International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.282

IOT Based Multi Functional Robot

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ABSRACT: A modern approach for surveillance at remote and border areas using multifunctional robot based on IOT used in surveillance, defence and military applications. In Modern world, Automation robot is used in many of the fields such as defence, surveillance, medical field, industries and so on. This robot is electromechanical as well as artificial intelligent machine controlled by 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. Most of the military organization now takes the help of robots to carry out many risky jobs that cannot be done by the soldier.

KEYWORDS: NODE MCU, Ultra Sonic Sensor, Metal Detector, Wi-Fi Module

I. 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. 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 f 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.This robotic vehicle has ability to substitute the solider at border area to provide surveillance.
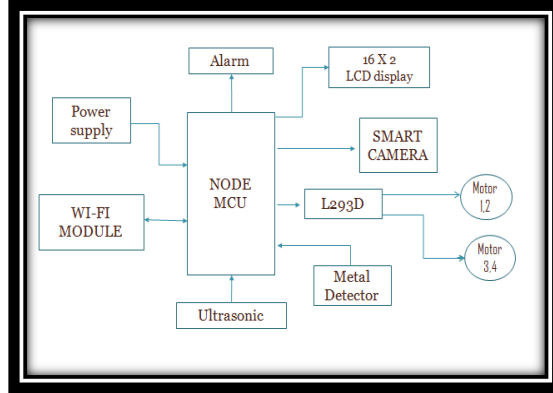
Figure:1. Block Diagram

II. 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 consist 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 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.

III. EXISTING METHOD

Already existing systems use robots that have limited range of communication as they are based on RF Technology, Zigbee and Bluetooth. Some existing projects use short range wireless camera. Some existing robots can only be controlled with a manual mode which needs human supervision throughout the whole surveillance process. Normally there are few robots that are exist that has controlled through wire. It can only controlled in certain range. Those are not user-friendly.The old model at which has wired power supply which only allows the robot to become hard for surveillance and also the moments becomes hard due to wired communication.

The older versions are like
- Power Cable
- Zigbee Based
- LPC2138(ARM 7) Microcontroller
- Sensor Module, etc.,

A. 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). In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver.

Figure:2. Ultra Sonic Sensor

B. Metal Detector

Metal detection sensors that use a linear variable differential transformer (LVDT) are widely used to detect foreign metal objects in food and in the security industry. Metal detector used to detect metallic objects like weapons or bombs in war fields.

Figure:3. Metal Detector

C. 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. They use the same basic technology, except that arbitrary images

Figure:4. LCD Display

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.

IV. PROPOSED METHOD

In this method we are using the few new components that can update the existing method. At first we add Raspberry pie that helps in the moment of the camera that was implanted in the robot for surveillance and we add power supply that at which is going to be used as the energy of the robot at which in the existing method we have the robot at cable power supply which can be hard for the distance and the moment.

Then we add the motor dive which was L293D and which helps the motor in the moment and it is used for the free moment of the motor.

D. 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.
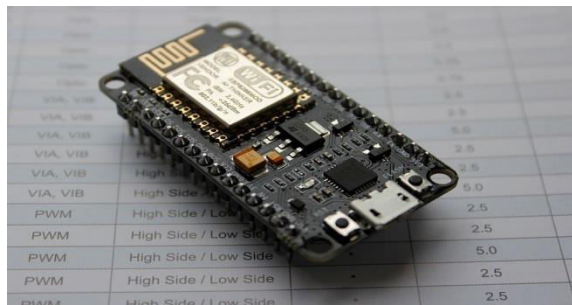

Figure:5. NODE MCU

E. DC Gear Motor

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.

Figure :6. DC Gear Motor

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.

F. 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 a immersive illusion. Beside, 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. Built-in microphone and speaker, there is no problem for talking with someone wherever the IP Camera is set up directly from your mobile device.

Figure:7. Smart Camera

G. Voltage Regulator

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 loose 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.
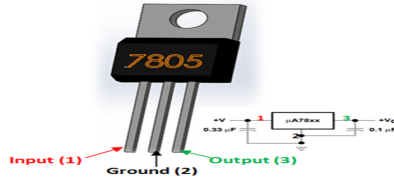

Figure:8. Voltage Regulator

H. BLYNK APP

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

Similar API & UI for all supported hardware & devices Connection to the cloud can be done using Ethernet, Wi-Fi, Bluetooth, BLE and USB (Serial) Set of easy-to-use Widgets Direct pin manipulation with no code writing Easy to integrate and add new functionality using virtual pins History data monitoring via History Graph widget Device-to-Device communication using Bridge Widget Sending emails, tweets, push notifications, etc.

IV. RESULT

The moment of the robot is noted as we have all the commandments placed in the program of Forward, Backward, Left, Right, Stop when the metal is detected it gives the output as metal detected through the LCD Display and when there is less space the device stops by the command of ultra sonic sensor and the live location will be seen in the blynk app which is used to control the robot.

