IMPLEMENTATION OF SURVEILLANCE AND COMBAT ROBOT USING IOT

V.S.P.G. Sri Priya [1], Sk. Karim[2], N. Praveen Kumar[3], Sk. Jani Basha[4], Dr. K. Kanthi Kumar[5], Dr. Sk. Ebraheem Khalelulla[6],

[1,2,3,4]UG Students in Tirumala engineering college, Narasaraopet, Andhra Pradesh, Guntur District -522601
[5]Professor in Tirumala engineering college, Narasaraopet, Andhra Pradesh, Guntur District -522601
[6]Assoc. Professor in Tirumala engineering college, Narasaraopet, Andhra Pradesh, Guntur District -522601

Abstract: A Soldier is a person who serves in an army. A soldier who is willing to sacrifice their life's for the protection of our country and citizens. Military people have a huge risk on their lives while entering an unknown territory. Now a day many illegal activities like crossing borders through forest regions, planting landmines. To keep an eye on such activities there is a need of Combat robot with defending technology by that we can plane and prevent such activates that are going to happened, this robot is controlling from a far distance (long range) using IOT technology with vision camera. The Robot will serve as an appropriate machine for Military Sector to reduce the loss of soldier life and will also prevent illegal activities by using hidden gun of defending technology which we have designed and installed on top of the robot. The Robot consists of wireless vision camera which can transmit video of the war field in order to prevent any damage and loss to soldier life. It will help to all the military people and armed forced to know the condition of the territory area.

Keywords: Azimuthally and Elevation angle, Controlling Robot, Commands, Target, Aim, fire.

1. Introduction

A Combat Robot is a multifunctional programmed device which is designed in AutoCAD and implemented in practical prototype for surveillance purpose in respective India territory areas with Defending Technology. This Combat Robot integrated with IOT based ESP32-CAM module for live video streaming of surveillance for knowing illegal activities are going on, which is programmed using the Arduino IDE tool. We have developed web application which is hosted in esp module and it consists of controlling buttons like Click to on and slider buttons for controlled the robot camera in angular displacement azimuthally and elevation angle direction. Arduino mega-2560 is well programmed microcontroller and it is used for controlling the whole robot functionalities according to receiving commands through to web applications by soldier who is controlling the robot. It is also consists SG90 servo motors and 28Byj-48 stepper motors for angular displacement of camera and hidden gun to aim and shoot the target which is designed with Laser diode in prototype model. Ultrasonic HC-SR04 sensors are integrated in robot for obstacle avoiding and prevent the damages to robot fortunately or unfortunately from beings and non living beings. Finally we have installed all these robot setup on four wheel flat-forms for Robot mobility.

2. Proposed System

The Proposed research work is to helpful to our Indian Military soldiers. Using Combat Robot to monitor and keep watch of areas which are not easily accessible by soldiers. Surveillance is the process of monitoring territory areas or a person who is doing illegal activities. Where surveillance of borderlines and Indian Territory is essential for the country safety, the robot is also includes the self-defending techniques, whenever it detect an object immediately the soldier who is operating the robot will identify the target through esp-32 cam module and aims toward the target and shoot them. We are representing the research work of Combat robot in AutoCAD 3D design model.
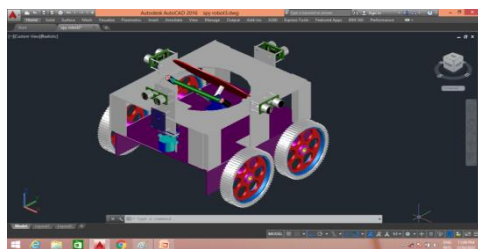
2.1 Combat Robot Design Model

