Surveillance and Smart-Housekeeping Robot Based on Internet Of Things

Y. Laxman Rao[1], Mohan Ganesh[2], Molli Sai Tanuja[3], D. Vijay Shivani[4], Mendadala Sanjana[5]

[1]Assistant Professor, [2]Assistant Professor, [3]B.Tech IV, [4]B.Tech IV, [5]B.Tech

[1,2,3,,4,5] Information Technology,

[1,2,3,4,5] Vignan's Institute of Engineering for Women, Visakhapatnam, India

Abstract— The main objective behind this paper is to develop a robot to perform the act of surveillance in domestic areas. Nowadays robots play a vital role in our day to day life activities thus reducing human labor and human error. Robots can be manually controlled or can be automatic based on the requirement. The purpose of this robot is to roam around and provide video information from the given environment and to send the information to the user. Also it mops the floor. In this project, one can control the robot with the help of mobile or laptop with through Internet of Things (IOT) and also can get the live streaming video both in daytime as well as at night with the help of wireless camera from the robot. The robot can be controlled both in manual as well as in automated mode with the help of Automatic Microcontroller. This robot also uses various sensors that collects data and sends it to the NodeMCU microcontroller which controls the robot behavior. Thus the action of surveillance can be performed. Further advancement in our project can provide surveillance even in defence areas.

Keywords NodeMCU, Surveillance, ESP8266 12e, IoT.

1. INTRODUCTION

Technology has brought a dynamic 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. especially one in custody or under suspicion. Thus surveillance is mainly required in the areas such as border areas, public places, offices and in industries. It is mainly used for monitoring activities. The act of surveillance can be performed both indoor as well as in outdoor areas by humans or with the help of embedded systems such as robots and other automation devices. A robot is nothing but an automatic electronic machine that is capable of performing programmed activities thus replacing human work, providing highly accurate results and easily overcoming the limitations of human beings. Thus replacing human in the surveillance fields is one of the great advancement in robotics. The robot consists of NodeMCU microcontroller which acts as the heart piece of the robot. This robot also consists of DC motors, wheel chassis, battery, Wifi module (ESP8266 12e). The

robot can be operated automatically or manually. User end communicates with the robot by implementing the concept of Internet of Things. This can be achieved through BLYNK application, which is used for IOT developing projects. The commands are sent to the robot by means of BLYNK application and they are received by NodeMCU microcontroller via Wi-Fi module since both are interfaced with each other. Thus the robot can be controlled in a wireless manner. In this project, we use wireless transmitting camera that provides video information that can be received at the user end.

LITERATURE SURVEY

A. Existing System

In the previous system, the robot can only broom the floor and cannot mop the floor. There are also robots which provide surveillance. Currently there is no technology where the robot can perform moping along with surveillance, providing security in the absence of the human. Some existing projects use short range wireless camera and can only be controlled with a manual mode which needs human supervision throughout the whole surveillance process.

2. PROPOSED SYSTEM

By interfacing Wi-Fi module with NodeMCU, we can get unlimited range of operations. Robot can be operated in both manual and automatic modes. By using Arduino microcontroller, the cost and complexity can be reduced. The communication with the robot occurs in more secured manner. Our current model helps in housekeeping along with surveillance. It helps to manage rooms of a hotel. In real time applications, it can be effectively used for the people who are handicapped or who are suffering with hand pain. The robot cleans the floor in very less time, providing security to the house.

3. SYSTEM ARCHITECTURE

The system consists of two major sections- one is the user section and other is the robot section. In that the user can possess laptop or mobile for communicating with the robot end. Thus by using laptop or mobile the user section can be portable one compared to those that uses a typical stationary

computer system. The communication can be performed using RF Technology or by using Bluetooth technology, but that comes at the cost of limited range. Thus in order to implement the idea of increasing the range we can go connecting the user section with the internet which is the main concept of Internet of Things. For connecting the user system with the internet, the BLYNK application is used. BLYNK application is nothing but an Internet of Thing (IoT) company which provides a platform for building mobile (IOS and Android) applications that can connect electronic devices to the internet and remotely monitor and control these devices. Thus through this BLYNK application we can send command and can easily control the robot. At the robot end we are using an NodeMCU microcontroller placed on the body or the chassis of the robot, which is the integral part of the robot. Below that chassis the wheels are connected with DC motors that are of 60 rpm each. Each motor requires 12v supply, supplied by means of an external battery source.
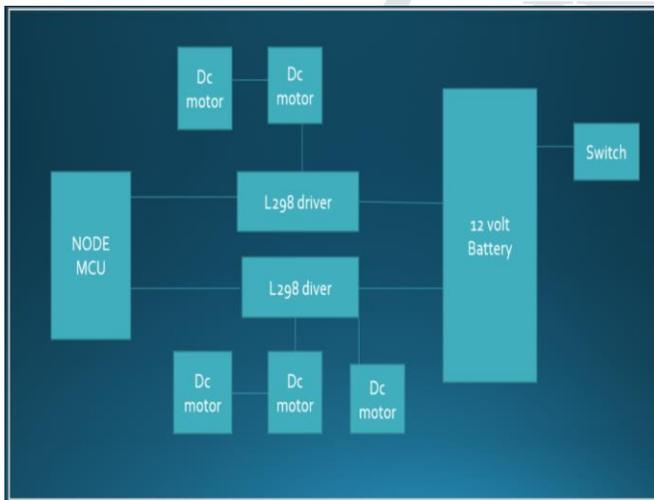

Fig: Arduino Software IDE

BLYNK APPLICATION:

Blynk is a platform with IOS and Android apps to control Arduino, Raspberry pi and the likes over the Internet. It is a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. After downloading the app, create an account and login. Click the "create new project" in the app to create a new blynk app. Give it any name. Blynk works with hundreds of hardware models and connection types. Select the hardware type. After this, select connection type. In this project, we have select Wi-Fi connectivity.

