

Spook Robi

K.S.Chandragupta Mauryan¹ A. P. NandhiniDevi², P.N.Nandhini³, Y.Praveen⁴,
A.Ramesh⁵

Department of Electrical and Electronics Engineering, Sri Krishna College of Technology, Coimbatore, Tamilnadu-641042.

ABSTRACT

This project deals with the design and development of a robotic vehicle that is used to work as a SPY. This robot is controlled by using a Touch Screen of Android mobile with the help of software and also by using Voice control technique. It has a wireless camera which can rotate up and down, left and right and it will send back real time video and audio inputs which can be seen on a remote monitor in the base station from where the robot is being controlled and action can be taken accordingly. It also has sensors which senses the obstacles found. if there is any obstacle it will stop and search for nearby easier way and if there is no easy way found then it will fly to cross that obstacle. It can silently enter into an enemy area and send us all the information through its camera eyes. This spy robot can be used in star hotels, shopping malls, jewellery show rooms, etc., where there can be threat from intruders or terrorists. Since human life is always precious, these robots are a replacement for fighters against terrorist in war areas.

KEY WORDS: Spy Robot, Touch screen android mobile, Wireless camera, RF technology, voice control, PIC microcontroller, Ultrasonic sensor, Motor control.

I. INTRODUCTION

In this world, the robots plays a vital role for almost all purposes. The word "Robot" was first used in a 1921 play titled R.U.R.Ossum's Universal Robots, by Czechoslovakian writer Karel Capek. Robot is a Czech word meaning "worker."

Merriam-Webster defines robot as "a machine that looks like a human being and perform various complex acts; a device that automatically performs complicated, often repetitive tasks; a mechanism guided by automatic controls." ISO describes a robot as "an automatically controlled reprogrammable, multipurpose manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications".

Yet, all these definitions do give us a rough idea about what comprises a robot, which needs to sense the outside world and act accordingly. There are motors, pulleys, gears, gearbox, levers, chains, and many more mechanical systems, enabling locomotion. There are sound, light, magnetic field and other sensors that help the robot to collect information about its environment. There are Processors powered by powerful software that help the robot to sense the captured environmental data and tell it what to do next and also has microphones, speakers, displays, etc that help the robot to interact with humans.

The main objectives of using robot are

- A. *Where man dares not to venture*
- B. *To rescue, pronto!*

C. We can even make them to go to war

In our project we aim at developing a robot model which will be efficiently and effectively used for spy purpose wherever needed. Being able to achieve reliable long distance communication is an important open area of research to robotics as well as other technology areas. As interest in robotics continues to grow, robots are increasingly being integrated into everyday life. The results of this integration are end-users possessing less and less technical knowledge of the technologies.

Currently, the primary mode for robot communication uses RF. RF is an obvious choice for communication since it allows more information to be transferred at high speed and over long distance. This paper explores the use of readymade RF networks for communication and device control.

Now-a-days tracing and attacking enemies at different areas are very much difficult. There is always a chance for loss of lives of the human being during war and emergency situations. We have implemented a solution for this problem by replacing humans with Robots which are completely controlled with a wireless network and also with voice control and touch screen control. we have also planned to make the robot to fly where ever it cannot move further due to any obstacle. Obstacles are sensed by using the sensors.

II. PROJECT DESCRIPTION

i. Touch Screen Control

In this project we are using the touch screen of an android mobile to control the robot for further operation. By simply installing the application which was already developed to control. The Control is done by simply touching the arrow keys for further movement of robot. For this we have developed an application for its unique specifications which is named as 'ESPINONAGE'.



Figure 1: PIC 16F877A Microcontroller Pin Diagram

ii. Voice Control

We are also adding an extra technology into the robot called voice control. As a result of it we have an advantage of simply commanding the robot for further movements. Its very simple to control the robot by just giving the commands.

iii. Flying Robot

Normally our robot is designed to work in normal state and as well as in flat surfaces. From this it is clear that it will stop when it detects an obstacle and take the easier path. Sometimes the robot may find it difficult to detect the nearest easier way to cross the obstacles. To overcome this problem we have planned to add a new idea into our project which can make the robot to make a fly when it detects obstacles. Due to this we can easily control the robot from anywhere.

iv. PIC Microcontroller

Microcontroller is the heart of any system. In our project we are using PIC 16F877A microcontroller to operate the Spook Robi. In this century many robots are operated in Arduino based system which is very easy to operate and the program coding is much more easy with any other microcontroller. Although Arduino has many advantages it is costly as compared to the PIC microcontroller and many duplicate Arduino boards are available in market which are very cheaper so we have to know about that while purchasing. This can be overcome by PIC microcontroller which are widely available at this present scenario. PIC microcontroller is cost effective than the Arduino board. Our aim is to reduce the overall cost of this project. Due to this we have chosen a PIC 16F877A microcontroller as a heart of our robot. PIC 16F877A Microcontroller is the 40 pin DIP packaged IC. Figure 1 shows the PIC 16F877A IC.

v. GSM

GSM (Global System for Mobile Communications, originally *Groupe Spécial Mobile*), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones. GSM was intended to be a secure wireless. In our project we use GSM for wireless control of the robot because GPS is widely used in mobile communications. We use android mobile in our project to control the direction of the robot. GSM is used as an interface between the mobile and microcontroller. GSM will send the AT commands to the microcontroller when the android application is directed to any direction. The commands are received by the microcontroller which leads to the motor control. Figure 2 shows one of the GSM modules available in the market.