Figure: 1 Combat Robot Model in AutoCAD 3D
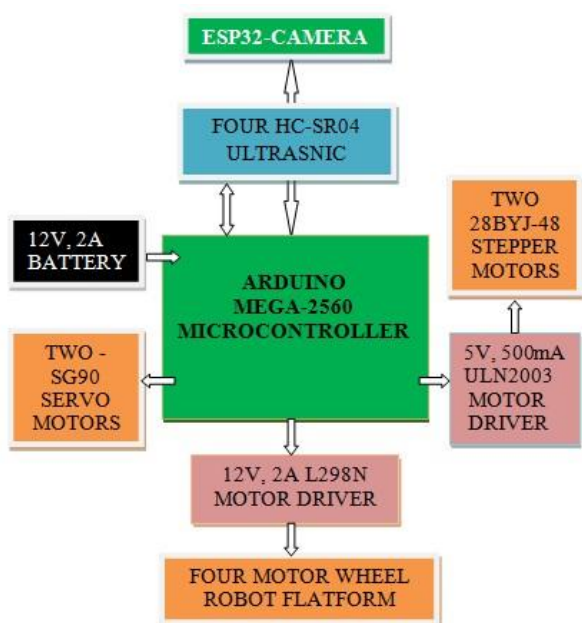
2.2 Methodology

Figure: 2 Block diagram of Combat Robot

The microcontroller is interfacing with hardware. Such as camera module, 4-Ultrasonic Sensor 2-stepper motors which are connected to microcontroller through uln2003 motor drivers, servo motors, and 4 motor wheel- robot flat forms connected through l298n motor driver to microcontroller. The Main programmer will be programming and debugging via USB and testing the microcontroller camera module.

3. Components

3.1 Esp32-Cam
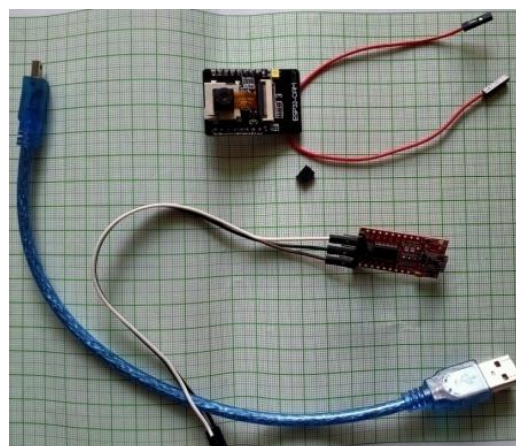
Figure: 3 Esp32-cam module with FT232RL USB to UART TTL converter

We are providing a vision for Combat Robot using Cam module to do Surveillance and Identifying the Targets. FT232RL USB to UART TTL converter is used for programming Cam Module and IOT Web application is hosted in Same ESP32-cam module.
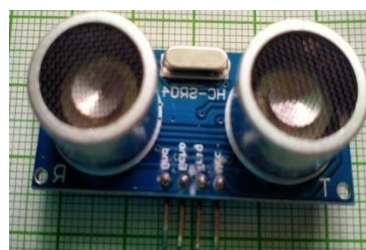
3.2 HC-SR04 Ultrasonic Sensor

Figure: 4 Ultrasonic Sensor

Ultrasonic sensors are used to detects the objects from four sides of robot and protect itself from attack.
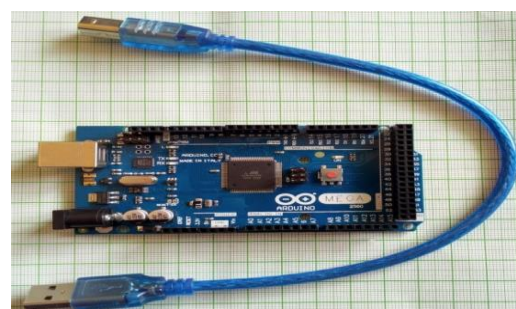
3.3 Arduino mega2560

Figure: 5 Arduino mega2560 with A to B cable

International Journal of Advance Research in Science and Engineering
Volume No. 11, Issue No. 06, June 2022
www.ijarse.com

IJARSE
ISSN 2319 - 8354

Microcontroller is well programmed for controlling the whole robot functionalities while receiving command from soldier who is commanding the robot using web application.

