Wireless Military Defense Robot

Shweta Vichare[1], Snehal Katare[2], Amruta Pawar[3]

[1,2,3]*Vidyalankar Institute of Technology, Information Technology Department, Wadala, Mumbai*

Abstract - *Some risky tasks cannot be done by humans. Thus, there is a need of change which can be bought by robots which is an effective option for risky tasks. Robots play different roles in fields of Industries, home appliances, medical colleges and military and defense. Most of the organizations now take the help of robot to carry out risky tasks. The proposed work is to design and develop a Wireless Military defense robot. Now a day's robots comes in market works on a simple terrain while this project works on plain surface as well as rough surface such as forest, hilly and rocky areas. This robots are used in military and usually employed with integrated system including different sensors to get surrounding data.*

Currently some existing robots have limited range of coverage because they are based on RF technology and zig-bee. Most of the earlier robots uses video surveillance which remains active for long time. Thus, this project presents an defense robot which uses different technologies like PIR sensor, Ultrasonic sensor, NodeMCU Wi-Fi module etc. and proposed with low voltage power supply, low cost and wireless robot which is controlled using microcontroller and web application.

Here the new system is proposed for surveillance at remote and border areas using 3G technology. This robotic vehicle works in both autonomous and manual mode controlled using Internet as communication medium which is used to detect, human, fire detection and autonomous operation is controlled by ultrasonic sensor and PIR sensor. Manual operation is controlled by ESP8266 module and cell phone used as an video camera by initiating Skype call and change the path of robot according to real time information of surrounding where the video surveillance through Skype call remain active whenever there is need thereby saving battery life. While the other sensors like MQ2 gas sensor, Flame sensor, PIR sensor will detect the presence of gas, fire and human presence while moving around.

***Keywords*: Wireless Sensor Network, NodeMCU ESP8266, MQ2 gas sensor, Flame sensor, PIR sensor, Ultrasonic sensor, Zig-bee, RF technology, Skype.**

1. INTRODUCTION

The robot is electro-mechanical device which used to controlled by electronic circuit to perform various physical activity. Due to gradual development in various technologies scientists come up with new ideas and inventions of robots. In today's life robots are becoming in dispensable part of human life and also bring automation in hospital, factories and offices. Besides automation this technology is also used in Entertainment, Defense forces, Security systems and in many risky and dangerous operations.

The main aim for implementation of this project to saving soldier life. Here the new system is proposed for surveillance at remote and border areas using 3G technology. This robotic vehicle works in both autonomous and manual mode controlled using Internet as communication medium which is used to detect, human, fire detection and autonomous operation is controlled by ultrasonic sensor and PIR sensor. Manual operation is controlled by ESP8266 module and cell phone used as an video camera by initiating Skype call and change the path of robot according to real time information of surrounding where the video surveillance through Skype call remain active whenever there is need thereby saving battery life. While the other sensors like MQ2 gas sensor is used to detect the harmful and flammable gases, Flame sensor is used to detect presence of fire at border and remote areas, PIR sensor is used to detect the presence of human at border areas.

The wireless defense robot can be controlled manually through web interface. It will be necessary that to make one platform from there we will access our robot. From the web page we control the direction of motor as well as monitor the video feed. We navigate our robot according to the live information getting from the Skype video calling which can be initiated with help of web interface.

2. LITERATURE SURVEY

2.1 Surveillance Robot For Military Application.

S.A Joshi, Aparna Tondarkar, explains that in [1] its an modern approach for surveillance at remote and border areas by using this multi-functional robot based on current IOT used in military defense operations which has an ability to provide surveillance at border area without human interference. The robotic vehicle works using Internet communication in both automatic and manual mode of operations. This multi-sensory robot is used to detect the presence of enemy captured by

camera and give live streaming to authorize person. Surveillance plays a major role while working at border area for this there is robot for surveillance purpose. This paper presents an smart surveillance robot for military applications by using Raspberry pi which will send a wireless command which is received by authorized person on web page and accordingly robot moves. This paper also explains Raspberry pi camera and Raspberry pi programming are done with help of python language and which is used to implement of video streaming.

