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MULTI-FUNCTIONAL ROBOT FOR DEFENCE

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ABSTRACT

A modern approach for surveillance at remote and border areas using multifunctional robot based on IOT used in surveillance, defense and military applications. In Modern world, Automation robot is used in many of the fields such as defense, surveillance, medical field, industries and so on. This robot is electromechanical as well as artificial intelligent machine controlled by computer programming.
It is designed to replace human beings in various hazardous areas. The control signal from transmitter is sent to the receiver which is connected to an object or device or vehicle that is to be remotely controlled. Similarly, this project mentions about a wirelessly controlled commando robot controlled using IOT.

1. INTRODUCTION

In today's world, robotics is fastest growing and very interesting field. ROBOT has various input and output to sense the environment and take appropriate action. It has an infrared sensor which is used to sense the obstacles coming in between the path of ROBOT, Camera to capture the pictures of the environment and actuator like motors, grippers and arms to perform actions. With the development and research of technology, scientist has come up with invention of military robots. This makes soldier's life more secure on war field. Military robots are used to perform various risky task like monitor war field, diffuse live unexploded bombs, detect landmines and shoot enemies. Automation is replacing the humans in hazardous work environments enabling to create safe work environments, border patrolling or surveillance is one workplace where automation can be used for better and safe environment for the solider to work.

Robotics systems with capability to monitor the surrounding area for human presence, fire or bomb blasts which can send this information to a central control station simultaneously can be deployed for better border surveillance. Nowadays, many countries take the helps of these robots to take dangerous jobs. These military robots appointed with the integrated systems like sensors, gripper, weapons, cameras and actuators. based purpose of robot it comes in different shapes and features.

The main principle of our robot is Principle of Humanity based on basic three laws of robotic system. This robot is electromechanical as well as artificial intelligent machine controlled by computer programming. it is designed to replace human beings in various hazardous areas. To overcome the complexity of wired communications, we are using advance wireless RF and Wi-Fi technology. The control signal from transmitter is sent to the

receiver which is connected to an object or device or vehicle that is to be remotely controlled. Similarly, this project mentions about a wirelessly controlled commando robot controlled using radio frequency technology.

Military Robots are used to detect bombs, weapons, fire and gas etc. in the war fields. The advantage is that the cost per hour to operate a robot is a fraction of the cost of the human labor needed to perform the same function. Including this, they are reprogrammed and perform functions with a high accuracy. Human operators are far more versatile so they can switch to any pre-defined job tasks easily. Robots are built and programmed to be job specific. Robots are in the infancy stage of their evolution. As robots evolve, they will become more versatile, emulating the human capacity and ability to switch job tasks easily.

While the personal computer has made an ineffaceable mark on society, the personal robot hasn't made an appearance. Robotics is element of science of automation which are operated under control of mini or micro-computer. Robots require a combination of elements to be effective: sophistication of intelligence, movement, mobility, navigation, and purpose. Without risking human life, robots can replace humans in some hazardous duty service. Robots can work in all types of polluted environments, chemical as well as nuclear. They can work in environments. This robotic vehicle has ability to substitute the solider at border area to provide surveillance. Nowadays for controlling and development of robot's various technologies are used such as Zigbee protocols, RF modules, Touch screen, Wi-Fi modules and other technologies. The implementation of this project to resolve the problem of replacing human to surveillance robot, because of this we reduce harm of human resource. Surveillance Robots are the robot which monitor the thing continuously.

2. LITERATURE REVIEW

S. A Joshi, Aparna Tondarkar, explain that the modern approach for surveillance at remote and border areas using multifunctional robot based on current IOT used in defense and military applications. Due to this robotic vehicle, we can replace the solider at border area to provide surveillance. Using Internet communication this robotic vehicle can operate on both automatic and manual mode. This multisensory robot used to detect presence of enemy capture it in camera and give the live streaming to the authorized person Surveillance is major role while we working on border area for this there is robot for surveillance purpose.