3.4 Stepper motor-28bjy-48

Figure 6: Uln2003 Motor Driver

Stepper motors are used for angular diaplacement of Cam module and Hidden Gun in 360deg Azimuthally. Stepper motors are controlling by microcontroller in 2038step positions /360deg through Uln2003 motor driver.
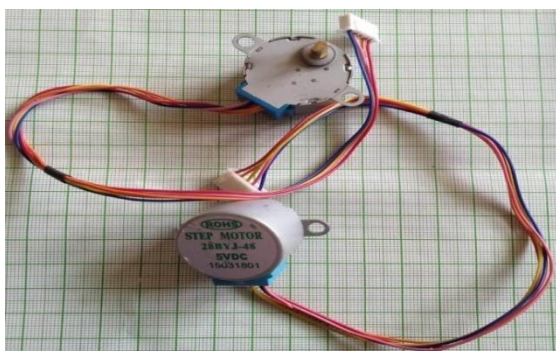

Figure: 7 Stepper Motors

3.5 Power Distribution Circuit and Battery power supply: 12V, 2A
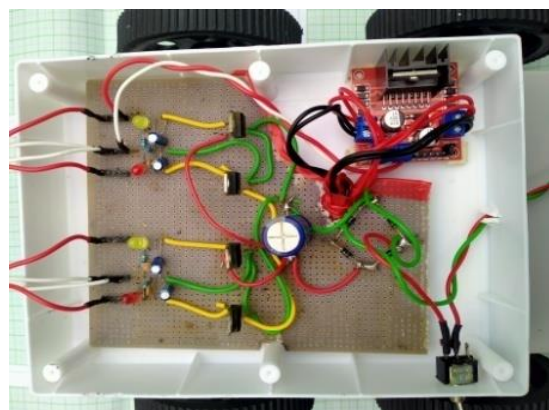

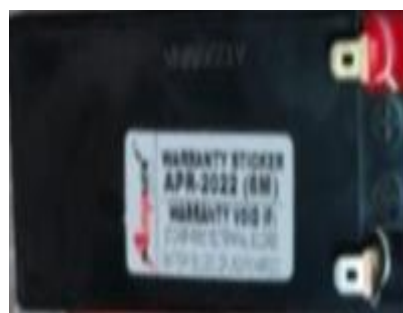
Figure: 8 Power Distribution Circuit

Figure: 9 Battery 12V,2A

In this Research work of Combat Robot we have used 12V, 2A batter and Power distribuiton circuit for 12V, 9V, 5V channels according to hardware power requirement and power supply On/off button.

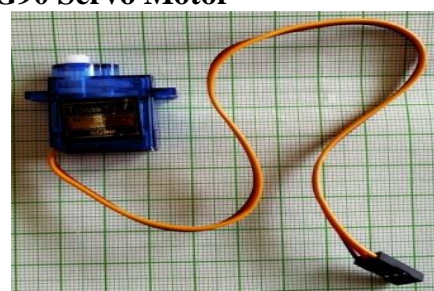### 3.6 SG90 Servo Motor

Figure: 10 Servo Motor

Servo motors are used for angular displacement of Cam module and Hidden Gun in 180deg Elevation angle. Servo motors are controlling by microcontroller using on-chip pwm channels.
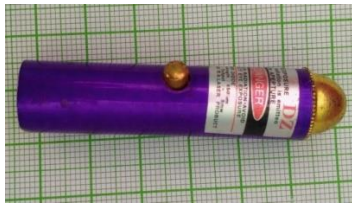
3.7 Laser Diode

Figure: 11 Laser diode

Instead of real gun in the research work Laser Diode is used when a target is aimed at position a narrow laser beam is spotted on aimed target and shoot by blinking the laser instead of shooting.

3.8 Robot Flat Form

A Four-motor-wheel robot flatform is used for Combat robot mobility to move forward, reverse, left, right .

Figure 11: Four-motor-wheel robot flatform

It is drive through L298N motor driver while it receive a controlling signals from Arduino mega 2560.
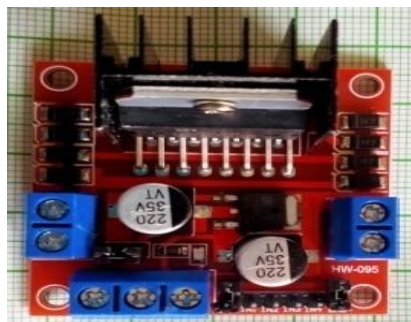

Figure 12: L298N motor drive

4. Results

4.1 Working of Combat Robot

- Robot is Controlling by Soldier from a long rang with integrated IOT Web Application of robot. It is built with several functions.

