JOURNAL OF ELECTRONICS ENGINEERING

PCE
PILLAI COLLEGE OF ENGINEERING

JULY 2019

CONNECTING THE POSSIBLITIES

INTELLIGENT UAV

SELF BALANCING ROBOT

Community Talk

The technical journal team of July 2019 would like to appreciate Staff members and students for their commendable contribution towards the publications in the departmental journal. We would like to thank our Principal Dr S. M Joshi and Head of the Electronics Department Dr. R.H.Khade for giving us this platform and encouraging the freedom to express our views and ideas in making of the departmental journal.

We extend our gratitude towards the team who strategically worked towards the completion of the journal parallel to their academic commitments. The journal comprises of research paper and technical articles about the various innovations in technical world.

The journal features “Control and Operation of Electrical Load using Centralized Personal”, which is a convenient approach for the Control and Operation of Electrical load is done. Earlier, manual control was needed during switching. With the help of Graphical User Interface (GUI) in personal computer (PC), the manual control has gone away .In case of stadium flood lights which are connected to personal computer centralized control is made possible.

We are grateful for the contributions from our writers, for dedicatedly taking out time from their busy schedule to make this happen. The cover page profoundly justifies our motto “CONNECTING THE POSSIBLITIES”. The exuberance and vitality of colors fuses to build a better future and embrace new technology with buoyant approach.

Dear Readers, we really hope you find the journal knowledgeable and worth sharing with your folks. Please send us your valuable feedback at

pce.etrx.journal@gmail.com and help us towards improvising.

Best Regards, Managing

Editor Board

MESSAGE FROM THE PRINCIPAL

I am happy to know that Department of Electronics Engineering is bringing out its July 2019 issue of Departmental Journal. The journal covers all major technical areas in Electronics and reflects the latest trends in those. The product is a synergetic output of team work involving teachers and students. Students who have given technical papers for departmental journal encompasses innovations and improvisations based on their projects.

I express my compliments to Head of the Department of Electronics, editorial / reviewer board and publication team for their commitment and effort for bringing out this journal.

Best Wishes,
Dr. Sandeep M. Joshi

FROM THE HOD'S DESK

It is my privilege to present July 2019 issued of our journal of Electronics department. The main endeavour of this journal is to create appropriate environment that stimulates vision, research and growth in the area of Electronics. Engineers today have propelled the world to a new era of technological advancement. Blending curiosity with scientific temperament among students is the need of the hour. Hence we encourage our students to publish papers on their project work. Many students have contributed their ideas by means of papers. In this issue we have accommodated 9 papers. I thank my beloved students for writing good quality papers for this journal.

Finally, I express my sincere gratitude to our editorial / reviewer board, publication team for their continued support and invaluable contributions suggestions for the advancement of the journal. I hope you will enjoy reading this issue and we welcome your feedback on any aspect of our journal.

Best Regards,
Prof. R. H. Khade

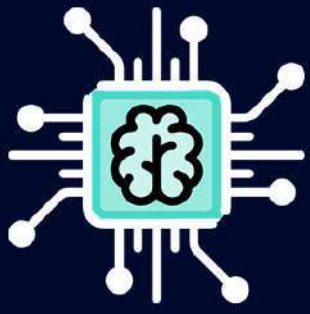
INDEX

1. CONTROL AND OPERATION OF ELECTRICAL LOAD USING CENTRALIZED PERSONAL COMPUTER

2. FOREST SENSE FOR ALERT INDICATION TO SECURE WILDLFE.

3. HAND GESTURE RECOGNITION AND VOICE CONVERSION SYSTEM.

4. HYBRID SELF BALANCING ROBOT USING ARDUINO.



INDEX

5. RFID BASED INTELLIGENT LIBRARY MANAGEMENT SYSTEM.

6. INTELLIGENT UAV AGRICULTURAL PESTICIDE SPRAYER.

7. TOUCH SCREEN BASED PATH DIRECTED ROBOT.

REVIEWERS

DR. P. S. GOYAL

DEAN R&D, PCE

psgoyal@mes.ac.in

DR. G. SITA

PROF. ETRX DEPT.

DR. R. H. KHADE

PROF. SUMAN WADKAR

PROF. RAVI K. BIRADAR

PROF. UJWAL HARODE

ASST. PROF. ETRX DEPT.

uharode@mes.ac.in

EDITORIAL BOARD

DR. SANDEEP M. JOSHI

PRINCIPAL

DR. R. H. KHADE

H. O. D. ETRX DEPT

PROF. SEEMA MISHRA

PROF. MEERA KHARAT

MANAGING EDITOR

PROF. ISHMEET SINGH RIAR

MANAGERIAL AND EDITORIAL ADVISORY BOARD

EDITING COMMITTEE

PRANJAL GUJARATHI

SUMEDH NERLEKAR

DESIGNING COMMITTEE

DEEPAK SINGH

MANAGING COMMITTEE

G. S. S. KUMAR MANTHA

Control and Operation of Electrical Load using Centralized Personal Computer

Vitthal H. Khatmode[1], Rahul S. Kadam[2], Sagar S. Ghag[3], Prof. Tusharika S Banerjee[4]

[1,2,3] Final Year Engineering Students,[4] Prof. of Electronics & Telecommunication department
Electronics Department, PCE, New Panvel, University of Mumbai, India.
[1]vitthalkhatmode@gmail.com, [2]rahulkadam9892@gmail.com, [3]sagarghag.eng@gmail.com

***Abstract*—A convenient approach for the Control and Operation of Electrical load is done. Earlier, manual control was needed during switching. With the help of Graphical User Interface (GUI) in personal computer (PC), the manual control has gone away .In case of stadium flood lights which are connected to personal computer centralized control is made possible. In this paper we have demonstrated the stadium module for the control of its electrical load via PC of control room.**

Keywords—GUI, Automation, Microcontroller, MAX-232, RS- 232, Keil

I. INTRODUCTION

Control system is a technique, method, or system of operating or controlling a process [1][2] by electronic devices with reducing human involvement to a minimum. The fundamental of building an automation system for an office or home is increasing day-by-day with numerous benefits. Industrialist and researchers are working to build efficient and affordability automatic systems to monitor and control different machines like lights, fans, AC based on the requirement. Automation [3][4] makes not only an efficient but also an economical use of the electricity and water and reduces much of the wastage. Automation is another important application of IoT technologies. It is the monitoring of the energy consumption and the Controlling the environment in buildings, schools, offices and museums by using different types of sensors and actuators that control lights, temperature, and humidity.

An automated device can replace good amount of human working force, moreover humans are more prone to errors and in intensive conditions the probability of error increases whereas, an automated device can work with diligence, versatility and with almost zero error. Replacing human operators in tasks that involve hard physical or monotonous work. Replacing humans in tasks done in dangerous environments (i.e. fire, space, volcanoes, nuclear facilities, underwater, etc.) performing tasks that are beyond human capabilities of size, weight, speed, endurance, economy improvement etc. Automation may improve in economy of enterprises, society or is most of importance to humankind. For example, when an enterprise that has invested in automation technology recovers its investment, or when a state or country increases its income due to automation like Germany or Japan in the 20th Century. That's why it looks into construction and implementation of a system involving hardware to control a variety of electrical and electronics system.

II. PROBLEM DEFINITION

Manual management makes it difficult to coordinate with Electrical load control. We aim to use an RS-232 protocol from the microcontroller to communicate with the PC. To turn ON/OFF the appliances, we would use Hyper Terminal on PC. Once the connection is established with the personal computer, then the system will start to work. The microcontroller used in this project belongs to 8051 family. The intensity control can also be incorporated using power electronic devices.
The problem can be approached in two steps:

Step 1: Human Interface to PC through RS232.

Step 2: Remote PC using GUI to Stadium module.

III. SYSTEM DESCRIPTION

This system is incorporated with the electrical loads and also associated to the PC where centralized control takes place. It uses an MAX 232 protocol from the microcontroller to communicate with the PC. To switch the appliances, we employ Hyper Terminal on personal computer. Once the connection is established with the PC, then the system begins to work. The 8051 family microcontroller is used in this project. Further, this project can be improved by implementing a GUI based control board on the PC with suitable embedded system software. The power control can also be integrated using power electronics devices. Thus, this is all about PC based electrical load control. We hope that it give a better understanding of this concept in implementation of any electrical project.

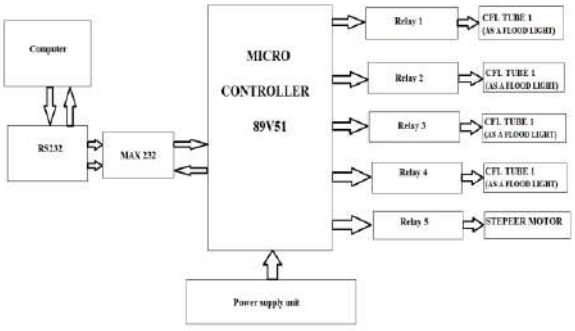


Figure 1 Block diagram

3.1 Max232

The MAX232 is an integrated circuit that converts signals from an RS-232serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. When a MAX232 IC receives a TTL level to convert, it changes a TTL Logic 0 to between +3 and +15V, and changes TTL Logic 1 to between -3 to -15V, and vice versa for converting from RS232 to TTL.