2.2 Review on Rough Terrain and Defense Robot.

Sahil Bhatnagar1, Shivam Kumar Gola explains that in [2] rather than using different robots they uses rough terrain robots as well as different technologies such as infrared sensor ,PIR sensor, Ultrasonic sensor, Bluetooth module and This paper also presents an defense robot which uses different technologies like infrared sensor, PIR sensor, Ultrasonic sensor, Bluetooth module and Wi-Fi technology etc. Also, this paper proposed low cost and a low voltage power supply wireless robot which is controlled using Android application. This paper explain various technologies are used for controlling and development of functionalities of defense robot such as Zigbee protocols, RF modules, Touch screen, Wi-Fi modules. In this paper also explained implementation of defense robot is totally done in the the field of rough terrain

2.3 Wireless Multifunctional Robot for Military Application

Rohit Borte, Nitin Darade explains that in [3] a modern approach for surveillance at remote and border areas using this multifunctional robot based on current #G technology used in defense and military applications. This vehicle has an ability to substitute the solider at border areas to provide surveillance. This vehicle works in both at autonomous and manual mode using Internet communication medium. This multisensory robot is used to detect bombs, human presence harmful fire at war field areas. Conventionally, this security robot obsoletes due to limited manual control and frequency range. Thus the limitations are overcome using 3G technology which has limitless range and also uses solar panel as a renewable resource. This paper also explains cell phone and DTMF decoder are used for controlling the manual operation of robotic vehicle. They initializing 3G video call and live information of surrounding area getting from this is used for the change the path of the robotic vehicle. This paper also explains the result of power consumption and tilt angle selection of solar panel in manual and automatic mode. The designs of the robot vehicle are done under certain circumstance.

2.4 Unmanned Multifunctional Robot Using Zigbee Adopter Network For Defense Application.

PreamKumar Manoharan explains that in [4] the system implementation is done with help of low power Zigbee wireless sensor network. This network is used find out the path as well as obstacle in between the path so that the robot will take action automatically. Thus Intelligent Unmanned robot (IUR) which is an proposed system based on Zigbee reduces manual error in defence side and hence saves human lives. It is specially designed robotic system to protect the country from enemies and save human life. This paper also explain the operation of robotic vehicle are monitored using CMOS camera and system communication are done with the help of low power Zigbee wireless sensor network.

2.5 Utilization of Mobile Technology for Mobile Robot Controller.

SaliyahKahar explains that in [5] the different mobile technology is used for implementation of robotic vehicle. For implementation of robotic vehicle, .Bluetooth, Wi-Fi or Wireless LAN and 3G this mobile technology are used for the controlling and development of mobile robot. Comparison between the each mobile technology are depends on various factor such as data rate, frequency and range as well as mobile technology used in this application .The application of this robot are used in various sector such as factory sector, manufacturing and security. This paper also explains the mobile technology is used for development of the mobile robot so the utilizing of mobile device are increases. This will provide benefits to mobile uses as well as Manufacturers Company.

3. PROPOSED SYSTEM

This Wireless Military Defense Robot has various modules where each module consists of various functionalities.