- It has ESP-32 Cam module like human eyes, which we have assembled on top of the robot, soldier can easily see the live video streaming infront of robot, it can move in angular displacement such as azimutally:360deg and Elevation :180Deg by using this we can do surveillance and identify the target even it is dark place using flash light. It has a robot chassis by which all the robot body parts and hardware are connected together or joint together such as Cam Module, Ultrasonic Sensors, Hidden Gun, Four-motor-wheel robot flatform for Robot Mobility.

- Robot is assembled with hidden gun on top of the robot with in angular displacement such as azimutally:360deg and Elevation :180Deg by using this we can Aim the enemies in any direction and fire them when ever their crossing our Indian Boarders and doing illegal activities.

- Four Ultrasonic Sensors are installed on four sides of robot for monitoring and detects the objects to protect itself from attacks.
- It has a Four-motor-wheel robot flatform for Robot Mobility to move freely in all directions.

- We Design a robot Web Application with Camera visiual Display and controlling buttons like click to on and slider buttons using this commands are transmitted to Main Arduino mega2560 microcontroller which is controlling whole robot in joint mode operations.

Figure: 12 Surveillance and Combat Robot using IOT is designed in Practical
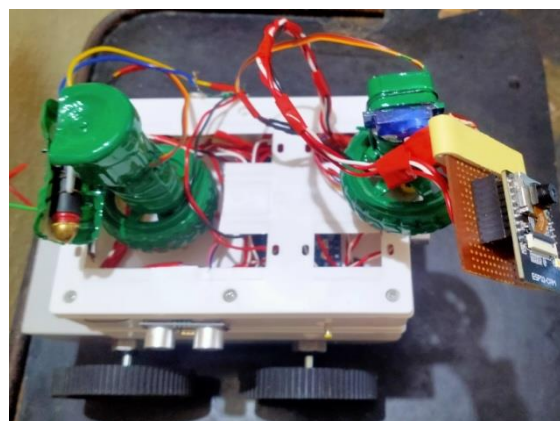

Figure 14: Robot Top View

4.2 Web Application: Viewport in Computer Screen

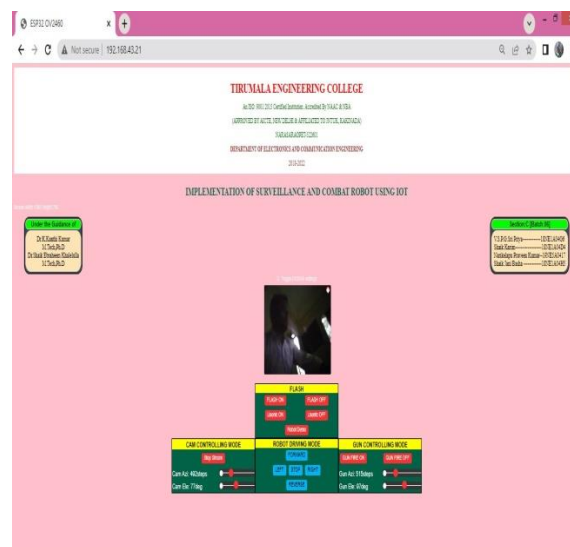**Figure 15:** Viewport in Computer Screen

According to computer screen viewport, we designed web application as shown in Figure 15

Figure 13: Robot front View

4.3 Web Application: Viewport in mobile Screen

- In mobile Screen viewport, we designed web application into block of Content in Column Scroll down format, as shown in figure: 16, 17, 18, and figure19.

