



MULTIPURPOSE ROBOT FOR MILITARY APPLICATIONS

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Abstract: The fundamental intent behind creating this robot is the reconnaissance of human activities in the war probe areas in arrange to diminish penetrations and attacks from the adversaries. The robot is comprised of an obstacle detector sensor, flame sensor, smoke locator, laser weapon and a night vision camera that will transmit the real-time recordings of the battle scene in arrange to avoid any mishap to human life. It is too prepared with a GPS tracker to transmit the area points of interest to the accepting stations. Military individuals have a tremendous chance on their lives upon entering an unknown and obscure region. The robot will prove to be a right fit for the defense segment to mollify the misfortune of human beings and will also anticipate any unlawful conduct. It will offer assistance all the military personnel and equipped strengths to comprehend the condition of the region some time recently entering. The robot lets client control the system wirelessly to maintain a strategic distance from human cost of crisis. The robot serves as a way guide in typical case.

IndexTerms - Ultrasonic sensor, ESP32 camera, flame sensor, smoke sensor, laser gun, night vision camera, GPS tracker.

I. INTRODUCTION

The appearance of innovation has brought in a progressive alter in the sphere of mechanical autonomy and robotization which varies in all the segments from managing family household tasks to the protection segment. Nowadays in worldwide advertise, keen phones too have got in an insurgency in wavering people's style of life and giving various applications on distinctive working frameworks. The android working framework is one of the frameworks in consideration, construct on an open source has made a gigantic affect giving numerous applications for mechanical autonomy to offer assistance to folks in their everyday lives. The leading innovation utilized here is the Bluetooth innovation for endowing serial communication with the robot. Bluetooth innovation can be utilized to share information between two gadgets considering the extend between two gadgets. The robot system will be paired with Bluetooth module and the commands are given to the robot using the android application. This war field robot comprises of Arduino board for a controller board. It is having a L293D engine driver circuits along with a HC-05 Bluetooth module. Two other DC engines are moreover utilized for the relocation of the robot. The night vision remote camera is connected with the robot system to screen the circumstance. The camera could be turned 360 degrees by the android application. Mine location sensor and fire discovery sensor are utilized.

The cardinal purpose of creating this robotic system is for the scrutiny of aggressive probing in the war field or border locales in arrange to decrease encroachment from the adversary side. The robot has a night vision camera which can transmit recordings from the war area in arrange to avoid any tribulation to human life. People of the military have a tremendous chance on their lives whereas entering an obscure region. The robot system will help in the guard segment to decrease the misfortune and will anticipate illicit exercises. Mine locator sensor is utilized to identify metallic objects. Fire locator is utilized to distinguish correct course of fire source. The flame, gas and smoke sensor is used for sensing the ubiquity of any parlous gases for humans.

II. PROPOSED WORK

The proposed idea for the robot focuses on implementing a range of different functionalities. The robot being a moving body, can exhibit motion forward, backward, left and right. Arduino AT mega 2560 is used in the robot. A Bluetooth module is connected to the board. An android application is put to work for connecting with the board. On successful establishment of the connection, the user controls the robot system by way of commands over the GUI of this android application. The command issued out from the application is intercepted by the Bluetooth module which subsequently transmits to the controller. Other sensor like Ultrasonic sensor

are used to obstacle detection . It enhance the performance of the smart spy system. The footages obtained through the camera are transmitted in real-time and then is displayed on the screen. The same footages are also been transmitted into the receiving stations at the camps as well. Flame, smoke and gas detection sensors are also present for recognizing of any hazardous gases present on-site.

III. COMPONENT DETAILS AND BLOCK DIAGRAM

3.1 Power source

For A 12V , 1200 Mah rechargeable battery is harnessed as a power source for the system. The voltage is stepped down to 5V to suit the needs of the ESP32.

3.2 ESP32 camera

A microcontroller unit with integrated Wi-Fi and dual-mode Bluetooth connectivity. ESP 32 camera module is mainly for the real-time video transmission through IP address. HTML code is added for the video footage access through IP address.



3.3 L293D motor

L293 motor is the driver IC used for motion control. This assumes the role of a DC motor speed and direction. It can be utilized in robots because it has an independent power source for the motor.



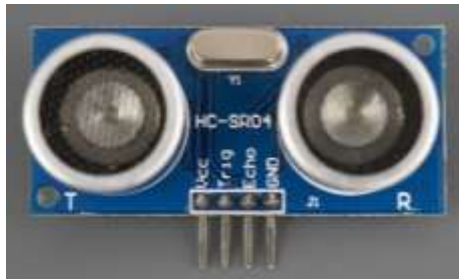
3.4 GPS module

The GPS module used is the NEO-6M. It is having a ceramic antenna which is renowned for its satellite search capabilities. Also, the module incorporates an onboard memory chip, thus enhancing its functionality. It can operate on a 5V power supply and has 9600 bps, which makes it feasible to be used in a variety of applications.



3.5 Ultrasonic Sensor

The ultrasonic sensor HC-SR04 module consists of transmitters, a single receiver and also a control unit. It needs a 5V power supply and an operating frequency of 40 hz. It uses ultrasonic waves to measure the distance of objects within a range. It has automatic breaking mechanism that stops the motion of the automatons on obstacle detection.



