. It is a breakout board and minimum system of SIM900 Quad-band GSM/GPRS module. It can communicate with controllers via AT commands. This module support software power on and reset.

The GPRS is configured and controlled via its UART using simple AT commands. Just connect on the Arduino/Raspberry Pi/AVR/PIC/ARM/FPGA board, you could easy to use AT command control it.

D. SENSORS

Different Wireless sensors:-

1. Moisture sensor

This moisture sensor uses the two probes to pass current through the soil, and then it reads that resistance to get the moisture level. More water makes the soil conduct electricity more easily (less resistance), while dry soil conducts electricity poorly.

Specifications

Output voltage signal: 0~4.2v
Current: 35mA
Pin definition:
Analog output (Blue wire)
GND (Black wire)
Power(Red wire)
Size: 60x20x5mm

Figure 4 Moisture sensor

2. Rainfall detector sensor

Figure 5 Rainfall detector sensor

Rain sensor module is an easy tool for rain detection.. Works on the switching principle. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity though a potentiometer. The analog output is used in detection of drops in the amount of rainfall.

Specifications

Working voltage- 5V
Output format: Digital switching output (0 and 1) and analog voltage output AO
With bolt holes for easy installation
Small board PCB size: 3.2cm x 1.4cm
Uses a wide voltage LM393 comparator

3. FLOAT SENSOR

A float switch is a type of level sensor, a device used to detect the level of liquid within a tank. The switch may be used to control a pump, as an indicator, an alarm, or to control other devices.

Figure 6 .Float sensor

E. RF MODULE

The RF modules are very small in dimension and have a wide operating voltage range i.e. 3V to 12V.
RF modules are 433 MHz RF transmitter and receiver modules. The transmitter draws no power when transmitting logic zero while fully suppressing the carrier frequency thus consume significantly low power in battery operation. When logic one is sent carrier is fully on to about 4.5mA with a 3volts power supply. The data is sent serially from the transmitter which is received by the tuned receiver. Transmitter and the receiver are duly interfaced to two microcontrollers for data transfer.

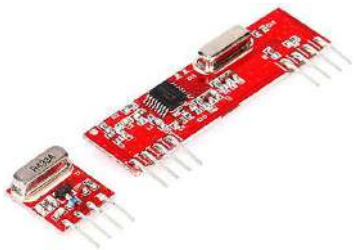

Figure 7 RF Module

III. IMPLEMENTATION

3.1 Hardware and Mechanical Design

A. *Design*

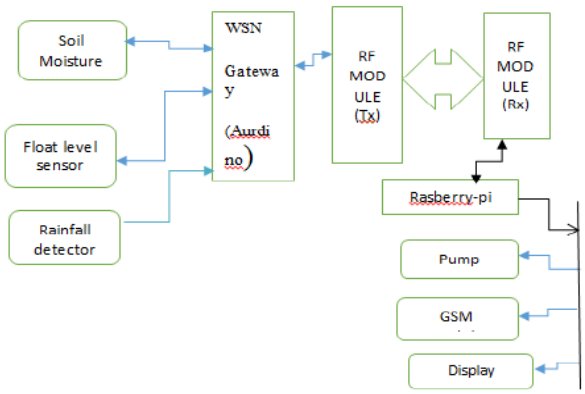

Figure 8 Block diagram of Automated Irrigation System

B. *Assembly*

We have two controllers and 3 sensors on which we can assemble the project. We made RF Module for wireless communication purpose one will transmit the data 1.e sensor information and other will work on receiver for action purpose on field. Again we have monitor & GSM module for diagnosis data. It will send message as a status of pump

3.2 Software Design

A. Algorithm

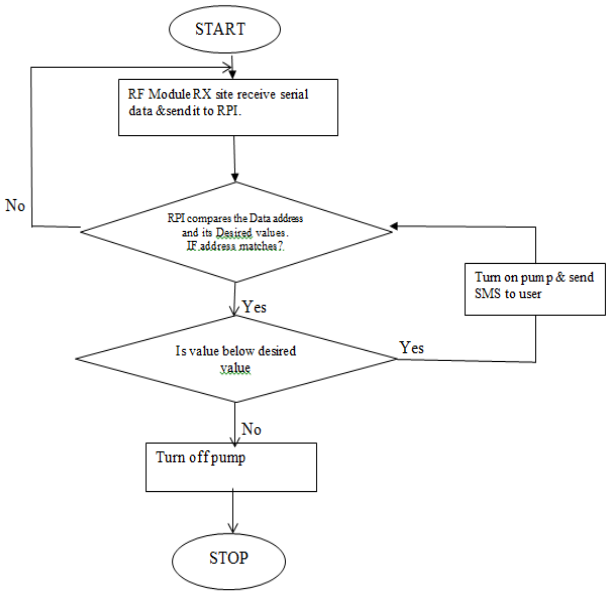

Figure 9 Flowchart of Automated Irrigation System

B. Android software design

A program for Arduino hardware may be written in any programming language with compilers that produce binary machine code for the target processor. Atmel provides a development environment for their 8-bit AVR and 32-bit ARM Cortex-M based microcontrollers

3.3 Software Required

A. PYTHON

Python, C, C++, Java, Scratch, and Ruby all come installed by default on the Raspberry Pi. Python is a widely used high-level programming language for general-purpose programming. An interpreted language, Python has a design philosophy that emphasizes code readability and a syntax that allows programmers to express concepts in fewer lines of code than might be used in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale.

B. C Programming.

C is an imperative procedural language. It was designed to be compiled using a relatively straightforward compiler, to provide low-level access to memory, to provide language constructs that map efficiently to machine instructions, and to require minimal run-time support. Despite its low-level capabilities, the language was designed to encourage cross-platform programming. A standards-compliant and portably written C program can be compiled for a very wide variety of computer platforms and operating systems with few changes to its source code. The language has become available on a very wide range of platforms, from embedded microcontrollers to supercomputers.

IV. OUTPUT MEASUREMENT

A. GSM MODULE

Figure 10 GSM module

GPRS/GSM Module is an ultra compact and reliable wireless module. It is a breakout board and minimum system of SIM900 Quad-band GSM/GPRS module. It can communicate with controllers via AT commands. This module support software power on and reset.

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B. Pump

Figure 11 Pump

An irrigation pump does two things; it provides the water flow rate and the pressure head to make the irrigation system function properly. It will pump the field when the signal is received.

V. RESULT

An Automated Irrigation System will sense the different parameter of the field environment by using sensor network and aurdino will send the data to raspberry pi with help of RF module .The raspberry pi will take action of turning on/off of pump and displaying data on monitor .The GSM is used to send the turning on action of pump as message to the user.

VI. CONCLUSION

Using this system, one can save manpower, water to improve production and ultimately increase profit. The automated irrigation system is feasible and cost effective for optimizing water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of plant growth and irrigation system.

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