This paper presents a smart surveillance robot for military application by using Raspberry Pi for security purpose. A field Raspberry pi sends a wireless command which is received by Authorized person on web Page and accordingly robot moves. In this system Raspberry pi camera is used for video streaming. The Raspberry pi programming is done in python language. The experimental result shows that the video streamed up to 15 frames per second.

Sahil Bhatnagar Shivam Kumar Gola, explains that they use rough terrain robots instead of using other simple robots. This paper also presents a Defense robot which uses different technologies like Infrared sensor, PIR sensor Ultrasonic sensor, Bluetooth module and Wi-Fi Technology etc. and this paper proposed a low voltage power supply, low cost and wireless robot which is controlled using microcontroller and Android Application.

Tarunpreet Kaur explains that in a modern approach for surveillance at remote and border areas using multifunctional robot based on current 3G technology used in defense and military applications. This robotic vehicle has ability to substitute the solider 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 used to detect human, bombs, harmful gases and fire at remote and war field areas. Conventionally, wireless security robot

obsoletes due to limited frequency range and limited manual control. These limitations are surmounted by using 3G technology which has limitless range. This system also enhances the use of renewable resource energy by equipping with solar panel. An autonomous operation is controlled by Ultrasonic sensor and infrared sensors. Manual operation is controlled by DTMF decoder and cell phones used as video camera by initializing 3G video call and change the path of robot according to real time information of surrounding. This paper also illustrates the experimental results of tilt angle selection of solar panel and power consumption in automatic and manual mode. This robotic vehicle is designed for reconnaissance as well as surveillance under certain circumstances.

Pream kumar Manoharan explains that in the system is proposed with the help of low power Zigbee wireless sensor network to trace out the intruders (unknown persons) and the robot will take the necessary action automatically. Thus, the proposed system, an Intelligent Unmanned Robot (IUR) using Zig bee saves human live and reduces manual error in defense side. This is specially designed robotic system to save human life and protect the country from enemies. In proposed system, the communication is carried by the Zig bee wireless communication network. With the help of CMOS camera, the robot is monitor in this system.
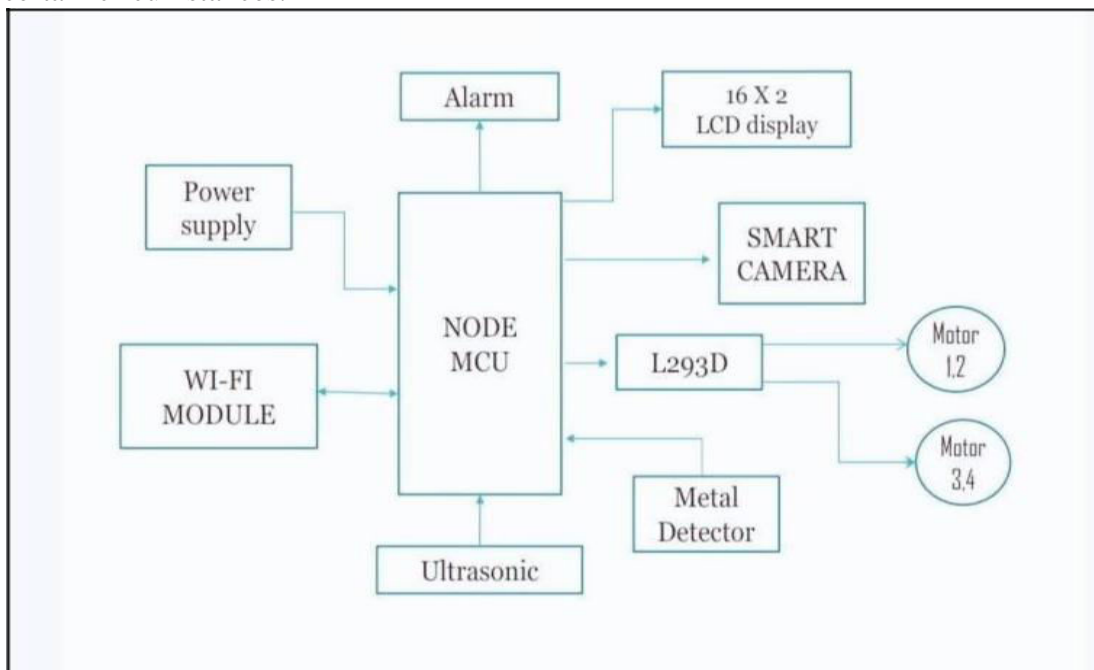
3. PROPOSED WORK