3.6 Smoke and gas Sensor

The gas sensor included is the MQ2 gas sensor, an electric sensor for sensing the presence of gases like LPG, propane, methane, carbon monoxide. It is made up a sensing material that when comes in contact with gas changes the resistance. Hence, the name chemiresistor. The sensor is also serving for the sensing the smoke present as well.

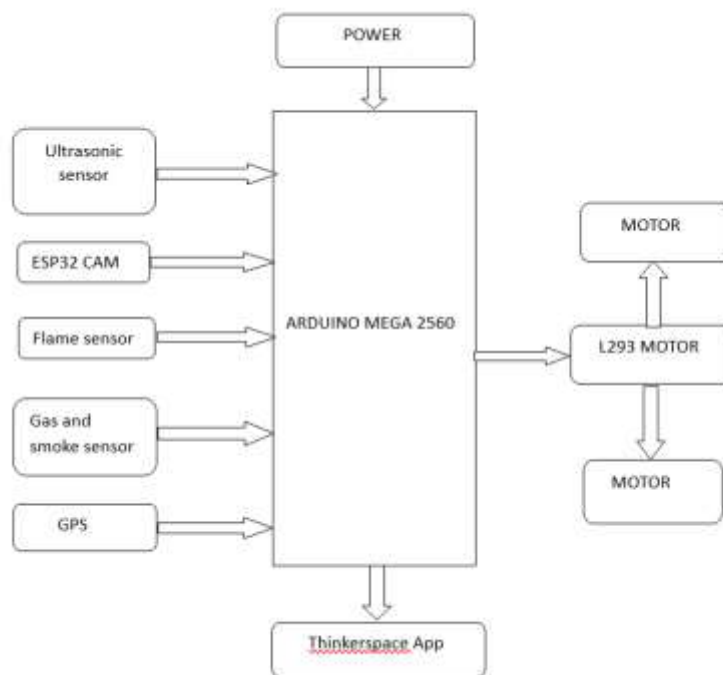


Fig.1 Block diagram

IV. WORKING

The multipurpose robot for military applications consists of Arduino AT MEGA 2560 microcontroller and ESP32 CAM, which are used alongside to the L293D motor driver for enabling the mobility of the robot, and we have a ultrasonic sensor for motion detection or person detection. Whenever a person or any obstacle is detected, automatic breaking happens in the robot. And a notification will be sent informing the obstacle's detection and alerting via notification. This robot could be tracked via the values of latitude and longitude elicited from GPS module. An ESP32 CAM for the live streaming of video that can be accessed via mobile phone or laptop by entering the IP address. The metal detector is also present for detecting any lost weapons or mines.

V. RESULT

The robot system showcased the correct outcomes during the project. The system navigation was well controlled, the robot was responding efficiently to the commands issued through the application. The integration between the sensors and the commanding station was perfectly aligned. The robot was able to detect the any movement which happened nearby it and the automatic breaking system got activated. Also, it was identifying all the potential threats present which were either the ammunitions or any mines. The notifications were being transferred from the point of identification and in turn the real-time video transmission mechanism would pass the video footages for enhanced clarity about the situation. The commands given inturn from the commading center for the alerts and footages received were also caried out accordingly.

Further, the GPS system made it much more easier to spot the exact location of the robot or the threat as per the alert given. The latitude values and longitude values exchanged helped in spotting the setting.

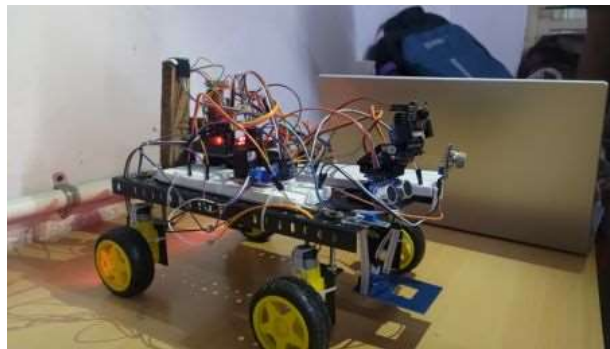


Fig: Connection of the system

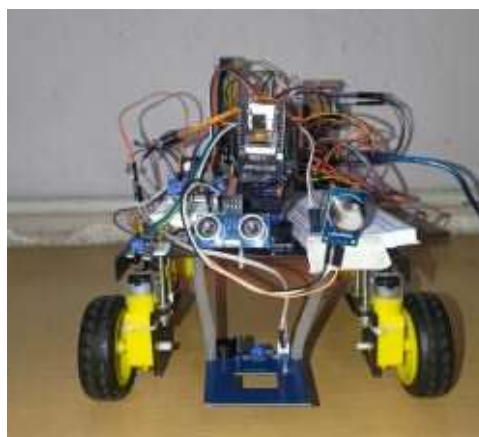


Fig. Project Image

VI. CONCLUSION

In conclusion, the development of the "Military Surveillance Robot" project utilizing Arduino MEGA 2560 microcontroller and ESP32 camera module that has resulted in a versatile and advanced surveillance system. The integration of these components has enabled remote control and monitoring of the robot's movement. This comprehensive surveillance system offers enhanced situational awareness, improved monitoring capabilities, and greater control over the robot's actions. It has the potential to be deployed in various military applications where real time monitoring, remote control, and video streaming are crucial for mission success and personnel safety. The "Military Surveillance Robot" project demonstrates the power of integrating microcontrollers, motor drivers, camera modules, and communication protocols to create an effective and efficient surveillance solution for military operations .

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