3.2 Relay Driver

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability. The ULN functions as an inverter. If the logic at input 1B is high then the output at its corresponding pin 1C will be low.

3.3 Microcontroller 8051

This is the most important segment of the project. The controller is responsible for detection and polling of the peripherals status. It is responsible for making and prioritizing all the devices attached to it. In this project, P89V51RD2 microcontroller is used. The P89V51RD2 is a low-power, high performance CMOS 4-bit microcontroller with 64K bytes of in-system programmable Flash memory. It has got 32 I/O lines two data pointers, two 16-bit timer/counters, six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and a clock circuitry.

IV. METHODOLOGY

Step 1: Human Interface to PC through RS232.

When the power is ON initially, all IC's & Relays get resets. Once any Button is pressed by user through computer control device window (GUI), computer will send command to Microcontroller with the help of standard serial communication protocol (RS 232). And through microcontroller relay operation take place & according that load works. The developed model is connected to four lights.

Step 2: Remote PC using Graphical User Interface to Stadium module.

With the help of Graphical User Interface by giving appropriate command individual buttons are turned on and off simultaneously. All the devices can work at a time. Any device can turn off as on as per requirement by giving appropriate command to the buttons.

V. RESULTS AND DISCUSSION

AT89C52 microcontroller is a programmable IC, which needs to be programmed to suit the design. The source code was first compiled on the Keil microvision Simulator and then test ran on proteus. Proper connection was given to the code during compilation in order to avoid any logic errors. The hex file was then generated and transferred to the chip with the aid of a programmer. All the ICs were tested separated on a bread board to ensure that they are in proper working condition. The whole circuit was also tested on the bread board to make sure it was design correctly. During construction, each section was tested as it was built to make sure the connections were done correctly before going onto the next section. This was done by applying the correct logic signals to the ICs and observing the output. After construction, the system was tested as follows; to test each of the relay outputs, typed ON 1 on the PCs HyperTerminal, then pressed the Enter key. Almost immediately, appliance 1 switched ON. To test the second relay, ON 2 was typed and then Entered, the appliance 2 switched ON, the same procedure was repeated for output 3 and 4, and the corresponding appliance came ON. To test the reverse case, OFF 1 was typed and then Entered, appliances 1 automatically switched OFF. The same applies to appliance 2, 3 and 4.

Figure 2: Demonstration

VI. CONCLUSION

To develop a flood light can be centrally controlled form the PC gives better which stage management. With this system, one can control the electrical appliances ON/OFF by just being seated at one place using a PC. This system is integrated with the electrical loads and also connected to the PC where centralized control takes place. Also using this PC based control system we can overcome the problem of manual control system. It is also time consuming.

ACKNOWLEDGEMENT

Would like to thank and express our sincere gratitude to the principal Dr. Sandeep Joshi and also Dr. Rajendra Khade

,Head of Department for all the support and giving us this chance to work on this topic even if it is part of the course.

REFERENCES

[1] J. C. Nunes and J. C. M. Delgado, “An Internet application for home automation,” Electrotechnical Conference, 2000. MELECON 10th Mediterranean, Vol. 1, pp. 298 -301, 2000.

[2] Neng-Shiang Liang; Li-Chen Fu; Chao-Lin Wu; “An integrated, flexible, and Internet-based control architecture for home automation System in the Internet era,” Proceedings ICRA 2002. IEEE International Conference on Robotics and Automation, Vol. 2, pp. 1101 –1106, 2002.

[3] Alkar, A. Z., & Buhur, U. (2005). “An Internet Based Wireless Home Automation System for Multifunctional Devices”. IEEE Consumer Electronics, 51(4), 1169-1174.

[4] Rifat Shahriyar, Enamul Hoque, S.M. Sohan, Iftekhar Naim; “Remote Controlling of Home Appliances using Mobile Telephony”, personal computer International Journal of Smart Home,Vol. 2, No. 3, July, 2008.

[5] Inderpreet Kaur, “Microcontroller Based Home Automation System With Security”, International Journal of Advanced Computer Science and Applications,Vol. 1, No. 6, December 2010.

[6] J ia-Ching Wang; Hsiao-Ping Lee; Jhing-Fa Wang; Cai-Bei Lin; , "Robust Environmental Sound Recognition for Home Automation," Automation Science and Engineering, IEEE Transactions on , vol.5, no.1, pp.25-31, Jan. 2008

FOREST SENSE FOR ALERT INDICATION TO SECURE WILDLFE

Sushant Subhash Babar[1], Ninad Nitin Joshi[2], Amar Pralhad Khamkar[3], Akash B. Dhanawade[4], Prof. Tusharika B

[1,2,3,4] Final Year Engineering Students,[5] Prof. of Electronics & Telecommunication department
Electronics Department, PCE, New Panvel, University of Mumbai, India.
[1]sushantbabar2396@gmail.com, [2]joshininad888@gmail.com, [3]khamkar.amar94@gmail.com,[4]akashd151997@gmail.com

***Abstract*--The monitoring of entire wildlife inside complete forest area could be implemented with the approach written in this Paper .The wireless communication and incorporation of sensors for fire, humidity, water level, temperature, and rain monitoring is done. Problems like atmospheric threats, deforestation natural disasters & can be overcome greatly.**

Keywords: Fire Detection , Sensors authentication , Adafruit IO , *ESP8266 Node MCU Wi-Fi Devkit , 16 Channel Analog MUX*

I. INTRODUCTION

1.1 FUNDAMENTAL

Sensor is device which converts physical quantity into electrical quantity. The human body which can't sense any quantity can be done easily by commercial sensors like temperature, humidity, intensity etc. Any input signals given to electronic instruments, definition of it and, convert them into appropriate output signal, the sensor does it entirely. Nowadays, sensors, becomes omnipresent in our regular routines. The properties of sensors are convert the non-electrical into electrical quantity take action speedily function essentially**.**

1.2 OBJECTIVE

The overall objective of the project is to control and reduce the role of the forest fires as natural hazard for the Alpine environment considerably through prevention and mitigation actions. Currently forest fires play a major role in threatening the forest heritage of the Alps. They are strengthened by decreased precipitation amount, increased temperature and raised frequency of weather extremes as consequence of climate change, by mountain depopulation and over exploitation. The project aims to develop a multi-referential innovative service that strongly supports forest fire management, above all in prevention activities and in the mitigation of the impact due to flaming front on the Alpine forests.

1.2 SCOPE

This project presents the prototype of a system for detection of any uncontrolled anthropogenic activities, smoke or fires in forests using sensors. The data from the sensors is processed in the micro-controller. This Forest Monitoring system prototype is designed and developed in an effort
To improve the security level for valuable trees which have high demand in market like teak, Sandalwood, etc. This prototype is tested and demonstrated successfully for its functionality.

II. PROBLEM DEFINITION

We can prioritize the current challenges that they require to improve. So, we are focusing on the issue of sensor. Sensors might get failed to sense the particular
Activity.
Vision – If we get the solution, then it will be very convenient for us to damp the disaster.
Issue Statement - Our problem is that we don't have sensor error indication.
Step 1: Forest sense will monitor forest fire events using real time data from Wi-Fi module kit
Step 2: By using sensors we can locate disasters or any fire in the forest at one place where we can locate and take action against disasters using devices.

III. SYSTEM DESCRIPTION

3.1 ESP8266 Node MCU Wi-Fi Devkit

Figure 1 ESP8266 Node MCU Wi-Fi

The ESP8266 is the name of a micro controller designed by Express if Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a

micro USB cable, you can connect Node MCU devkit to your laptop and flash it without any trouble, just like Arduino.

3.2 16-CHANNEL ANALOG MULTIPLEXER

Figure 2 16-CHANNEL ANALOG MULTIPLEXER

The 74HC4067; 74HCT4067 is a single-pole 16-throw analog switch (SP16T) suitable for use in analog or digital 16:1 multiplexer/demultiplexer applications. The switch features four digital select inputs (S0, S1, S2 and S3), sixteen independent inputs/outputs (Y), a common input/output (Z) and a digital enable input (E). When E is HIGH, the switches are turned off. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of $V_{CC.}$

IV. CONCLUSION

Forests and the products they provide are universally required for the continuation of human ,society as we know it. To change our society to one that does not depend on the forest (to the, forest's detriment) and its associated benefits requires such an enormous paradigm shift that we generally do not even consider it worthy of further investigation. Given this situation therefore, it is imperative that we discover mechanisms to manage the forest for all the benefits it can provide, in a sustainable manner. Few countries have all the answers to all the issues faced, thus there exists a real need for international cooperation. Loss of forest resources transcends national boundaries and affects the entire planet. Given this, the roles of various agencies become vitally important in order to minimize any potential downside and to maximize the upside. Governments, NGOs, intergovernmental panels and the like must work more closely in order to resolve the pressing issues facing the forests. In many cases a collaborative approach will provide a solution which is more acceptable to all parties, and more robust than a solution that is developed unilaterally.