Fig 1: Block diagram

Working principle

The system we have proposed consist number of features like soldier identification, for monitoring various parameters in the environment, remote monitoring and controlling mechanism etc. The system consists of Micro-controller, LCD display, RFID reader, IR sensor, Metal detector, LPG gas sensor, Temperature sensor, DC motor for assembly and Wi-Fi module for wireless

communication between Microcontroller system and Android phone having Android web server which we have designed as per our application.

This robot will continuously check for bomb detection with the help of Metal detector and send information to the Android application using Wi-Fi connectivity. The robot will move by analyzing the obstacles in the path with the

help of IR sensor. We are able to control the movement of robot remotely using Android application. In this model we are going to control the robot using IoT module and its live location is derived by using blink app that has been placed in the robot. The location details will be sent to the controller and the robots monitoring is going to be done by the controller through the camera that has been placed in the robot and seen through the computer.

The placed ultrasonic sensor which shows the location of the thing or being and its distance from the robot. The placed metal detector which shows the location of any armed weapon that has been placed beneath like mines. It sends the location of the detected metal through IoT. The location of the camera is seen through the laser that has been placed beneath or above of the camera. There was a buzzer that has been placed in the robot that will give buzzing sound in need of hurry.

The camera consists of a speaker and microphone which helps in the conversation that happens between and it is fixed with night vision so that we watch even in the dark.

HARDWARE DESCRIPTION
NODE MCU
The Node MCU is an open-source firmware and development kit that helps you to Prototype your IOT product within a few Lua script lines. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Espress if Systems, and hardware which is based on the ESP-12 module.

Features:
• Open-source
• Interactive
• Programmable
• Low cost
• Simple
• Smart
• WI-FI enabled

Arduino-like hardware IO:
Advanced API for hardware IO, which can dramatically reduce the redundant work for configuring and manipulating hardware. Code like Arduino, but interactively in Lua script.

ESP-12E Wi-Fi Module (esp8266)

ESP-12E Wi-Fi module is developed by Ai-thinker Team. core processor ESP8266 in smaller sizes of the module encapsulates Ten silica L106 integrates industry-leading ultra-low power 32-bit MCU micro, with the 16-bit short mode, Clock speed support 80 MHz, 160 MHz, supports the RTOS, integrated Wi-Fi MAC/BB/RF/PA/LNA, on-board antenna. The module supports standard IEEE802.11 b/g/n agreement, complete TCP/IP protocol stack. Users can use the add modules to an existing device networking, or building a separate network controller. ESP8266 is high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

ESP8266EX offers a complete and self-contained Wi-Fi networking solution; it can be used to host the application or to offload Wi-Fi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. ESP8266EX is among the most integrated Wi-Fi chip in the industry; it integrates the antenna switches, RF balun, power amplifier, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

DC Gear Motor

Almost every mechanical development that we see around us is accomplished by an electric motor. Electric machines are a method of converting energy. Motors take electrical energy and produce mechanical energy. Electric motors are utilized to power hundreds of devices we use in everyday life.

Electric motors are broadly classified into two different categories: Direct Current (DC) motor and Alternating Current (AC) motor. In this article we are going to discuss about the DC motor and it's working. And also, how a gear DC motors works.

A DC motor is an electric motor that runs on direct current power. In any electric motor, operation is dependent upon simple electromagnetism. A current carrying conductor generates a magnetic field, when this is then placed in an external magnetic field, it will encounter a force proportional to the current in the conductor and to the strength of the external magnetic field. It is a device which converts electrical energy to mechanical energy. It works on the fact that a current carrying conductor placed in a magnetic field experiences a force which causes it to rotate with respect to its original position. Practical DC Motor consists of field windings to provide the magnetic flux and armature which acts as the conductor.