The surveillance is done by using the smart camera which a feature of communication using the speaker and the microphone implanted in the camera.
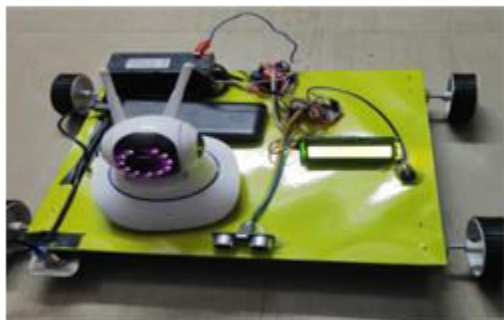
V. HARDWARE IMPLEMENTATION

Figure:9. Hardware

We see the robot which was connected with 4 DC motors with wheels and the NODE MCU as the Microcontroller and the Motor Drive (L293D) and the LCD Display connected with Buzzer as the Screen and the Metal Detector in front as the Ultra Sonic Sensor and we have Smart Camera which is connected to separate power bank and we have all attached to the board.

VI. 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.

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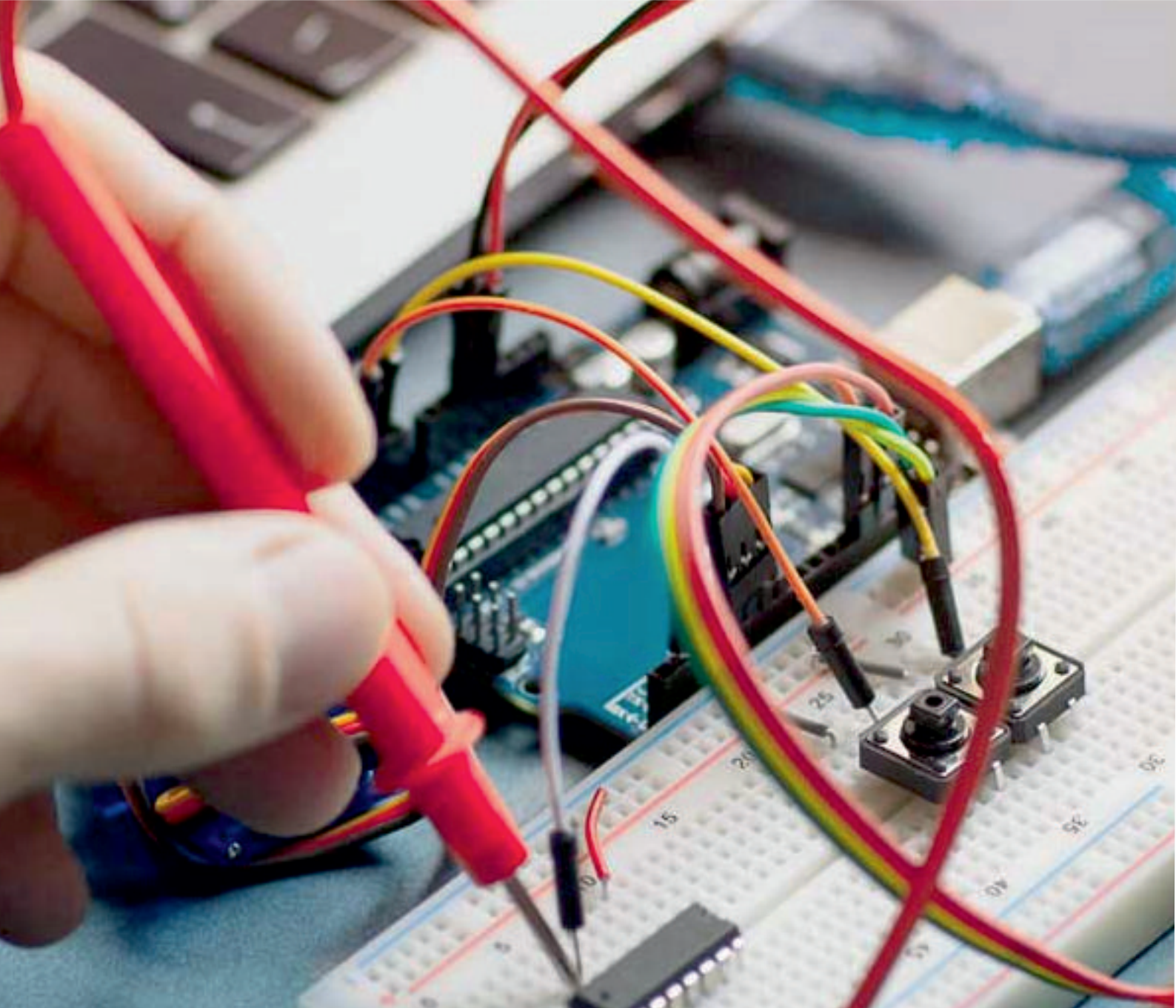
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