V ACKNOWLEDGEMENT

As we know electronics engineering is the art of combining the knowledge of science, engineering and physics to acquire the ability to design a system, component, or process to meet desired needs. So we would like to thank and express our sincere gratitude to the principal Dr.Sandeep Joshi and also Mr. Rajendra Khade, Head of Department for all the support and giving us this chance to work on this topic even if it is part of the course. Our thanks and appreciations also go to our ETRX colleagues in developing the project and people who have willingly helped us out with their abilities.

REFERENCE

[1]A Arora, P Dutta, S Bapat, “A line in the sand: a wireless sensor network for target detection, classification, and tracking” science Direct, Computer Networks, Volume 46, Issue 5, 2004.

[2]Antonio-Javier Garcia-Sanchez, et.al., “Wireless Sensor Network Deployment for Monitoring Wildlife Passages”, Sensors ISSN 1424-8220, pp 7236-7262 August 2010.

[3]Bugrake Son, Yong-stork Her, and Jung-Guy Kim, “A Design and Implementation of Forest-Fires Surveillance System based on Wireless Sensor Networks for South Korea Mountains”, IJCSNS International Journal of Computer Science and Network Security, VOL.6 No.9B, September 2006.

Hand Gesture Recognition and Voice Conversion System

Aspal Singh Rathod[1], Pranay Hemant Sadavarte[2], Anish Pramod Sagvekar[3], Seema Mishra[4]
[1,2,3]Final Year Engineering Students, [4] Prof. of Electronics department
Electronics Department, PCE, New Panvel, University of Mumbai, India
[1] aspal.rathod08@gmail.com, [2]pranay.sadavarte3@gmail.com,[3]anishsagvekar9847@gmail.com,[4]smishra@mes.ac.in

***Abstract*—This System is used to converse using only hand gestures that are recognized using a hand glove with flex sensors. Hand Gestures are converted in verbal format on an LCD display and are further provided to an Android app via Bluetooth for an audible outcome.**

Keywords—Flex sensors, PIC, ADC, Gesture, Flex Glove, UART, Bluetooth, Android

I. INTRODUCTION

The purpose of this system is to make interaction easier for the dumb people. The output is in the form of text as well as voice which makes it feasible for every person to understand and doesn't require anyone to learn the sign language except for the user. With better flex sensors and programming techniques, the system can be trained to become more and more accurate to get better results in the output. The aim of this system is to consider a gesture an input and obtain the word or letter as a text as well as an audio at the output. To obtain this, the physical gesture needs to be converted into a digital form for the components to recognize the gesture. This gesture can be further processed to get an output as a text and an audio.

II. SELECTION OF PARAMETERS

The selection of parameters is a crucial step that has to be taken before obtaining a desired result. The parameters to be considered in our case, before expecting a result are given below. All these parameters have to be cross checked before switching ON the power supply or else it might damage the components or create unnecessary alterations at the output.

A. Baud Rate (Bd)

Baud rate is measured in terms of pulses or symbols per second. It is equivalent to the bit rate if the number of symbols is 2. The value of baud rate determines the speed of transfer of data over a data line. The baud rate of two interfacing devices are kept the same for compatibility. In this case, the baud rate is said to be 9600.

B. Frequency

The Crystal Oscillator used in this case is of 8MHz. Thus the circuit is provided with a clock of rate 8MHz. A crystal oscillator is a device that consists of piezoelectric substances that vibrate, leading to a resonance and an outcome of an accurate frequency.

C. Data Transfer Rate

Data transfer rate is the number of bits passing through a data line in unit time. The rate of transfer of data is equal to the baud rate when the types of symbols or pulses passing through the data line are only two. In this case, the algorithm used is for ADC and hence the number of symbols is also two (0 or 1). Hence the value of data transfer rate is also 9.6kb/s.

D. Potentiometer

The value of the Potentiometer used is also one of the most important factors to be considered before implementing the circuit. The value of the potentiometer used is 200 Ohms with a power of 0.5W, ½ W. It has a tolerance of 10%.

III. ALGORITHM/BLOCK DIAGRAM

Analog to Digital Algorithm is used for the conversion of Analog signals from the flex sensors into digital signals in the form of 1s and 0s. To do so, a Threshold value has to be considered. The value of the threshold determines whether the signal is high or low, 1 or 0 respectively. The output value of the flex sensors is in terms of millivolts. The value of the output voltage of the voltage divider varied by flex sensors is then divided by 5. This value is considered as the output value with which the Threshold can be compared. In this case the Threshold value is set as 820. The value below 820 is said to be 0 and above it is said to be 1. Thus providing a Digital output to guess the gesture.

A. Block Diagram

1. Hand gestures are made by varying the position of the fingers and the palm which can be provided as input to the system.
2. The input can then be provided to the gesture recognition system using a glove made as a medium of interaction between the input and the recognition system.
3. This glove consists of the flex sensors which are nothing but variable resistors that send the signals and help the system recognize the gestures.
4. This information is enough for the gesture recognition system to recognize the message that the user wants to convey.
5. This output of the gesture recognition system is then provided to the display unit and the speech synthesis system where it can be converted into an audible speech.
6. The output of the speech synthesis system is then provided to a speaker to spell the message even louder.

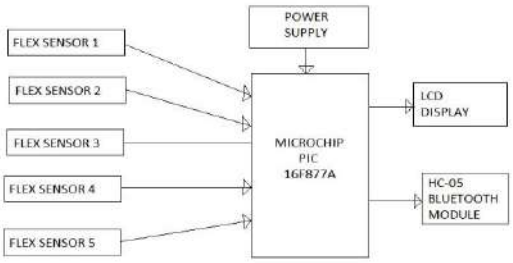


Figure 1 Block diagram

B. Flowchart

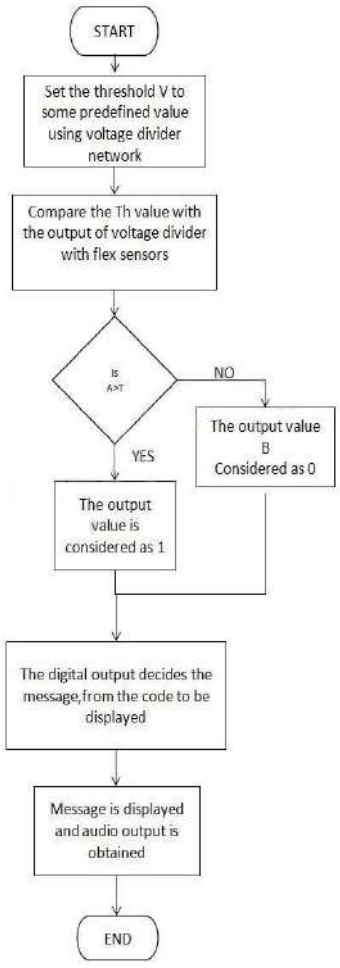


Figure 2: Flowchart

IV. UART

UART (Universal Asynchronous Receiver Transmitter) is a kind of serial communication protocol; mostly used for short-distance, low speed, low-cost data exchange between computer and peripherals. During the actual industrial production, sometimes we do not need the full functionality of UART, but simply integrate its core part. UART includes three kernel modules which are the baud rate generator, receiver and transmitter. The UART implemented with VHDL language can be integrated into the FPGA to achieve compact, stable and reliable data transmission. It's significant for the design of SOC. The simulation results with Quartus II are completely consistent with the UART protocol.

V. ANDROID APPLICATION

The Audio Output is to be observed on an Android Device using an Android Application available for free on the Play Store. The output of the circuit is transmitted to the Android device using Bluetooth Transmitter HC-05 using UART Protocol at a Baud Rate of 9600. The Android device also provides an output in the form of text on its display. This text is then converted into Voice. An internet connection is necessary for the implementation of conversion of text into Voice in the Android Device.

VI. CONCLUSION

The interfacing was implemented and the program was fed in the PIC Controller. The hand gestures are given as the input the output was observed in the form of text on a 16x2 LCD module, as well as in the form of Audio on an Android device.

VII. ACKNOWLEDGMENT

I remain immensely obliged to my project guide Mrs.Seema Mishra, for her valuable guidance, patience, keen interest and constant encouragement and for his invaluable support.
I would like to thank Dr. R.H. Khade, Head, Department of Electronics Engineering and for their invaluable support.
I would also like to thank Dr. Sandeep M. Joshi , Principal, PCE, New Panvel for his invaluable support and for providing an outstanding academic environment.
I would also like to thank all the staff members of the Department of Electronics Engineering and for their critical advice and guidance without which this project would not have been possible.
I would like to say that it has indeed been a fulfilling experience working on this project.

