JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Design and Implementation of IOT Based Surveillance Robot

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Abstract: The main objective behind this paper is to develop a robot to perform act of surveillance in domestic areas. Nowadays robots play a vital role in our day-to-day life activities thus reducing human labor and error. Robots can be manually control or automatic based on the requirement. The purpose of this robot is roamed around and provide audio and video information from the given environment and to send obtained information to the user. In this system, one can control robot with the help of mobile or laptop through internet of things (IOT) and also can get live streaming of video both is daytime as well as at night with the help of wireless camera. This robot also uses various sensors that collects data and send it to the Arduino microcontroller which controls the robot behavior.

Keywords: Microcontroller, wifi, DC motor Batteries, IR sensor

I. INTRODUCTION

Technology has brought dynamic and tremendous change in robotics and automation field which ranges in all kinds of areas. Surveillance is the process of close systematic observation or supervision maintained over a person, group etc. Thus, surveillance is mainly required in border areas, public places, offices and industries. It in mainly used for monitoring activities. The act of surveillance is performed indoor as well as in outdoor areas by humans or with the help of embedded systems such as robots and other automation devices.

The robot consists of Arduino Uno microcontroller which acts as heart piece of the robot. It also consists of dc motors, wheel chassis, wi-fi module (ESP8266 12e) and various types of sensors such as ultrasonic sensor for obstacle detection IR sensor for detecting pits. The robot can be either operated automatically or manually. User end communicate with the robot by implementing the concept of Internet of Things. This can be achieved through developed robot software, which is used for IOT developing projects. Already existing system use robots that have limited range of communication as they are based on RF tor Bluetooth technology. By interfacing wi-fi module with Arduino, we can get unlimited range of operation. Also, by using Arduino controller, the cost and complexity can be reduced and the communication with robot occurs in more secured manner.

II. PROPOSED METHODOLOGY

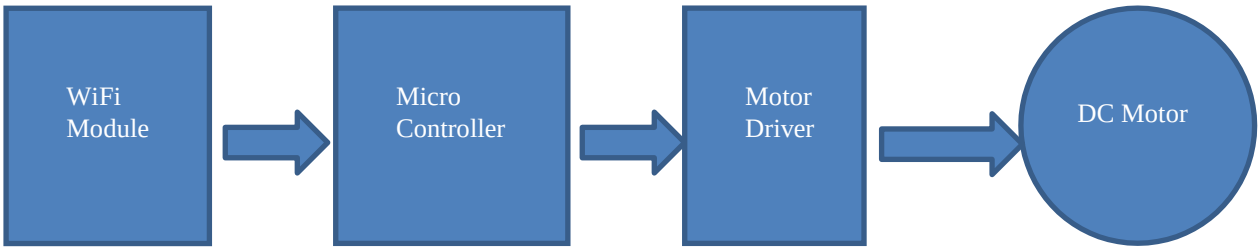

Fig: Block Diagram

The project aim is to design a robot that can be operated using android mobile phone. The controlling of robot is done wirelessly through smart phone using wi-fi feature. Android smart phone is used as remote control for operating robot. The controlling device of the whole system is the microcontroller. Wi-fi module and dc motors are interfaced with the microcontroller. The data received by wi-fi module from android one is fed as input to the controller. The acts accordingly on dc motors of the robot. The robot in the project can be made to move in all the four directions using android phone. The direction of the robot is indicated using LED indicators of the robot system. In achieving the task, controller is loaded with the program written using Embedded 'C' language. The proposed work performed with the help of spy robot used to monitor and keep watch of areas not easily accessible by humans.

The electronic circuit controlling the robot is build around Arduino Pro Mini. The L293D motor driver IC and ESP82566 wi-fi module are interfaced to controller board. A pair of geared dc motors are attached at the rear wheels which are interfaced with the motor driver IC. A mobile phone whose camera is used as IP web camera is mounted on the robot body.

Fig: Prototype model of proposed model

In the circuit, Arduino Pro Mini and wi-fi module need 5v regulated dc for their operation while the motor driver IC needs 12v dc. A 12v NIMH battery is used as primary source of power. The supply from battery is regulated to 5v and 12v using 7805 and 7812 ICs. In this robot, 12v geared dc motors are attached to the wheel. Geared dc motors are available with wide range of RPM and torque, which allows robot to move based on the control signal receives from the motor driver IC.

A mobile phone mounted on the robot body for live transmission of video recording. The phone has IP camera installed on it which records and transmits the live recording to remote server. The app automatically uses the mobile camera as IP camera. Another mobile phone will be used to control robot over wi-fi. It has custom app installed in it can move the robot in forward, backward, left and right direction. In control circuitry of the robot is powered on, it initializes the controller and starts reading data from the wi-fi module. The control commands can be passed to robot using custom app running on an android phone. The app has user interface which allows moving the robot forward, backward, left, right and stop. The user has tapped just the direction buttons to transfer the commands. The commands are passed by the app to the wi-fi module interfaced in control circuitry in the form of single character strings. These command strings interpreted in the Arduino sketch to control dc motors. The robot can be move by implementing following input logic at the motor driver pins. On receiving the string commands, the Arduino sketch just changes the digital output at the input pins for motor driver IC to control the motion of the robot.