Figure 2 : GSM Module

vi. GPS

The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The

system provides critical 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.

GPS is used to detect the current location of the robot in all environmental conditions. It depicts the location of the intruders and helps to know about the surrounding in which the robot is working.

vii. **IC L293D – Motor Control**

L293D is a typical Motor driver or Motor Driver IC which is used to drive DC on either direction. It is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. This implies that it is a Dual H-bridge Motor Driver integrated circuit (IC).The l293d can drive small and quite big motors as well. Figure 3 is the pin diagram of the L293D motor control H bridge IC.

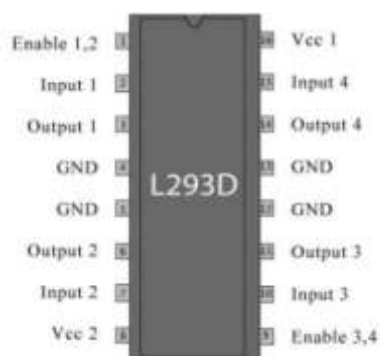


Figure 3 : L293D Pin Diagram

These are 4 input pins for this L293D, pin 2,7 are on the left and pin 15, 10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected on the left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided at the input pins as LOGIC 1 or LOGIC 0. In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor. The behaviour of motor for various input is shown in Table 1.

Table 1: Behaviour of motors under L293D motor Control

OPERATION	A	B
Stop	Low	Low
Clockwise	Low	High

Anti Clockwise	High	Low
Stop	High	High

viii. **Ultrasonic Sensor**

Ultrasonic sensor is a common sensor used in robotics for distance/range detection. It uses ultrasonic sound to determine the distance of an object in front of it. The display gives the distance in inches detected by the sensor. These sensors can accurately detect an object within approximately within 60 inches. Ultrasonic Ping sensors are very accurate. These sensors are not subjected to interferences by the sun. Ultrasonic sensors are not obstructed by some cloth materials too. Figure 4 shows the URM 37 V4.0 module and Figure 4.1 is the block diagram of the ultrasonic sensor.



Figure 4 : URM37 V4.0 Ultrasonic Sensor

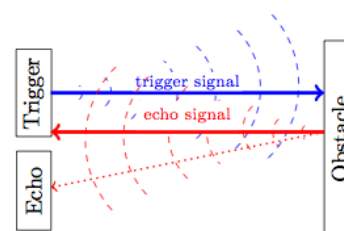


Figure 4.1 : Block diagram of Ultrasonic Sensor

ix. **RF Technology**

Radio Frequency is the abbreviation of RF. This technology is used in this robot for controlling purpose. By using this signals we can control the robot even in remote areas .

Radio frequency is a term that refers to alternating current (AC) having characteristics such that, if current is given as input to an antenna, an electromagnetic (EM) field is generated suitable for wireless broadcasting or communication. These

frequencies cover a significant portion of the electromagnetic radiation spectrum, extending from 9KHz, the lowest allocated wireless communications frequency (it's within the range of human hearing), to thousands of gigahertz (GHz) . Many types of wireless devices make use of RF fields. Cordless and cellular telephone, radio and television broadcast stations, satellite communications systems, and two-way radio services all operate in the RF spectrum. Figure 5 is the RF transmitter and receiver module diagram.

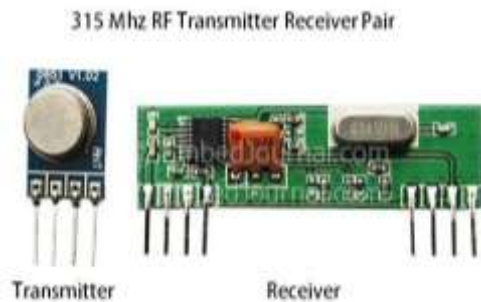


Figure 5 : RF Transmitter and Receiver

RF Advantages:

- ⌋ No line of sight is needed.
- ⌋ Not blocked by common materials. It can penetrate most solids and pass through walls.
- ⌋ Longer range and not sensitive to the light
- ⌋ It is not much sensitive to the environmental changes and weather conditions.

x. *Wireless Camera*

We are using a wireless CCD camera. This type of cameras are commonly available in the market. This camera works on 12volts DC supply. It has a receiver, which is placed in the remote station. Its output signals are in the form of audio and video. These signals are directly connected to a television or a computer through a tuner card. This CCD camera is connected to the robot. This camera captures the video and audio signals and sends those signals to the remote station. with the help of the camera receiver which is connected to the television or a computer we are able to see the captured signals. Diagram of the wireless camera is shown in figure 6.