REFERENCES

[1]. https://ieeexplore.ieee.org/document/7931887
[2].https://www.ijser.org/researchpaper/Hand-gesture-recognition-and-voice-conversion-system-for-dumb-people-.pdf
[3].https://www.slideshare.net/abhilashajain988/magic-glove-sign-to-voice conversion-36454519

Hybrid self balancing robot using Arduino

Rutuja G.Thorat [1] Rockey Jacob Anthony [2], Nehal Vilas Parab [3], Aditya Prashant Deshpande [4], Prof. Suman W[5]
[1,2,3,4]Final Year Engineering Students, [5] Prof. of Electronics and Telecommunication department
Electronics Department, PCE, New Panvel, University of Mumbai, India
[1] rutuja15el@student.mes.ac.in, [2] cjacobra15e@student.mes.ac.in,[3] nvparab@student.mes.ac.in ,[4]adeshpande@student.mes.ac.in

Abstract – Self balancing robot is a robot that self balances itself up in the vertical position with reference to ground using principle of inverted pendulum. Here we are using two wheels on which the robot is balancing itself and we are using two stepper motors (NEMA17 5.5KG-CM) whose rotation angle is proportional to the input pulse this way it act against falling and the motor has full torque when there is no movement. The other hardware components that we are using are ARDUINO NANO V3 use for orienting the robot, MPU6050 which act as a feedback element and is a combination of gyroscope and accelerometer which give acceleration and rotation in all 3axis. The very important role is played by PID algorithm for continuously modulated control as it is a control loop feedback.

Keywords- Stepper Motor NEMA17, inverted pendulum, MPU6050, PID algorithm.

I. INTRODUCTION

Self Balancing Robot

This papers introductory chapter presents a short overview description of some past research, structure of the self balancing robot, component description, application of the parameters, working parameters, angle estimation and balancing control, required PID algorithm calculation and block diagram and graphs. Before the development of self balancing robot an iBOT was developed by Dean Kamen, An iBOT is the powered wheelchair which is capable of tethered remote control operation for the movement it also has a function of raising the sit level. Then by using this iBOT, segway PT was developed, as a commercial product. This segway PT is another self balancing machine based on inverted pendulum use for personal transport. The other widely reported self balancing robots are JOE and nBOT. JOE is based on a featured digital signal board, micro processor, ARM and ATmega series. Mobile robots are used for civil application which are mechanically stable such as Aibo the sony robotic dog, or four wheel vacuum cleaner.

Structure of Self Balancing Robot

Our bot consists of single platform which as ARDUINO, IMPU, and Motor driver mounted on it the bot get balanced on 2 wheels by providing sufficient friction. The robot is driven by 2 stepper motors NEMA17, and is equipped with an ARDUINO NANO V3 board based on ATmega328P processor, MPU6050 which consists of a signal axis gyroscope and 2 axis accelerometer for acceleration and rotation in all 3 axis. Here we are using ARDUINO NANO as it is small and thus occupies small space in our project and is bread board friendly as it is easy to handle the connections and to program a nano we need mini USB cable not a regular USB cable.

II. COMPONENT DESCRIPTION

1. ARDUINO NANO V3

ARDUINO NANO V3 board based on ATmega328P processor, it is small in size and it is bread board friendly.

Microcontroller	ATmega168
Operating voltage	5volts
Input voltage	7-12 volts
Digital I/O Pins	14
PWM Digital I/O Pins	6
Analog Input Pins	8
DC Current per I/O Pins	40 mA
Clock Speed	16 MHz

2. MPU-6050

It is a Motion Tracking devices design for low power, low cost, high performance requirement which guarantee sensor fusion algorithm and calibration procedure deliver optimal performance. It has a onboard Digital Motion Processor which processes complex 6 axis motion fusion algorithm

Component	**Electronic Description**
MPU6050	6 AXIS (Gyro + Accelerometer) MotionTracking devices

VDD	2.37 V- 3.46 V
VLOGIC	1.7 V - VDD
Pin 8	VLOGIC
Pin 9	AD0
Pin 23	SCL

3. Stepper Motor

NEMA17 hybrid stepper motor is used as a unipolar or bipolar stepper motor which as 1.8 degree step angle that is, 200 steps per revolution.

Weight(kg)	0.48
Rated voltage	4.25
Rated current	0.88
Max. radial force (N)	28
Max axial force (N)	10
Step angle (Degree)	1.8
Number of phase	2

III. WORKING AND APPLICATION PARAMETERS

1. Arduino Nano development board

The self balancing robot needs to have real-time response for Orientation and to counteract robot falling by correcting its tilt Angle, thus, the Arduino Nano board must provide the processing speed that is sufficiently fast to perform the task within the sampling time. ARDUINO NANO V3 board based on ATmega328P processor, which has a maximum clock rate of 16 MHz

2. Power Supply

For power supply, the motors need voltage between 12-16 volts and the Arduino nano board needs power supply between (5-15) volts. We have use 2 sets of batteries for the motors; here we have selected 14.8 volts lithium battery, and for the of Arduino nano board we have used a four-cell (4*1.5) Ni-MH battery pack.

3. Stepper Motor

For making a self balancing robot the criteria for motor selection should emphasize torque output as it has to counteract the robot falling hence the motor needs to provide enough torque to correct the robot body position back to equilibrium state. The NEMA17 hybrid stepper motor is used as a unipolar or bipolar Stepper motor which as 1.8 degree step angle that is, 200 steps per revolution.The motors response to digital input pulses and provides open-loop control by which it makes the motor efficiently controllable and it is also possible to gain low-speed synchronous rotation with a load that is directly coupled to the shaft. The main advantage of the stepper motor is it provides a wide range of rotational speeds as the speed is proportional to the frequency of the input pulses. Stepper motors have a natural frequency of operation. When the excitation frequency matches this resonance the ringing is more pronounced, steps may be missed, and stalling is more likely. Motor resonance frequency can be calculated from the formula:

$$f = \frac{100}{2\pi} \frac{\sqrt{2pMh}}{\sqrt{J_\gamma}}$$

Mh = Holding torque N·m
p Number of pole pairs
J_γ Rotor inertia kg·m

The holding torque (T) is the product of motor's torque constant (KT) and the current (i) applied to the stator windings.

$$T = KTi$$

According to Newton's law in rotational terms, torque (T) is proportional to rotor and load (J) and angular acceleration (A)

$$T = JA$$

4. MPU6050

The MPU6050 is a combination of an embedded 3-axis gyroscope and a 3-axis accelerometer and it is useful for motion detecting purpose. It is a small module that consist of the integrate logic level converter circuit which is compatible with 3.3V-5V voltage level and a MPU6050 sensor, which we have easily integrate in our project conveniently. The MPU-6050 is the world's first and only 6-axis motion tracking devices designed for the low power, low cost, and high performance requirements of Smartphone, tablets and wearable sensors. The MPU6050 sensor's reading (raw data) is transformed in space attitude angle. To get more stable and accurate reading, we should set the drift compensation first. The drift differs for different sensors (also affected by environments), thus it's necessary to configure it before using every time. However the system is not balanced that means it keep falling off away from the vertical axis to the straight

upright 90 degree position in it equilibrium state a combination of gyroscope and accelerometer is need to send the angle position of robot and the input of the microcontroller. Here accelerometer is use to measure the total external acceleration of the balancing robot which includes the gravitational and motion acceleration, the accelerometer featured properties are 3 axis sensing, output voltage signal conditioning and by following the directional cosine method we can calculate the tilt angle θ If we have measurements of X and Z axis gravitational acceleration. The gyroscope is a sensor that measures the angular velocity of the robot and sends the data to the Arduino Nano board via serial communication. It has the 3 axis angular measurement but only one axis is use but integrating the angular velocity is yard directly however this process will also integrate the noise in the resultant measurement. Therefore composition of angular drift is done by using the complementary approach.