III. TESTING AND RESULT

Once the circuit has designed, it is necessary to verify this design is correct and a prototype is built to the drawing. This verification of design is done by writing several small programs, beginning with the most basic program and building on the demonstrated success of each. One by one hardware tested for its function. i.e., wi-fi module interfacing, motor driver ICs etc. Analog inputs are checked by applying actual input to the port pins.

The PCB was tested by tracking the tracks from the net list and artwork of PCB. The error in the network was eliminated while testing and after that it was given to PCB manufacturing. The PCB was tested using DMM (Digital Multi Meter) for continuity of the tracks. After completing component soldering as per drawing, quality of soldering was physically inspected. Once supply board is made its output was checked to see if the supply board was providing necessary supply voltages. The initial test for the microcontroller is to ensure that the crystal is working

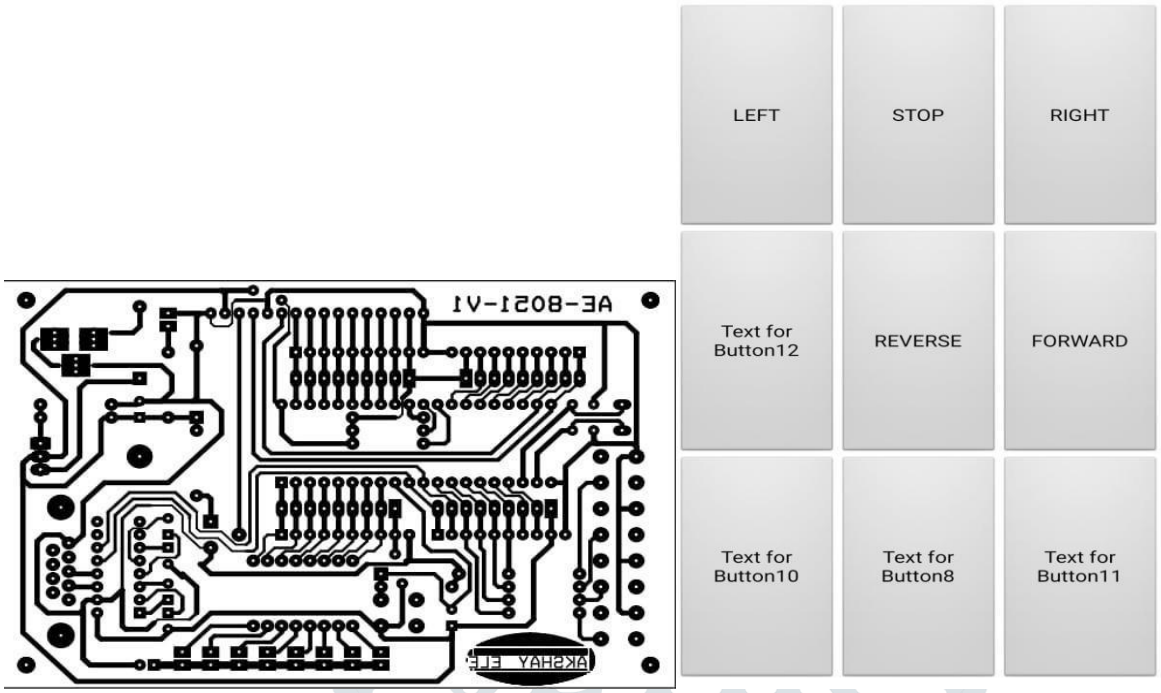

Fig: Pcb Design

192.168.79.236	**SAVE**
Forward	**A**
Left	**C**
Right	**D**
Reverse	**B**

Table No:1

Hint for TextBox1	**Hint for TextBox2**
Hint for TextBox5	**Hint for TextBox6**
Stop	**E**
Hint for TextaBox13	**Hint for TextaBox14**
Camera	**F**

Table No:2

IV. CONCLUSION

In this paper, the framework for making a robot for surveillance purpose is proposed. It overcomes the problem of limited range surveillance by using the concept of IOT. We can control the robot with the help of laptop/mobile manually. Automatic monitoring can also be done. Our proposed robot is small in size thus manoeuvrings into area where human access is impossible.

Wireless technology is one of the most integral technologies in the electronics field. This technology is used to serve our project as supreme part of surveillance act. This provides highly efficient and cost-effective robot that replaces human work and reduces human labour and performing monitoring works in a well effective manner.

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