Figure 17: Column Scroll down-2

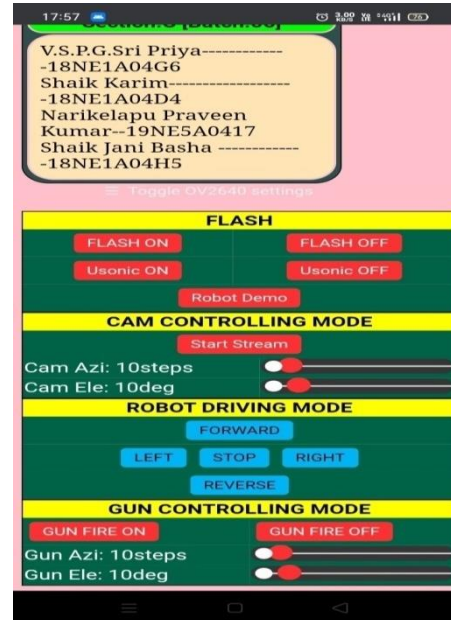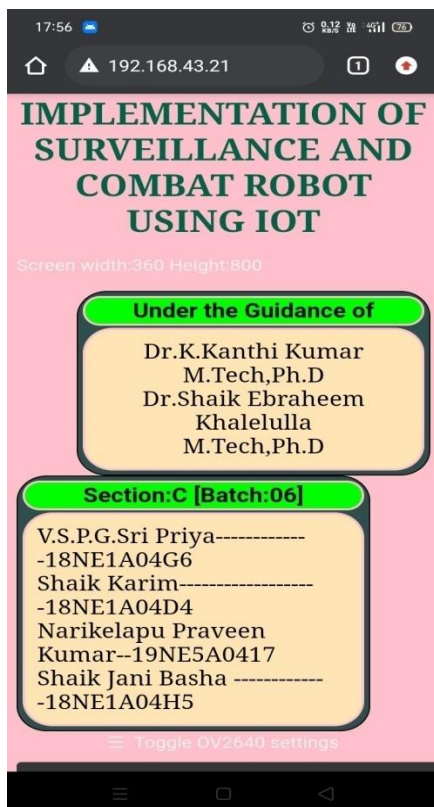**Figure 16:** Column Scroll down-1

Figure 18: Column Scroll down-3

Block of Content with robot controlling commands in Column Scroll down format such as live video streaming display, Flash light On/Off U-Sonic mode on/off and robot demo mode, Video streaming start/stop, angular Displacement of and gun , Robot Driving command, gun shooting commands
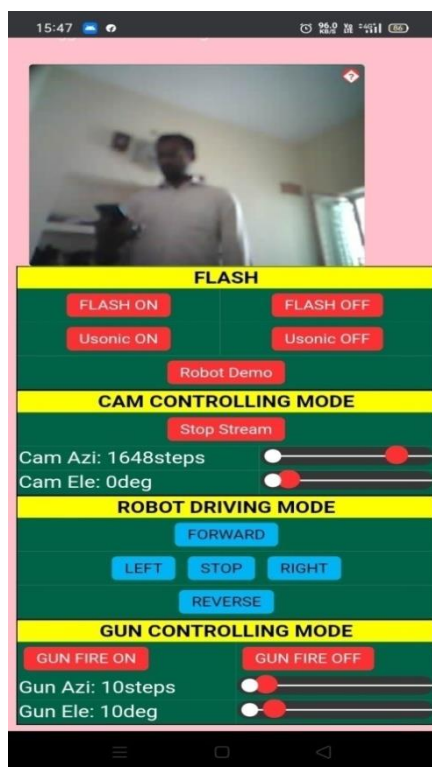
Figure 19: Column Scroll down-4

4.4 Advantages

- Within the small time we can take actions when ever we notice a suspicious events.
- It can reduce the loss of life, as the surveillance and counter strikes can be done by using robot from a long range.

4.5 Applications

Its major Application is Concerned with Military and Defence.

5. Conclusion

However in this reasearch work on prototype of Surveillance and Combat Robot using IOT, we have completed its Design and developed the robot in Pratically and tested. It is working according to our reasearch work based idiology.

6. References

[1] Military Surveillance and Deployment Robot by Aakash Dogra1, Ashiwni Gohokar2, Nachiket Sonar3, Gauri Khapre4 - International Journal of Engineering Research & Technology (IJERT), 2018.

[2] Military Surveillance Robot Implementation Using Robot Operating System by Aditya Prakash1, Rahee Walambe2 -Institute of Electrical and Electronics Engineers(IEEE), 2019.

[3] Design of Military Surveillance Robot by Minal S Ghute1, Kanchan P. Kamble2, Mridul Korde3 - International Conference on Secure Cyber Computing and Communication (ICSCCC), 2018.

[4] HTML, CSS, JavaScript Tutorials from w3schools (https://www.w3schools.com).

[5] JavaScript Tutorials from Java Point (https://www.javatpoint.com).

[6] ESP-32 Cam & Arduino IDE working from https://randomnerdtutorials.com.

[7] Arduino Board configurations & working from Arduino (http://ww25.adruino.cc).