IV. RESULTS

1) Angle reading test

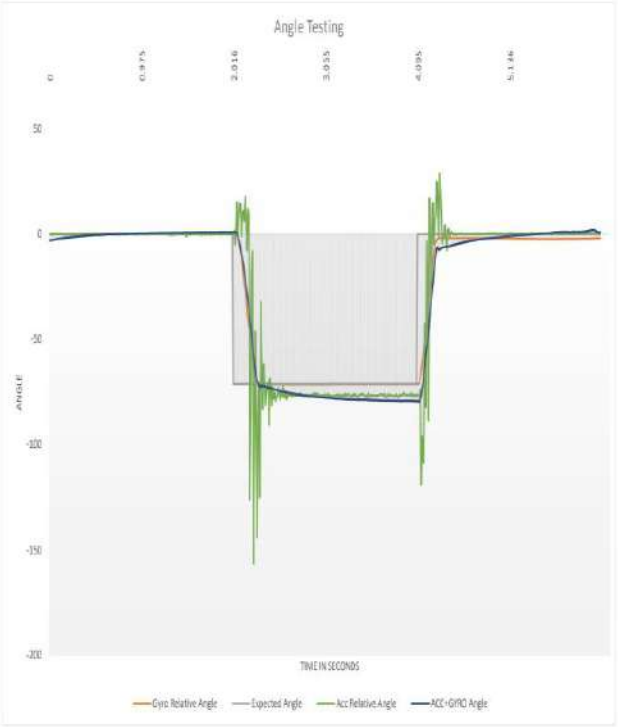


Fig. 1 Angle reading test

2) Simulation output of pid controller

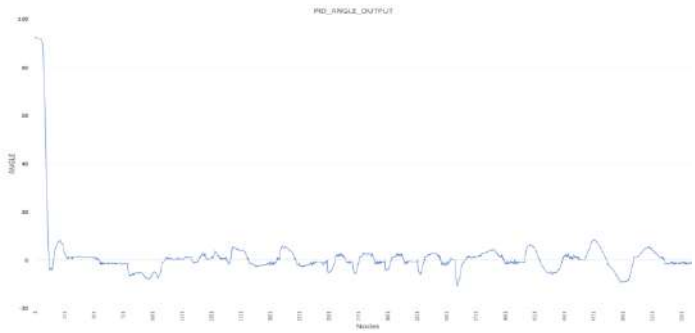


Fig. 2 Pid output

V. CONCLUSION

Our project is based on inverted pendulum concept & by using PID Controller algorithm we have developed a self balanced robot which consists of MPU 6050 which is responsible for our robot balancing action. It uses Nema -17 motors which counteracts the robots fall. We have calculated the critical tilt angle and the speed at which the robot balances itself. Here we have done PCB designing in Eagle CAD & the outer body is designed in Solid Works. The software which we have implemented for successfully manufacturing our robot is Arduino IDE Software. For making it well self balanced we have made use of PID Controller algorithm & Arduino v3 that acts as the brain of our robot. Here the MPU 6050 provides information to the Arduino Board and it then controls the wheels of the robot. This way by implementing PID algorithm & making use of hardware such as MPU 6050 which consist of both accelerometer and gyroscope and ARDUINO V3 & Nema 17 Motor that uses its torque for balancing the robot. This way we have manufactured self balancing robot.

ACKNOWLEDGEMENT

We express our sincere gratitude to Dr.R.H.Khade , HOD, Electronics Department, without whom it would not have been possible to successfully accomplish our project. We also thank to our senior faculty members of Electronics, Prof. Ujwal Harode, for their time to time suggestions to develop the project. Furthermore, we are indebted to the Principal Dr. Sandeep Joshi whose constant encouragement and motivation inspired us to do our best. Last, but not the least, we sincerely

thank our family members, colleagues and all the others who directly or indirectly contributed in making our task easier.

REFERENCE

[1] D. Caulley, N. Nehoran , “Self-balancing robot,” 2015 , University of Puget , Ornell University Msc.Electronics and Software Engineer.

[2] Juang Hau ,“Autonomous Balancing Robot,” 2012 , National University of Singapore .

[3] R. C. Ooi, “Balancing a Two-Wheeled Autonomous Robot,” The University of Western Australia, 2003 .

[4] O. Boubaker, MSc Electrical Engineering –ENSET , Tunisia "The inverted pendulum: A fundamental benchmark in control theory and robotics.

[5] D. Goldman, N. Gravish, S. Sharpe and H. Li, “Nonlinear Dynamics of Human Locomotion and Self Balance,” Georgia Institute of Technology, Shanghai Jiao Tong University, 2012.

[6] “Richard J Meinhold , Understanding the PID controller and Kalman Filter, Operations Research and Statistics, George Washington University , Washington D.C USA , ” The American Statistician 37 (2),123-127,1983

[7] Louis Brennan “The Sheryl Gyroscopic Monorail Car". *Scientific American*. January 22, 1910.

[8] Dean Kamen (2001) "Segway PT Previous Model". *Segway Inc. Archived from* the original *on 9 July 2011*.

Intelligent UAV Agricultural Pesticide Sprayer

Aditya Singh[1], Kartik Kanchan[2], Shreyas Moolya[3], Abhishek Pawar[4], Dr. R.H Khade[5]
[1,2,3,4] Final Year Engineering Students, [5] Prof. of Electronics department
Electronics Department, PCE, New Panvel, University of Mumbai, India
[1]adityadh943@gmail.com,[2]kartikkanchan95@gmail.com,[3]shreyasmoolya@gmail.com , [4]avpawar03@gmail.com, [5]rhkhade@mes.ac.in

Abstract—We live in a country whose maximum population is dependent on farming. Also farming in our country needs to develop in terms of productivity, quality and in many more aspects but farmers in our country are far from the goal to be achieved. The crops are infected by many types of pests, insects, diseases. Hence farmers sprays pesticide on it to avoid any damage to crops risking his life. According to World Health Organization (WHO) more than 1 million cases are registered and in India annually around 1 lakh farmers dies due to harmful effects of pesticide. To reduce the contact between farmers and pesticide we had developed a UAV(Unmanned Aerial Vehicle) which sprays pesticide remotely handled and reduces life risks of farmers.

Keywords—Quadcopter, Nodemcu, KK2.1.5 Flight Controller

I. INTRODUCTION

The application of pesticides and fertilizers in agricultural areas is of prime importance for crop yields. The use of aircrafts is becoming increasingly common in carrying out this task mainly because of reduction in cultivated land, labour shortage, unscientific and out-dated method. Manual spraying of pesticides and fertilizers are mainly responsible for the increase in the number of chronic diseases. The potential health effects of pesticides include asthma, allergies, and hypersensitivity, and pesticide exposure is also linked with cancer, hormone disruption, and problems with reproduction and fatal development. However, some factors may reduce the yield, or even cause damage (e.g. crop areas not covered in the spraying process, overlapping spraying of crop areas, applying pesticides on the outer edge of the crop). Climatic condition, such as the intensity and direction of the wind while spraying add further complexity to the control problem. In this paper, we describe an architecture based on unmanned aerial vehicles (UAVs) which can be employed to implement a control loop for agricultural applications where UAVs are responsible for spraying pesticides on crops. We have spitted the entire design in two main systems i.e. a Carrier System and another Sprinkler System. The Carrier system is basically a quadcopter of X-configuration which is used to carry the pesticide tank in the farms whereas the Sprinkler system will spray the pesticides over the crops.

II. DESIGN PARAMETERS AND ANALYSIS

1) Required Thrust

Total Thrust Required = (2 X Total Weight of UAV) + 20%
= (2 X 1650) + 600
Total Thrust Required = 3960 g ~ 4000g

Total Thrust Required = 4000g

Components	Weight
ESP8266 Node MCU	20 g
KK2.1.5 Flight Controller	20 g
Frame	400 g
4 X Motor	240 g
4 X (Propeller + ESC)	145 g
Camera	40 g
Battery	310 g
Sprinkler	150 g
Tank	300 ml ~ 300 g
Misc.	40 g
TOTAL	**1665 g**

Table 1

Thrust Required from 1 Motor = 1000g = 9.8 N

Formula for calculating Thrust produced by Motor

$$T = [(\eta * P)\ 2 * 2\pi * R2 * \rho]\ 0.3333$$

T = thrust (in Newtons)
η = propeller hover efficiency = 0.7-0.8 is typical low-pitch props
P = voltage*current*motor efficiency (in W)
R = prop radius (in meters)
ρ = air density = 1.22 kg/m3

For A2212/13T Motor

KV Rating = 1000 RPM
Max Current = 13 A
Max Efficiency = 80%

For Propeller 1045
Propeller Size = 10 in
Radius = 5 in = 0.127 m

At 12 Volts (Battery Voltage)

Thrust produced by Motor

$T = [(\eta * P)2 * 2\pi * R2 * \rho]0.3333$

$T = [(0.75* 12*13*0.8)2 * 2\pi * 0.1272 * 1.22]0.3333$

T = 10.26 N

Thrust Required < Thrust produced by Motor

III. Hardware And Software Specifications

A. Hardware

1) 1000kv BLDC Motors - DC motor is a type of synchronous motor that is powered by DC source via an inverter to produce an AC electric current to drive each phase of the motor. Its construction is simple as permanent magnet synchronous motor. The advantage of this motor is High speed and electronic control.

2) Electronic Speed Controller (ESC) -An electronic speed controller is an electronic device used to control the speed of the motor and the direction also. It follows a speed reference signal and varies the switching rate of field effect transistors. By adjusting the duty cycle or switching the frequencies of the transistor the speed can be changed.