Fig: System Architecture

4. REQUIREMENTS

A. Software Requirements

ARDUINO SOFTWARE:

The Arduino Integrated Development Environment – or Arduino Software (IDE) – contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .in. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information.

Fig: Blynk App

B. Hardware Requirements

NODE MCU:

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.
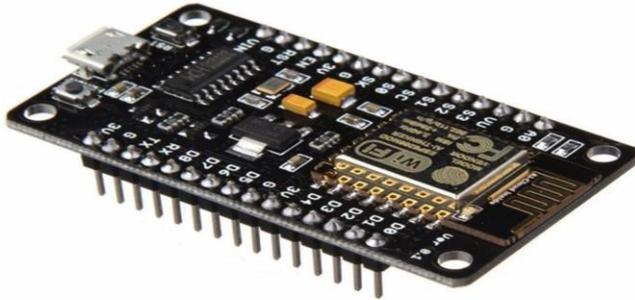

Fig: NodeMCU

L298 MOTOR DRIVER:

The L298 is an integrated monolithic circuit in a 15-lead Multiwatt and PowerS020 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL (Transistor-Transistor Logic) logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors.

Fig: L298 Motor Driver

DC MOTORS:

A Direct Current (DC) motor converts current electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.

Fig: DC Motors

AMPTEK BATTERY:

A battery can be defined as; it is a combination of one or more electrochemical cells that are capable of converting stored chemical energy into electrical energy. Simply said that battery is a storing device to store the energy.

Fig: AMPTEK Battery

In this project, we are using a 12V battery for the running of delivery robot. The capacity of this battery is 12V 1.4AH.

SWITCH:

A switch may refer to one of many different things. For example, it may refer to a part of the physical circuit components that control the flow of signals. It can be a button or level to turn a device on or off.

Fig: Switch

WHEELS:

A wheel is a circular block of a hard and durable material at whose center has been bored a hole through which is placed an axle bearing about which the wheel rotates when torque is applied to the wheel about its axis.

Fig: Wheels

JUMPER WIRES:

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

Fig: Jumper Wires

5.   RESULTS

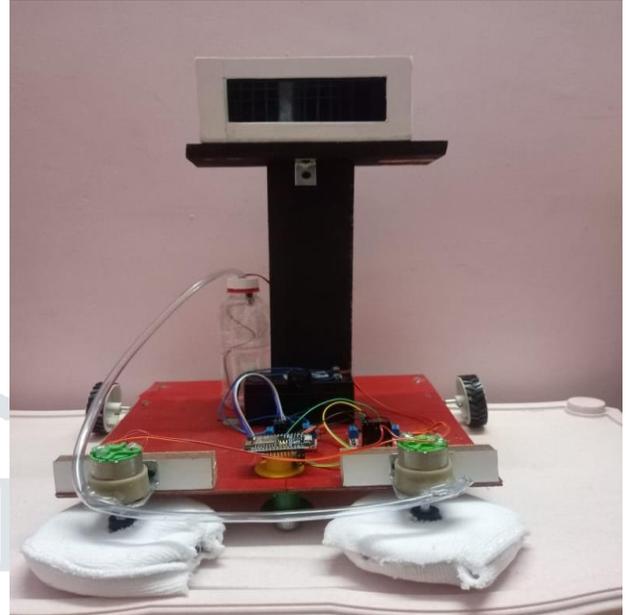IOT based Surveillance Robot project is completed.

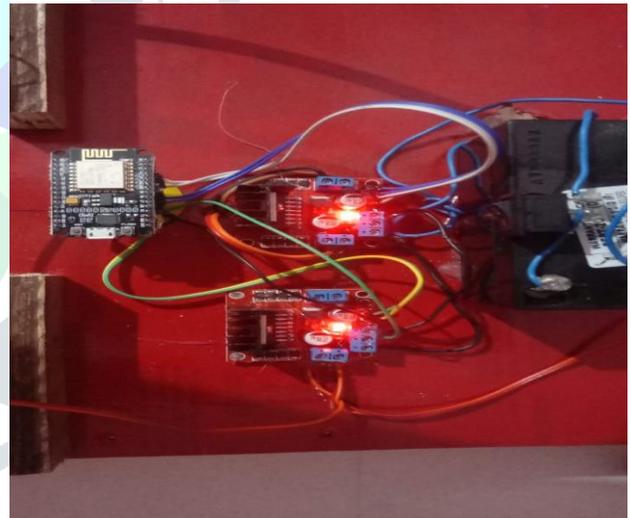

Fig: Robot Prototype

Fig: Connecting Sensors

6.   CONCLUSION AND FUTURE WORK

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

References

[1] " IoT based Autonomous Floor Cleaning Robot" by Saurabh, Alok.

[2] " IoT based Smart Housekeeping Robot" by Mohini, Aparna (May-2018).

[3] " IoT based surveillance robot" by Mahendran, Anandravisekar (volume-07, March-2018).

[4] Arduino Language Reference [Online]. Available: http://arduino.cc/en/Reference/HomePage, September 2012

[5] The Arduino Uno Website [Online]. Available: http://arduino.cc/en/Main/arduinoBoardUno, September 2012

[6] www.wikipedia.com

[7] www.youtube.com