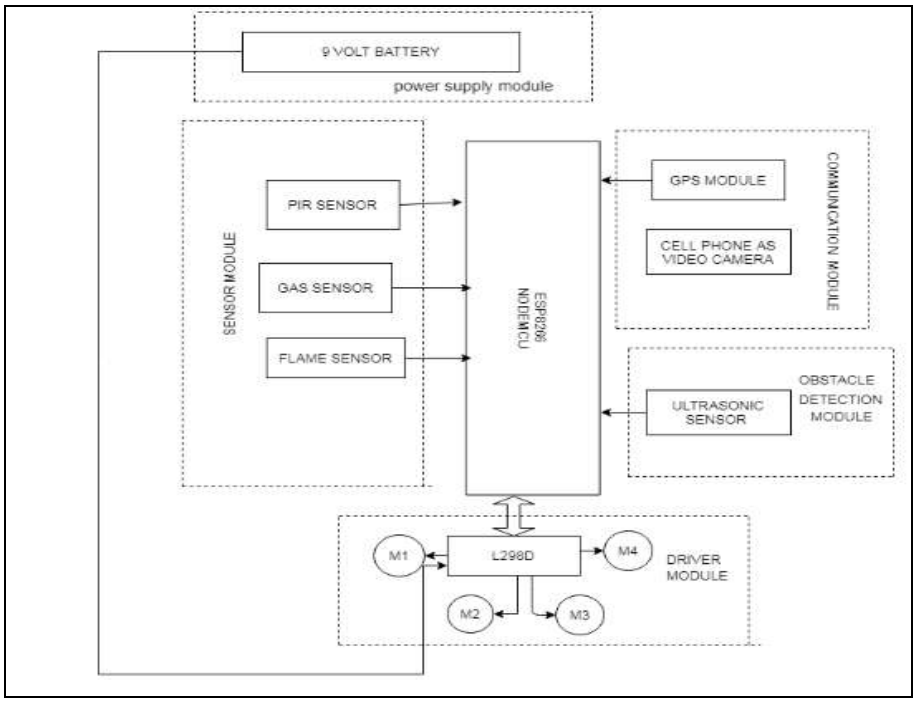

Figure 3.1: Circuit Diagram of robotic vehicle

Here the System implemented using following module:

3.1 PowerSuppy Module.

The L298N is motor driver and it is used to control speed and direction of DC motor at same time which used in military defense robot. The motor driver is used to drive the 4 DC motor which have voltage upto 6V as well as current up to 1.3A.The module have an onboard 5V regulator which is enabled using a jumper. So each dc motor requires 100mA current so in total for 4 DC motors it will take up to 400mA. Battery used is of 6V and 1.3A.

Figure 3.1.1: 6V Battery

3.2 Sensor Module.

Here's the description of various sensors used in sensor module.

3.2.1 PIR Sensor

PIR sensor is used to detect the human presence or particle movement in specific range and can also be called as motion sensor or Infrared sensor.

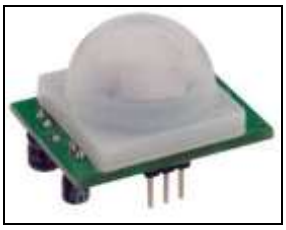

Figure 3.2.1.1: PIR Sensors

3.2.2 MQ2 Gas Sensor.

Gas Sensor(MQ2) sensor is used to detect the gas leakage in defense and remote area. It can detect combustible gas and smoke. In military defense robot this sensor have threshold value up to 450, if the detects the gas value greater than 450, it will indicate it to user about gas leakage alert.

Figure 3.2.2.1: MQ2 Gas Sensor

3.2.3 Flame Sensor

The Flame Sensor is used to detect any sources of fire and light within the range of 760nm-1100nm.It will notify user by displaying digital output on serial monitor and will give alert on web interface.

Figure 3.2.3.1: Flame Sensor

3.3 Obstacle Detection Module

The autonomous robot is able to find the path by using obstacle detection module. The ultrasonic sensor used to detect obstacles. It uses echo signal to detect object by sensing the signal which are received back after striking with object and also determine distance of obstacle by determining the time between transmission and reception of object.

Figure 3.3.1: Utrasonic Sensor

3.4 NodeMCUESP8266

The Node MCU Development Board has a USB to 3.3V power supply on the board. The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. As the Flame sensor requires one analog input which is provided by analog pin A0 of NodeMCU hence additional multiplexer is not requiredforthispurpose.NodeMCUcontrollerhasonlyoneanaloginput.This controls the robot in both automatic and manual mode.

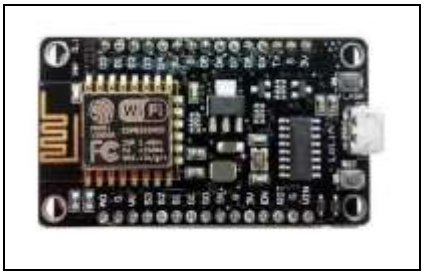

Figure 3.4.1: NodeMCU

3.5 Communication Module

The communication between robot and web interface take place with help of Skype call. The data and video transmission is done by Skype video calling. When any of the sensor become active an alert message is shown on web page through which a user can initiate a Skype video call and real information getting from Skype call is used to control the robot in manual mode. The smart phone is placed on the robot and kept on automatic mode to monitor the surrounding to provide live view of surrounding of robot in order to change its path

3.6 Driving Module

3.6.1 L298N Driver

L298N driver is used to drive the DC gear motors in total eight directions forward, forward-right, forward-left, left, right, backward, backward-right, backward-left. The speed of motor depends on RPM of DC gear motor that contain one H-bridge to drive motor in all directions.