3) KK 2.1.5 Flight Color Control Board

The KK2.1 Multi-Rotor controller manages the flight of (mostly) multi-rotor Aircraft (Tricopters, Quad copters, Hex copters etc.). Its purpose is to stabilize the aircraft during flight and to do this, it takes signals from on-board gyroscopes (roll, pitch and yaw) and passes these signals to the Atmega324PA processor, which in- turn processes signals according the users selected firmware (e.g. Quad copter) and passes the control signals to the installed Electronic Speed Controllers (ESCs) and the combination of these signals instructs the ESCs to make fine adjustments to the motors rotational speeds which in-turn stabilizes the craft. The KK2.1 Multi-Rotor control board also uses signals from your radio system via a receiver (Rx) and passes these signals together with stabilization signals to the Atmega324PA IC via the aileron; elevator; throttle and rudder user demand inputs. Once processed, this information is sent to the ESCs which in turn adjust the rotational speed of each motor to control flight orientation (up, down, backwards, forwards, left, right, yaw)

4) Transmitter-Receiver - The Transmitter acts as a controller from the user. It is a radio communicating wireless control system. The signal from the transmitter is received by the receiver placed on the frame of Drone through the antenna in a receiver. The signal from a receiver is given to KK board. This board will send the signal to all electronic speed controller from that speed of the motor is controlled by the transmitter. The modulation scheme used in between transmitter and receiver is pulse position modulation (PPM).

5) Propelllers - These are simply fans which convert the motion of the motor into upward thrust. They are, made up of flexible fiber to be unbreakable while crash landing.

6) Frame - These are many types of frames for Drone. They are made of fiber has integrated PCB for soldering ESCs and battery wires. Different colour coding made us know the orientation of the Drone.

7) Transmitter-Receiver - The Transmitter acts as a controller from the user. It is a radio communicating wireless control system. The signal from the transmitter is received by the receiver placed on the frame of Drone through the antenna in a receiver. The signal from a receiver is given to KK board. This board will send the signal to all electronic speed controller from that speed of the motor is controlled by the transmitter. The modulation scheme used in between transmitter and receiver is pulse position modulation (PPM).

8) ESP8266 NODEMCU - ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. In has integrated cache to improve the performance of the system in such applications. Alternately, serving as a WiFi adapter, wireless internet access can be added to any micro controller based design with simple connectivity (SPI/SDIO or I2C/UART interface).

9) Water Pump - Water Pump is used to drag the pesticides out of the pesticide tank which is sprinkled on the crops.

B. Software

1) Blynk App : Blynk App is used to switch ON and OFF the Sprinkler system using Internet .
How Blynk Works
Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other things.
There are three major components in the platform:
Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.
Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

2) Arduino IDE : To program the ESP8266 Nodemcu , Arduino IDE is used. It is easy to upload a program using Arduino IDE.

IV. System Design

A. Quadcopter System

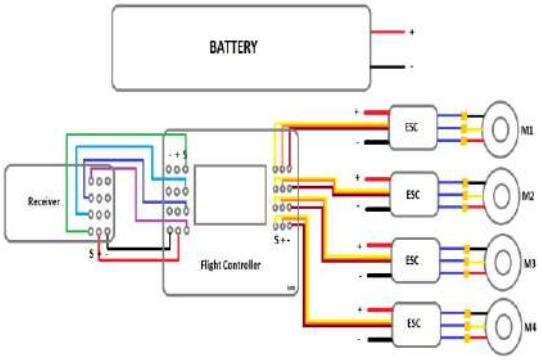


Figure 1 Quadcopter System

The quadcopter is simple design with four rotor propellers with controller. The flight controller is the main part of this vehicle. This KK2.1.5 controls all the operation commanded by us. The four motors are used to create differential thrust and the quadcopter hover and move accordance with the speed of those motors.

There are two types of configuration in quadcopter construction. First one is Plus (+) configuration and another one is Cross (X) configuration. In this project we used X (Cross) configuration.

Both the models are same, but the control of these models slightly different. The cross configuration is easier than plus configuration model. ESCs controls the speed of the motor and are fully monitored by ESCs which receives commands from the RC.

B. Sprinkler System

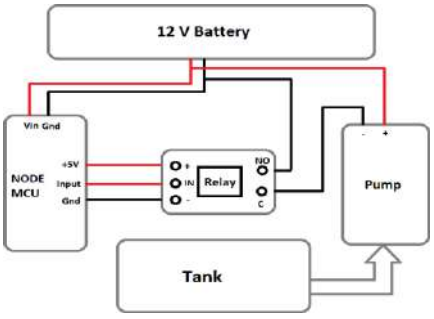


Figure 2 Sprinkler System

Sprayer module contains two sections, spraying module and controller. Spraying module contains the spraying content i.e., pesticide or fertilizer and the controller section used to activate the nozzle of sprayer. The command is received from remote controller which is activated manually. Tank contains the chemical content which is going to spray on crops that may be a pesticide or fertilizer. The Nozzle of the sprayer module will be activated by the relay which acts as a switch to turn 'ON' and 'OFF' the spraying module.

V. Results And Discussions

The drone developed is more efficient and robust in nature compared to its contemporaries. It can fly across different terrains and varied weather conditions. The biggest advantage of the drone is that it is customisable according to the requirement. While designing the system , PID tuning plays an important role to maintain the stability of the quadcopter. Hence , in order to get appropriate P,I and D gain values multiple drone flying tests are performed.The drone will also be useful to spray not only fertilizers and pesticides but also can be used to spray paints, monitor fields with the help of Wi-Fi camera too.

VI. Conclusion

In the past decade , latest technologies are included into the precision agriculture to improve the productivity of the crop. These technologies are useful where human interventions are not possible for spraying of chemicals on crops and scarcity of the labor. It also helps the spraying job easy and faster. The proposed system describes the crop monitoring through the camera which is mounted in UAV which provides a good surveillance of the crops, protects the crops from animals & birds and protects the farmers from the harmful effects of pesticides.

VII. Acknowledgement

We deeply express our thanks to our project guide Dr. R.H Khade for his valuable inputs, guidance, encouragement and whole-hearted cooperation in fullfillment of our project.

References

[1] "Unmanned Aircraft Systems." Faa.gov. FAA. Web. 8 Oct. 2014.
[2] Tucker, Compton J. "Red and Photographic Infrared Linear Combinations for Monitoring Vegetation." Remote Sensing of Environment (1977): 127-50. Print.
[3] Green, Miranda. "Unmanned Drones May Have Their Greatest Impact on Agriculture ..." The Daily Beast. 26 Mar. 2013. Web. 8 Oct. 2014.
[4] Johnson, L.F, and S. Herwitz. "Collection of Ultra High Spatial and Spectral Resolution Image Data over California Vineyards with a Small UAV." Remote Sensing of Environment (2003).
[5] ASHISH LALWANI et al., "A REVIEW: AUTONOMOUS AGRIBOT FOR SMART FARMING", Proceedings of 46th IRF International Conference, 27th December 2015, Pune, India, ISBN: 978-93-85832-97-0.
[6] Aneesh H. Nair et al., "Hovercraft Based Farming system", International Journal For Research & Development in Technology Volume: 1, Issue: 2, JUNE 2014.
[7] P.D.P.R.HarshVardhan et al., "DEVELOPMENT OF AUTOMATED AERIAL PESTICIDE SPRAYER", IJRET: International Journal of Research in Engineering and Technology eISSN: 2319- 1163 | pISSN: 2321-7308.
[8] VarikutiVasanthaRao et al., "Multiple Power supplied Fertilizer sprayer", International Journal of Scientific and Research Publications, Volume 3, Issue 8, August 2013

MULTI ROBOT COORDINATION FOR SWARM ROBOTICS

Manishq Bhatia[1] , Shishir Puttur[2], Neha Shinde[3], Prof. Ujwal Harode[4]
[1,2,3,4]Final Year Engineering Students
Electronics Department, PCE, New Panvel, University of Mumbai, India
[1]manishq.bhatia@gmail.com, [2]shishirputtur@gmail.com,[3] nehashinde631@gmail.com,[4]uharode@mes.ac.in

***Abstract*—This project presents a new robotic concept, called SWARM-BOT, based on a swarm of autonomous mobile robots with self-assembling capabilities. SWARM-BOT takes advantage from collective and distributed approaches to ensure robustness to failures and to hard environment conditions in tasks such as navigation, search and transportation in rough terrain. One SWARM-BOT is composed of a number of simpler robots, called s-bots, physically interconnected. The SWARM-BOT is provided with self-assembling and self-reconfiguring capabilities whereby s-bots can connect and disconnect forming large flexible structures. This project introduces the SWARM-BOT concept and describes its implementation from a mechatronic perspective.**

Keywords—Bio-potential, Electrogastrography, Gastric motility, Myoelectrical activity, Signal analysis.

I. INTRODUCTION

Swarm robotics is a new approach to the coordination of multi robot systems which consist of large numbers of mostly simple physical robots. The desired collective behavior emerges from the interactions between the robots and interactions of robots with the environment. This approach emerged on the field of artificial swarm intelligence, as well as the biological studies of insects, ants and other fields in nature, where swarm behavior occurs. The project is designed to build a small robot whose behavior can be traced from swarm intelligence. Swarm Robotics is an approach to the coordination of multi robot systems which consist of group of micro robots. These micro robots communicate with each other to perform a specific task.