Figure 6 : Model Diagram Of Wireless Camera

III. Operation

Motor Controlling Unit

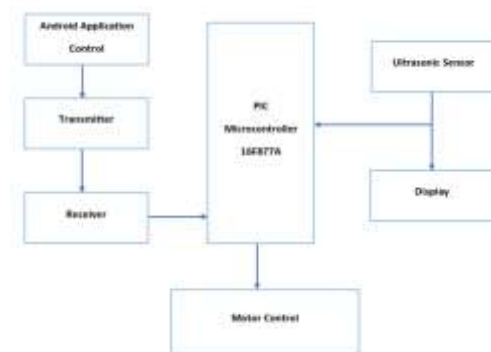


Figure 7 : Block Diagram of Motor Control

The robot wheels are controlled by the motors by using the IC called L293D. This IC is used as a interface between the motor and the PIC microcontroller. This IC will convert the signals from the Microcontroller to required motor controlling signal to operate the motor.

While we are directing the robot by means of touching the touch screen of android mobile which is done by an android application. The signals are generated when directing the robot. That signals are transmitted to the receiver which is present in the robot. The received signals are send to the PIC microcontroller. In this microcontroller the required control signals are generated. The generated signals are send to the motor to direct the robot. The originally generated signals are not capable of controlling the motor. For this we have to add a separate IC to convert the generated signals to perfect and correct signals to control the motor. IC L293D is the IC used for converting the signals which controls the wheels of the robot. By using this operation we are controlling the robot in forward, reverse, rotating direction. Figure 7 is the block diagram of the motor control of robot.

Video transmitting and receiving Unit

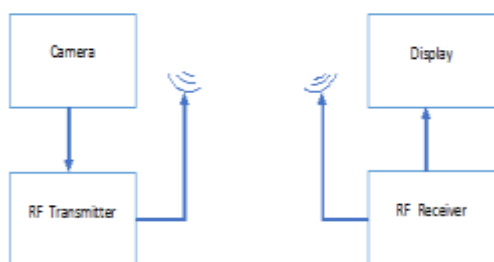


Figure 8 : Block Diagram for video transmitting and receiving

This robot is having a camera to telecast the live video of the activities of the intruders to the base station, where we can control the robot. The recorded video is transmitted to the receiver which is mounted in a base station through the RF Transmitter. The RF receiver receives the video and displays that in the displaying device. This is how the video transmitting takes place. This operation of robot by using the Radio Frequency technology. Figure 8 is the block diagram of the video transmitting and receiving of the video from the robot.

Overall Operation

By directing the android application in android mobile the controlling of the robot takes place that is to move in either in left of right forward or reverse direction. Simultaneously the recorded video is transmitted to the base station in which the robot is controlled. This is how the robot operates. Figure 9 is the model block diagram of our robot model.

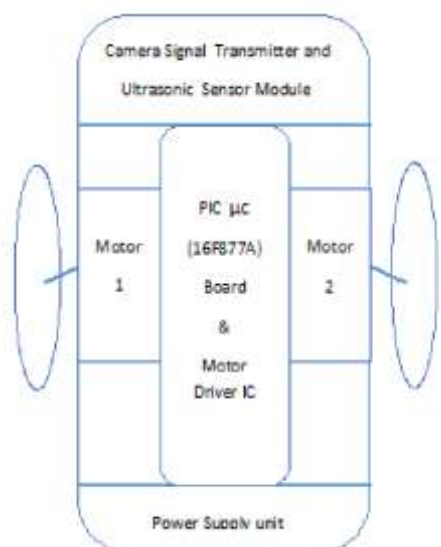


Figure: Block Diagram of SPOOK ROBI

Advantages

- } Saves the human life in war fields.
- } Easy to operate and control.
- } Cost effective than human life.
- } It also has autonomous control.

IV. Conclusion

The moto of our project is to develop a spy robot with android controlled operations. It is capable of transmitting live videos from intruders side which is provisioned with obstacle detection sensors. Thus the 'SPOOK ROBI' is efficient in preventing the loss of human life.

V. Future work

We have also planned to add the voice control in which the robot is controlled by using the vocal commands and also to add the flying mode in which we can make a robot to fly in some unavoidable obstacle on the way of mission.

References

- [1.] Sarshan Dayma, Bhusan Chavan, Suraj Kale, "SMART SPY ROBOT", IJSTM-feb, 2015.
- [2.] Mr.Lokesh Mehta, Mr.Pawan Sharma, "SPY Night Vision Robot With Moving Wireless Video Camers & n Ultrasonic Sensor", IJRETM-JUNE, 2014.
- [3.] M.Selvam, "Smart Phone Based Robotic Control for Surveillance Applications", IJRET-volume 03, 2014.
- [4.] Smart Phones Android Operated Robot , <http://www.sooxmatechnologies.com>.
- [5.] PIC 16F877A microcontroller Data sheet by Micro ship.
- [6.] Android SDK developer Guide (online) <http://developer.android.com/>