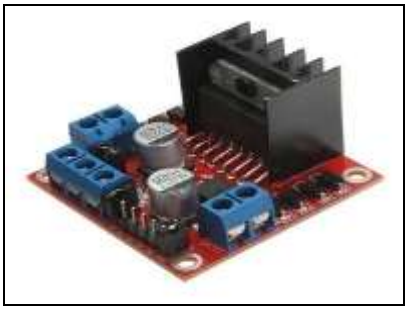

Figure 3.6.1.1: L298N Driver

3.6.2 Gear Motor

DC Gear motor is used to drive the robot and for this military defense robot we used 240 rpm four DC gear motors. As rpm is inversely propositional to a force that tends to cause rotation hence the speed of motor depends on the diameter of wheel and rpm of motor. Thus when speed of motor is gradually increased the force of rotation will be decreased. This Dc gear motor require voltage up to 3V-6V with current 100MA-120MA. It has Tire diameter up to 65mm and provide car speed in 20-40 M/minute. Motor size 70mmx22mmx18mm.

Figure 3.6.2.1: DC Gear Motor

4. SYSTEM IMPLEMENTATION

4.1 Installing Arduino IDE Software

Arduino IDE is cross platform application that is used to write and upload programs to Arduino compatible boards like NodeMCU, Raspberry pi etc. we have installed ESP8266 support library and within BOARD MANAGER of Arduino IDE

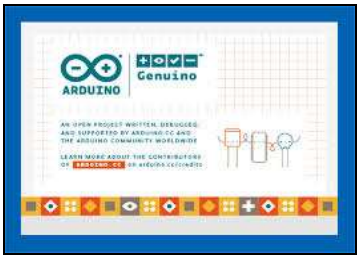

Figure 4.1.1: Arduino IDE

4.2. Testing all modules and Sensor

The mounting of all the sensor, first we want to test it individually. Testing a module like Flame sensor, Gas sensor, Ultrasonic sensor, DC motor with L298D with their respective programs

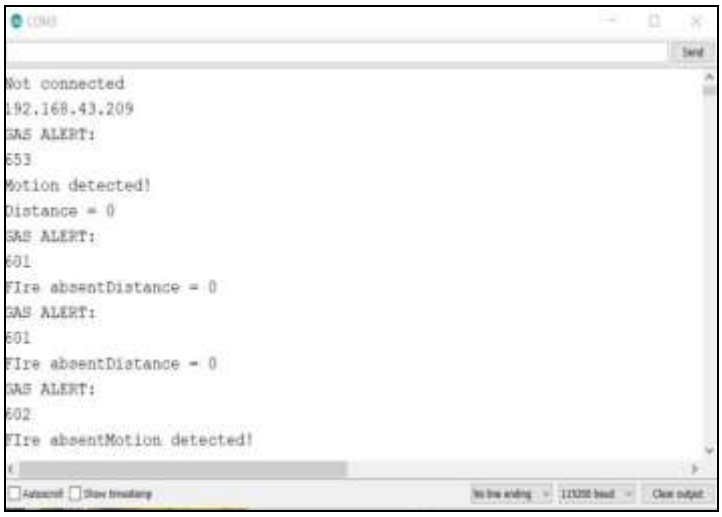

Figure 4.2.1: Testing of Sensor

4.3 Designing Web page

The web page designing is main part of our project to control robot from any remote area. It will be necessary that to make one platform from there we will access our robot. From the web page we control the direction of motor as well as monitor the video feed.

Figure 4.3.1: Web Interface

4.4 System Flowchart

System flow chart is the graphical representation of over all system. This flow chart shows how the robot can behave when he is in the on field for surveillance.