The goal of this approach is to study the design of robots such that a desired collective behaviour emerges from the inter-robot interactions and the interactions of the robots with the environment, inspired but not limited by the emergent behaviour observed in social insects. The project is organized in the following manner

II. GENERAL REPRESENTATION

Given above is the basic block diagram of microprocessor used. The block diagram is divided into two stages: Transmitter and Receiver.

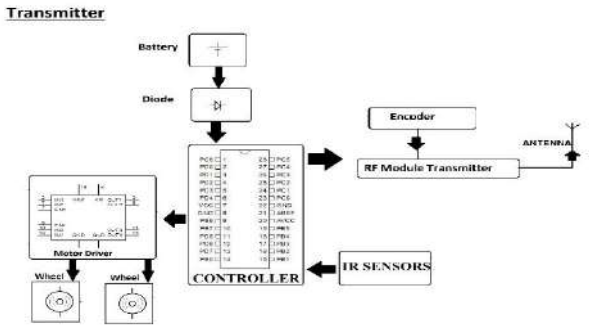


Figure 1 Transmitter

Input Stage: The robot is either controlled by master control robot or can be able to take it own simple self-decisions automatically.

The robot is also interfaced with a PIC16F778A that connects it to its master control unit, and can perform actions according to the command issued by master control unit.

Output Stage: For working in a swarm robot, the master and the slave has to communicate with each other. For this we use receiver and transmitter. The type of transmitter and receiver depends upon the range of communications. In the communication process, micro controller plays a key role.

III. TRANSMITTING SIGNAL

A. CAPACITOR

A capacitor is a two terminal passive electronic component consisting of a pair of conductors separated by dielectric.

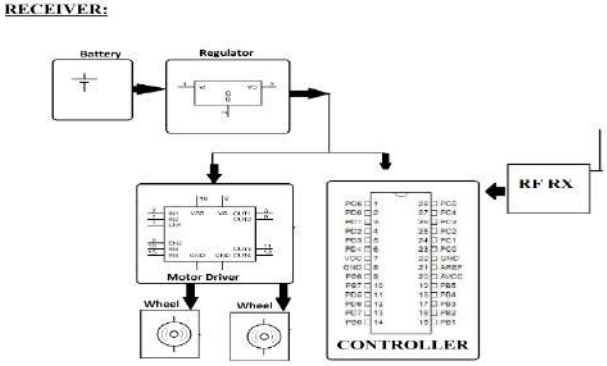


Figure 2 Receiver

The transmitter and the receiver both have separate task to be performed. The transmitter works with master and receiver works with slave in order to provide seem less communication between the master and the slave.

B. REGULATOR

ICs are available with fixed or variable output voltages.

A. IR SENSORS

Because it has a good range which fulfills our requirements. It is very low cost and can be constructed on general purpose PCB.It is of very small size.

Good immunity to ambient light and waves are invisible to eyes.

B. Microcontroller (ATmega328P)

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

IV. ANALYSIS AND RESULT

A. Coordinated motion

Coordinated motion is a basic ability required of a swarm-bot. To allow the swarm-bot to move, the constituent s-bots must coordinate their actions to choose a common direction of motion. This coordination is not self-evident, as each s-bot is controlled independently. The required coordination is achieved primarily through use of the s-bot's traction sensor, which is placed at the turret-chassis junction of an s-bot. The traction sensor returns the direction (i.e., the angle with respect to the chassis' orientation) and the intensity of the force of traction (henceforth called “traction”) that the turret exerts on the chassis.

B. Self-Assembly

Probably the most characteristic capacity of the swarm-bot system is that it can self-assemble; that is, move from a situation characterized by the activity of a number n>1 of s-bots to a situation in which these n s-bots physically connect to each other to form a swarm-bot.

If an s-boten counters difficulty during the approach phase, it launches a recovery procedure which consists of the s-bot moving backward and approaching the red s-bot again. Experiments have shown that this procedure can reliably control the s-bots so that they connect to each other or to an s-toy with red lights turned on.

C. Cooperative Transport

Artificial neural networks were designed by artificial evolution to control the actions of a group of s-bots whose task was to pull and/or push a heavy object in an arbitrarily chosen direction. In this case, the s-bots could only interact through their physical embodiment to coordinate their actions during the approach and transport phase.

D. Ongoing Work

Task allocation and division of labour are two important research areas in collective and swarm robotics. Previous studies have shown that an increasing group size does not necessarily implies an increase in the efficiency with which a collective task is performed. However, inherent inefficiency of large robot groups can be avoided if such large groups are equipped with an adaptive task allocation mechanism which distributes the resources of the group based on the nature of the task and the diversity among the individuals of the group.

V. ACKNOWLEDGMENT

As we know Electronics Engineering field is the art of combining the knowledge of physics and to acquire the ability to design a system, electronic components, or process to meet the desired need of the society. So we would like to express our serious gratitude to the Principal Dr. Sandeep Joshi and also Mr. RH Khade, Head of Department for all the support and our special thanks to our supervisor Ujwal Harode for supervising us throughout the course period.

REFERENCES

[1] Tamio Arai, Enrico Pagello, Lynne E. Parker IEEE TRANSACTIONS ON ROBOTICS AND AUTOMATION, VOL. 18, NO. 5, OCTOBER 2002: 655-661(2002)

[2] KOVAN – Dept. of Computer Eng.Middle East Technical University AnkaraTurkey(2004)

[3] Li Zhang ; Weimeng Sun ; Zhiqiang Zheng 2005 2nd International Symposium on Systems and Control in Aerospace and Astronautics(2005)

[4] Springer, Berlin, HeidelbergInternational Workshop on Swarm Robotics SR 2006: Swarm Robotics pp 71-102(2006)

[5] Erol Şahin, Sertan Girgin, Levent Bayindir ,Ali Emre Turgut Swarm Intelligence pp 87-100

[6] Y. Mohan and S. G. Ponnambalam, "An extensive review of research in swarm robotics," 2009 World Congress on Nature & Biologically Inspired Computing (NaBIC), Coimbatore, 2009, pp. 140-145.(2009)

[7] R. Doriya, S. Mishra and S. Gupta, "A brief survey and analysis of multi-robot communication and coordination," International Conference on Computing, Communication & Automation, Noida, 2015, pp. 1014-1021.

[8] A. Kolling, P. Walker, N. Chakraborty, K. Sycara and M. Lewis, "Human Interaction With Robot Swarms: A Survey," in IEEE Transactions on Human-Machine Systems, vol. 46, no. 1, pp. 9-26, Feb. 2016.(2016)

[9] B. Araki, J. Strang, S. Pohorecky, C. Qiu, T. Naegeli and D. Rus, "Multi-robot path planning for a swarm of robots that can both fly and drive," 2017 IEEE International Conference on Robotics and Automation (ICRA), Singapore, 2017, pp. 5575-5582.(2017)

TOUCH SCREEN BASED PATH DIRECTED ROBOT

Happy Koul [1],Deepak Shinde [2], Prof. Seema M[3]
[1,2]Final Year Engineering Students, [3]Prof. of Electronic Department
Electronics Department, PCE, New Panvel, University of Mumbai, India
[1]happy15el@student.mes.ac.in , [2]deepss15el@student.mes.ac.in ,[3]smishra@mes.ac.in

***Abstract* – In this paper, a robot controlled by a touch screen is presented. The touch screen used is a 3.2 TFT Touch screen. An arduino Mega 2560 is used which comes with 16MHz crystal oscillator and 4 UARTs is used. It has 54 digital input/output ports and 16 analog input/output ports. Motor driving IC L239D is used which acts as a current amplifier supplying an amplified current to the motors. 4 DC motors of 60 rpm are used to which wheels are fitted. RF module is used for the wireless connection between the transmitter and receiver.**

***Keywords -Resistive Touch Screen* , Arduino Mega, Dc Motor, RF Module**

I. INTRODUCTION

Technology is advancing so fast so that there can be ease and comfort in every aspect of life. Robots have replaced humans in many work places and are controlled by just giving a little input. A touch screen is used as an input device in which we give the input just by touching the touch screen by finger or stylus. It is designed in such a way that it senses the touch of a finger or stylus and sends a signal to the controller. Touch screens are very easy tools(devices) to use as an input. touch screens reduce time to input and hence time for the output(results). The use of touch screens is increasing day by day because of ease of use and handling. In addition, the accuracy provided by touch screens is remarkable. It provides a greater pointing precision. There are two types of touch screens, Resistive and capacitive touch screens. In this project we are using a resistive touch screen. a resistive touch screen is made of several layers in which important are the two electrically resistive layers with a very small gap in between them with one side provided with the voltage and the other senses the touch. Advantages of resistive touch screens such as stylus versatility, higher sensor resolution, register fewer advertent touches, reliability, low cost have made it more popular in use recently.

