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The Integration of Manual and Automated Multifunctional Defense Robot

A. Muthulakshmi[1], N. Sadhana[2], M. Sneha[3], S. Suba[4], Dr. R. Rajagopal[5]

[1,2,3,4] UG Scholars, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India

[5] Assistant Professor, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India

ABSTRACT

From the early stage millions of humans have been losing their lives for their country. To avoid this a scientific invention need to be built that prevents the death of so many lives which is necessary. Based on this situation we create a robot which works manually and automatically. This paper presents a modern approach for monitoring at remote and border areas using multifunctional robot used in defense and military applications. This robotic vehicle has ability to substitute the soldier at border areas to provide surveillance. The robotic vehicle works both as autonomous and manually controlled vehicle using internet as communication medium. This multisensory robot not only used to monitor but it also detects bombs, live human body detection, harmful gas leakage and fire detection at remote and war field areas. In the recent development and trend most of the Defense organization now takes the help of robots to carry out many risky jobs that cannot be done by the soldier. These robots used in Defense are usually employed with the integrated system, including video screens, sensors, metal detector and cameras. This is specially designed robotic system to save human life and protect the country from enemies.

KEYWORDS: *Defense, Multifunctional Robot, Wireless Camera.*

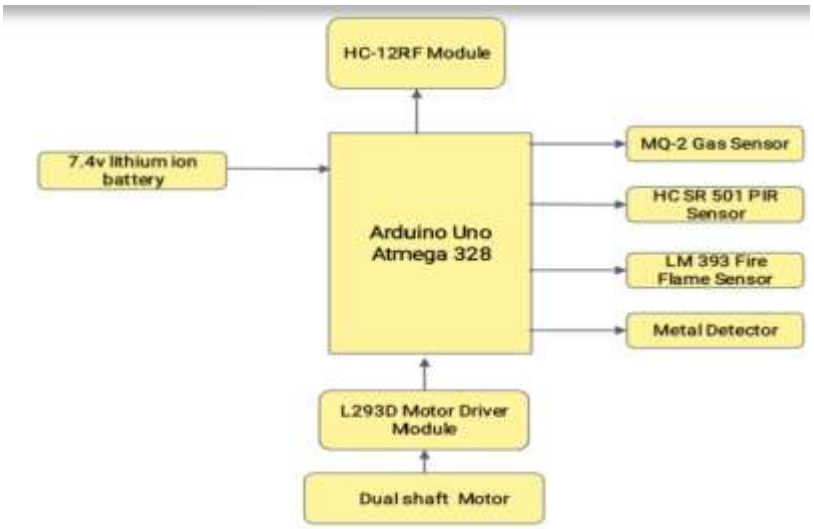
INTRODUCTION:

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 indispensable part of human life and also bring automation in hospital, factories, offices security systems and in many risky and dangerous operations. Nowadays the technology is enhanced day by day with the real time projects and efficient work towards by developing of robots. This paper describes the implementation of multifunctional defense robot system for remote area like warzone or border monitoring purposes. The system can substitute the solider in border to provide surveillance. Nowadays for controlling and development of robots various technologies are used such as Zig bee protocols, Bluetooth modules, Touch screen and Wi-Fi but they have limited range of coverage. This robotic vehicle works in both autonomous and manual mode controlled using Internet as communication medium and it covers upto 1km range. This system is employed with integrated system including video camera and different sensors to get surrounding data and it has the ability to monitor the surrounding and send the information to the control station. The onboard camera on the sytem send continuous visual data to the control station and the 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. This 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 can control the direction of motor as well as monitor the video feed. We navigate our robot according to the live information getting from the video feed which can be initiated with help of web interface. This system is designed for surveillance as well for reconnaissance circumstances. The system uses HC-12 RF TRANSCEIVER module to share the information. PIR sensor detects human presence and triggers system to send alert messages to the control station. The sensor data and Images taken are saved to on board memory is continuously sent to control station can be seen on a webpage. In this paper we discussed through various researches what development has been done in robotics in field surveillance and Defense Robots and our proposed work regarding the following paper.

PROPOSED SYSTEM:

Our robot prototype employs RF(Radio Frequency) technology hence it has wide range of operation and to cover better distance is the main goal of this project. Our system is aimed towards the RF(Radio Frequency) technology up to 1Km distance.This project proposed a wireless RF based surveillance robot which monitors the surrounding environment and provides feedback to the user and also this multisensory robot is not only used to monitor but it also detects bombs, live human body detection, harmful gas leakage and fire detection at remote and war field areas. In manual mode the robot is controlled by HC-12 RF module transceiver and in automatic mode the robot is controlled by using sensors. Thus the proposed system, an multifunctional defense robot using HC-12 RF module transceiver reduces manual error in defense side.

BLOCK DIAGRAM:



COMPONENTS USED:

Arduino uno Atmega328:

The Arduino Uno is a microcontroller board based on the Atmel's ATmega328.It is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno, Arduino Pro Mini and Arduino Nano models.

HC-12RF Module:

The HC-12 is a half-duplex wireless serial communication module with 100 channels in the 433.4-473.0 MHz range that is capable of transmitting up to 1 km

Transmitting power:-1dBm to 20 dBm

Receiving power:-117dBm to -100dBm

The HC-12 circuit board is built around the STM8S003F3 microcontroller and the Si4463 transceiver.

Flame sensor:

A flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression system. This sensor is used in industrial boilers.

MQ-2 Gas sensor:

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave.Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industries.

Metal Detector :

A metal detector is an instrument that detects the nearby presence of metal. Metal detectors are useful for finding metal objects on the surface, underground, and under water.Most metal detectors can detect objects about 4-8″ (10-20 cm) deep.An electric motor is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire.

HC SR501 PIR Sensor:

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view.They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.PIR sensors are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". The term passive refers to the fact that PIR devices do not radiate energy for detection purposes. They work entirely by detecting infrared radiation (radiant heat) emitted by or reflected from objects.

L293D Motor Driver Module:

The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.

USB TO UART:

A USB to UART converter is an integrated circuit used to send or receive serial data from a USB port into serial data that can be received or sent by a UART interface. This is a small device that plugs into your USB port and has at least ground, Rx and Tx outputs.

7.4V LITHIUM ION BATTERY

A lithium-ion or Li-ion battery is a type of rechargeable battery which uses the reversible reduction of lithium ions to store energy. The anode of a conventional lithium-ion cell is typically graphite made from carbon. The cathode is typically a metal oxide.

CONCLUSION:

This proposed system gives an exposure to design a simple robot that can be used to do multifunction in defense. Manual control is also employed to control the robot from the control room which is located far away from the border area.To avoid such drawbacks we proposed a system to save the battery life that means robot will not always remain in surveillance mode although whenever user wants to control robot, they can do it on their choice otherwise it will always remain in automatic mode.This Multifunctional robot can be deployed in war fields for military use, the robots successfully detect metal and toxic gases so the robot instead of humans can be put to detect a dangerous item. Our robot prototype employs RF(Radio Frequency) technology hence it has wide range of operation and can cover better distance. Our system is aimed towards the RF(Radio Frequency) technology up to 1Km distance.

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