Ultra Sonic Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear).

Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Metal Detector

A metal detector is an electronic instrument which detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects. If the sensor comes near a piece of metal this is indicated by a changing tone in earphones, or a needle moving on an indicator.

Usually, the device gives some indication of distance; the closer the metal is, the higher the tone in the earphone or the higher the needle goes. Another common type is stationary "walk through" metal detectors used for security screening at access points in prisons, courthouses, and airports to detect concealed metal weapons on a person's body.

The simplest form of a metal detector consists of an oscillator producing an alternating current that passes through a coil producing an alternating magnetic field. If a piece of electrically conductive metal is close to the coil, eddy currents will be induced in the metal, and this produces a magnetic field of its own. If another coil is used to measure the magnetic field (acting as a magnetometer), the change in the magnetic field due to the metallic object can be detected.

LCD Display

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.

LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary image are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance

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Smart Camera

We have introduced most advanced technology for V380 Indoor Security IP Camera, integrated with various features of HD 1080P 60fps, POE (Power Over Ethernet), P2P and Auto HD IR-CUT and so on, which bring you a very clear and vivid image and also offers an immersive illusion. Besides, with 360-degree globe panoramic IP Camera, viewing what is in range of the camera, you can also have a video surveillance in every corner of your house as well

Voltage Regulator

We will see about one of the most commonly used regulator IC's, the 7805 Voltage Regulator IC. A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate.

One of the important sources of DC Supply are Batteries. But using batteries in sensitive electronic circuits is not a good idea as batteries eventually drain out and lose their potential over time. Also, the voltage provided by batteries are typically 1.2V, 3.7V, 9V and 12V. This is good for circuits whose voltage requirements are in that range. But, most of the TTL IC's work on 5V logic and hence we need a mechanism to provide a consistent 5V Supply.

Here comes the 7805 Voltage Regulator IC to the rescue. It is an IC in the 78XX family of linear voltage regulators that produce a regulated 5V as output.

Battery

A twelve-volt battery has six single cells in series producing a fully charged output voltage of 12.6 volts.

A battery cell consists of two lead plates a positive plate covered with a paste of lead dioxide and a negative made of sponge lead, with an insulating material (separator) in between