II. SYSTEM OVERVIEW

A robot is basically a device which is built to perform the particular desired function. This project is about controlling the motion of the robot with a touch screen. As the robot is a wireless, there are two different circuits of transmitter and receiver.

A. Transmitter:

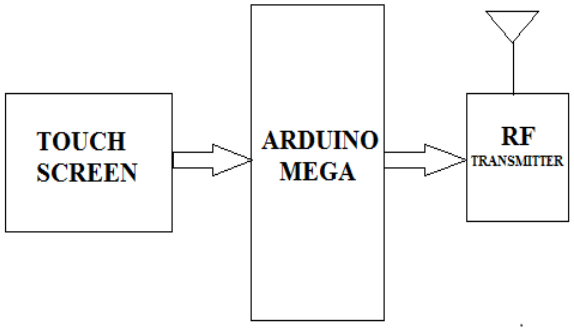


Fig. 1: Transmitter Block Diagram

The transmitter circuit comprises of:

- Touch Screen
- Arduino Mega
- RF transmitter

In the block diagram, we see that the touch screen is connected to the Arduino Mega which is the Arduino board for IC AT Mega 2560. The touch of the finger or stylus is sensed by the touch screen. and is transmitted to Arduino Mega which interprets the signal. The interpreted data is further passed to RF transmitter.

RF transmitter transmits the signal to the RF receiver.

B. Receiver:

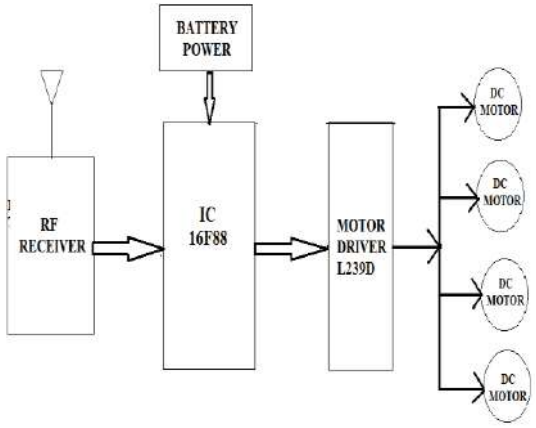


Fig. 2: Reciever Block Diagram

The receiver circuit consists of RF receiver module which receives the RF signal transmitted by the transmitter. The other components in the receiver circuit are IC 16F88, Motor Driver IC L239D and the four DC Motors. As the motors used are of 60 rpm each they need a little higher supply. The Motor Driver IC L239D is used here for amplifying the current that we receive from the IC 16F88. The amplified current is used to drive the motors.

.

C. PHYSICAL STRUCTURE

The physical structure shown in figure has four wheels which are basically the four DC Motors. The battery is mounted on the robot body and over it is the circuit of the RF Receiver and the motor driver.

The screen on the other side is in the hands of user for the input for directions. The screen is connected with an RF Transmitter circuit.

Fig. 3: Robot Vehicle

III. SOFTWARE DESIGN

The software designing of the robot was divided into two sections:

a. Mathematical Modelling
b. Arduino programming

MATHEMATICAL MODEL:

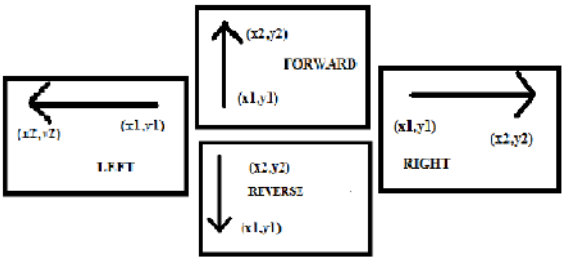


Fig. 4: Mathematical Model

The direction to the robot is drawn on the touch screen. The robot moves according to the direction given on the touch screen. But the touch on the screen should atleast be of 50 pixels. If the touch is less than 50 pixels, the robot won't move. When we touch the screen, the first touch coordinates are stored. These coordinates are considered as (x1, y1). When we move the finger, the last coordinates of the touch are known (x2, y2). For each movement of the finger the difference between the final and first touch coordinates are stored. According to the difference, the direction of the robot is decided.
For example,

- Case 1: IF we move the finger on the screen and if the (x2) coordinate is greater than the (x1) coordinate by more than 50 pixels, the robot moves right.
- Case w: IF we move the finger on the screen from and if the (x1) coordinate is greater than the (x2) coordinate by more than 50 pixels, the robot turns left.
- Case 3: IF we move the finger on the screen and if the (y2) coordinate is greater than the (y1) coordinate by more than 50 pixels, the robot moves in the forward direction.
- Case 4: IF we move the finger on the screen and if the (y1) coordinate is greater than the (y2) coordinate by more than 50 pixels, the robot moves in the backward direction.

One lie divides the screen at 250 pixels. Above that, if we touch the screen, the robot stops all the movements.

Directions are implemented as follows:

1. Right: Only left wheels move in clockwise direction.
2. Left: Only right wheels move in anti clockwise direction.
3. Forward: Left wheels move in clockwise direction and right wheels move in anticlockwise direction.
4. Backward: Left wheels move in anti clockwise direction and right wheels move in clockwise direction.

ARDUINO PROGRAMMING:

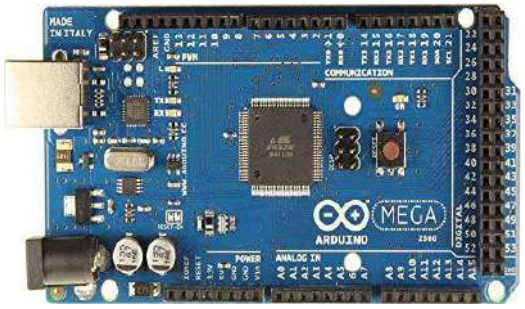


Fig. 5: Arduino MEGA

The Arduino Mega is an open source microcontroller board based on IC 2560. 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 is programmable with Arduino IDE (Integrated Development Environment) via a type B USB cable.

The main code body for robot control:

```
FORWARD
    digitalWrite(19,HIGH)
    digitalWrite(21,HIGH);
    digitalWrite(20,HIGH);

LEFT
    digitalWrite(21,LOW);
    digitalWrite(20,HIGH);
    digitalWrite(19,HIGH);

REVERSE
    digitalWrite(21,LOW);
    digitalWrite(20,LOW);
    digitalWrite(19,LOW);

RIGHT
   digitalWrite(21,HIGH);
   digitalWrite(20,LOW);
   digitalWrite(19,HIGH);
```

IV. HARDWARE DESIGN

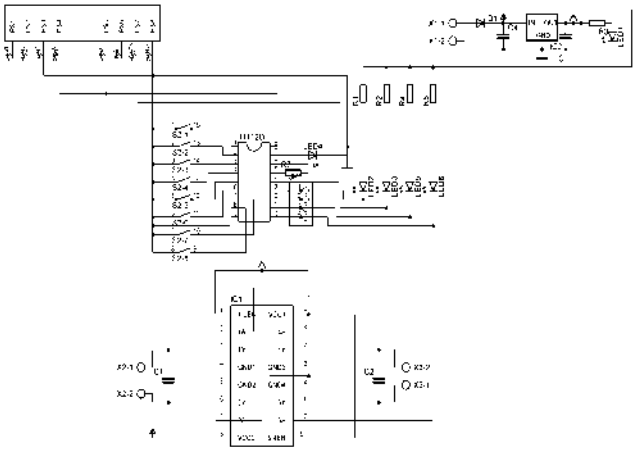


Fig. 6: Hardware Design

This is the circuit diagram for the RF Receiver and motor driver circuit interfaced with each other. Relay circuit is also used in this circuit which acta as a switch.

V. APPLICATION

Applications:
1.Various Millitary application
2.Exploration robots
3.Firefighting robot
4.Agricultural Purpose

VI. CONCLUSION

This proposed system gives an exposure to design a robot that can be used to do multi functions in various fields such as defense, Remote area monitoring. The proposed design and implementation of touch screen controlled robot by using Radio Frequency technology will be used to control the robot vehicle from certain range of distance.

REFERENCES

[1] Cornell University project journals:https://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/f2014/mrr222_va86_dar324/4760%20Final%20Page/home.html
[2] Chandrashekhar Kalnad Touch Screen Controlled Robot (For Handicapped and Mentally Disabled) IJECT Vol. 7, Issue 3, July - Sept 2016
[3]Tan, Ming Chun(2005).Autonomous Robot Navigation using Radio Frequency. Bachelor Project.Thesis.Universiti Teknologi Malaysia,Skudai.
[4] C. Guo, J. E. Young and E. Sharlin, Touch and toys: new techniques for interaction with a remote group of robots, In Proceedings of the CHI'09, pp.491-500, 2009.