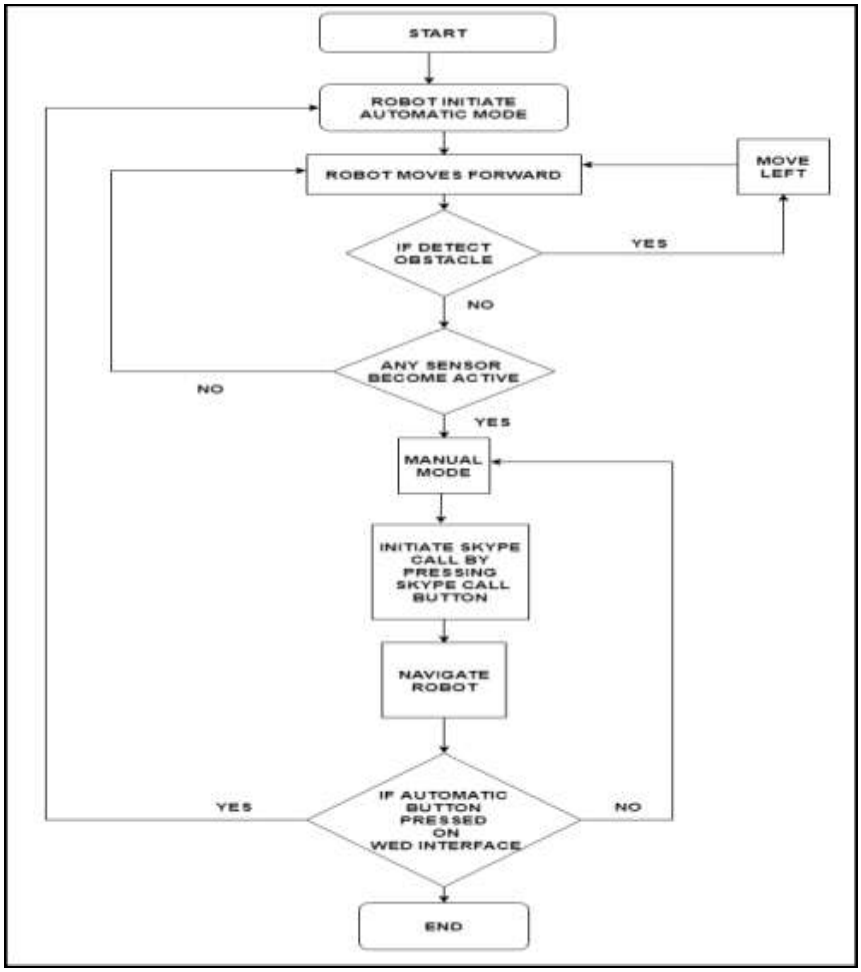

Figure 4.4.1: Flow Chart

5. RESULT

The below fig shows the pictorial representation of wireless military defense robot. The main purpose of this robotic vehicle used for the surveillance at border and remote area. This robot operated in manual and automatic mode. The manual operation can be controlled through the web interface. The main aim of this robot to save human life. Also this robot will initiate the Skype video call to control and monitor the behavior of robots and information getting from Skype video call will be used to find out the path of the robotic vehicle.

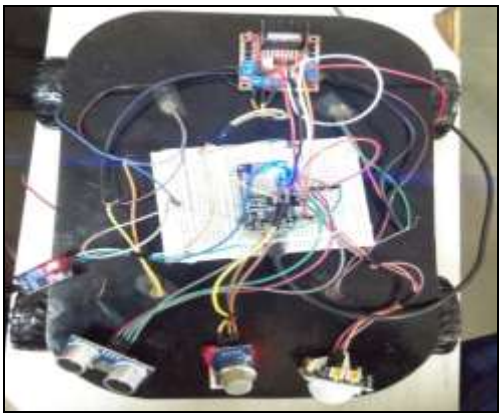

Figure 5.1 Robot

6. CONCLUSION

In this paper we implemented wireless military defense robot for surveillance purpose. This robot is used find out the real time condition of border area without human interference. This wireless Defense Robot path can be controlled manually according to the live information getting from the Skype video call.

7. REFERENCES

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