4.RESULT
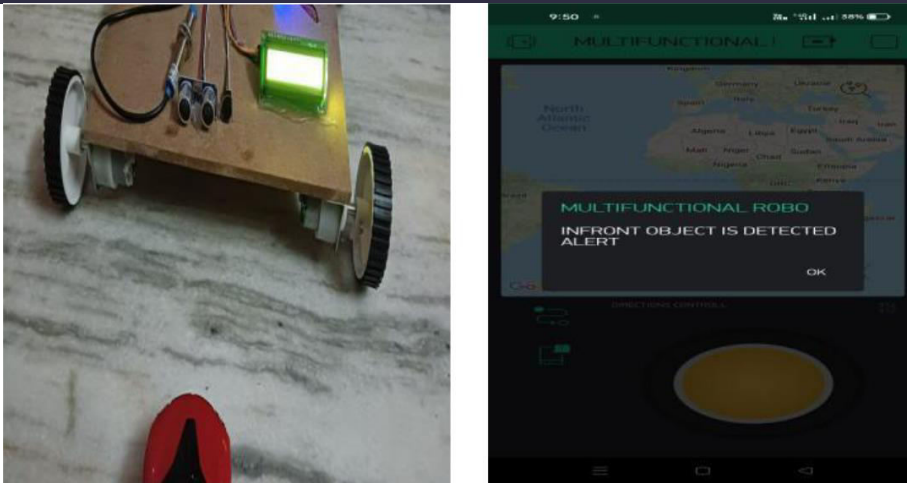

Figure 2: Experiment Kit

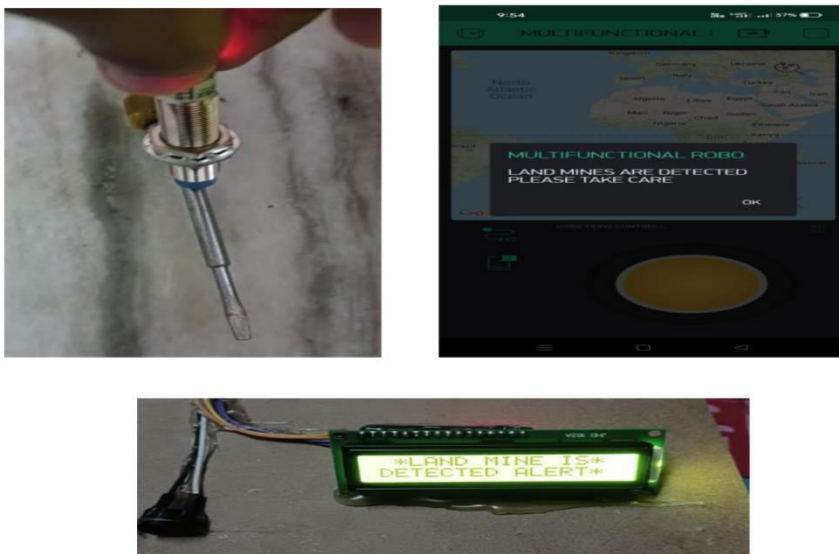Figure 3: Object Detection Using Ultrasonic Sensor With Blynk App

Figure 4: Landmine Detection Using Metal Detector With Lcd And Blynk App
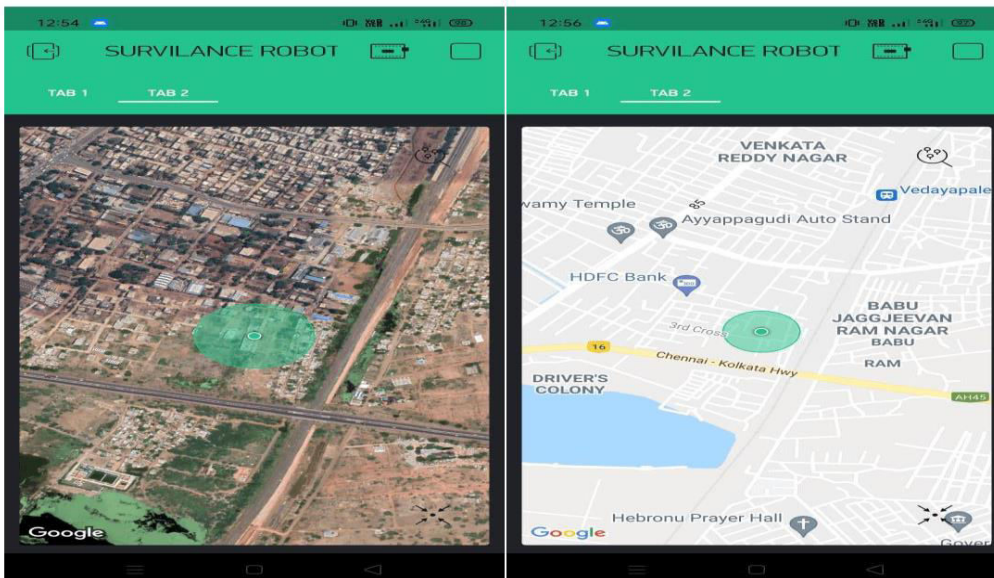

Figure 5: Live Location Of Landmine With Satellite Mode And Map Mode Using Blynk App

5. CONCLUSION

In this project, 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. Our proposed robot is small in size thus maneuvering into area where human access is impossible. 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 replaces human work and reduces human labor and performing monitoring works in a well effective manner.

We have concluded from existing robot system that, they have limited range as they are based on different communication technology used such as Zigbee, Bluetooth, RFID. Also, they are costly due to Expensive camera is used for surveillance. Therefore, 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. Rather than using expensive camera, we prefer Skype video calling for live streaming.

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