IOT based Wireless Multifunctional Robot for Military Application

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ABSTRACT

This project is to make a robot which will be helpful for mankind. This robot will collect data from remote place and able to send those data to a remote IoT cloud database. This robot will be controlled via android mobile phone. We can control the movement of the robot by sending instructions via internet. The robot will receive the instruction wifi module and process the data with microcontroller. Then it will move the robot in all direction with the help of motor driver L298N by following the instructions received from android mobile phone. Then the robot will collect data of sensor from that place and send those data via Wi-Fi to the cloud database with the help of node MCU ESP8266. Then the data will be shown as well as the remote place can be monitored from anywhere in the globe from the internet server used. The system is made in very low cost.

Keywords: GPS, Metal Detection, Location, IoT, Ultrasonic Sensor, Microcode Applications

ARTICLE INFO

I. INTRODUCTION

Today, robotics is a rapidly growing field, as technological advances continue; researching, designing, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Robotics is a key technology in the modern world. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks. Robotics' is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. Robotics can be defined as the science or study of the technology primarily associated with the design, fabrication, theory, and application of robots. While other fields contribute the mathematics, the techniques, and the components, robotics creates the magical end product.

Problem Statement:
To design a system which will control vehicle remotely, display updated GPS co-ordinates continually and will display other sensors data on terminal and also send data to cloud.
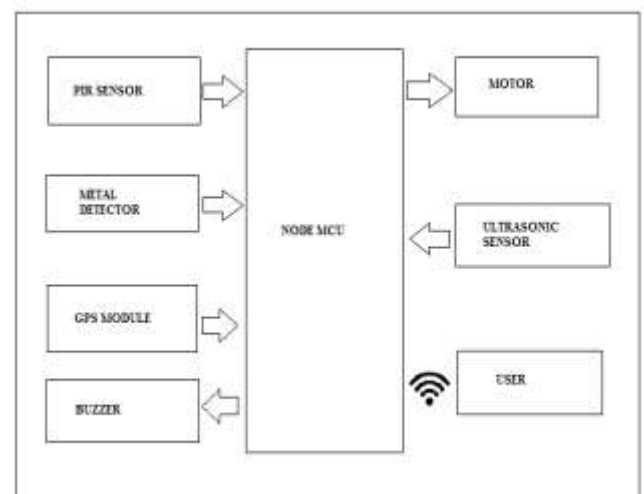
II. PROPOSED SYSTEM

Fig 1. System Architecture

A. Description:

This robot will collect data from remote place and able to send those data to a remote IoT cloud database. This robot will be controlled via android mobile phone.

We can control the movement of the robot by sending instructions via internet. The robot will receive the instruction wifi module and process the data with microcontroller.

Then it will move the robot in all direction with the help of motor driver L298N by following the instructions received from android mobile phone.

Then the robot will collect data of sensor from that place and send those data via Wi-Fi to the cloud database with the help of node MCU ESP8266.

Then the data will be shown as well as the remote place can be monitored from anywhere in the globe from the internet server used.

B. Mathematical Model

The mathematical model for multifunctional robot system is as

Let S be Closed system defined as, S = { Ip, Op, Ss, Su, Fi, A}

Where,

Ip={sensor value, robot value}

Where,

Dtr - Set of training data

Dts – Set of testing data

Set of actions = A={F1,F2,F3,F4} Where,

F1 = Activate

F2 = Server Communication

F3 = Robot Functioning

F4 = Movement function

Ss- Set of robot's activity states

Su- success state is when a robot finishes the work

Fi- failure state is when a sensor not sensing and values and server communication fail.

III. HARDWARE DESCRIPTION

ESP8266 Controller (NODEMCU):

ESP-12E WiFi module is developed by Ai-thinker Team. core processor ESP8266 in smaller sizes of the module encapsulates Tensilica 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.
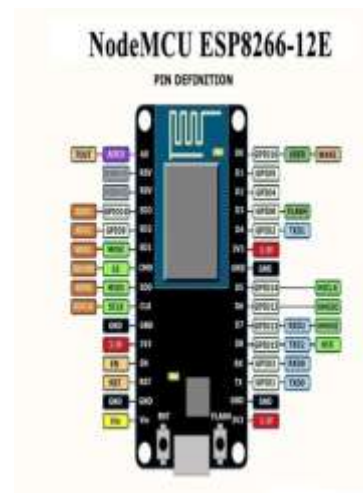

Fig 2. Wi-fi Module ESP8266

Battery:

It will provide the energy for the working of the robot. The battery of a two wheelers will be able to provide enough power to drive the robot for its working or independent multiple batteries can be used for better performance.

Fig 3. Battery

Wheels:

These will be required for the cause of the motion of the body of the robot. The choice of the wheels largely depends on the shape and size of the grass. It will also depend on the required ground clearance of the robot. As treads of the tires can contribute significantly to the performance of the mower, great caution is needed during the decision to choose the particular tires.

Fig 4. Wheel

Metal Detector:-

The metal detector sensor working is when the electromagnetic field is transmitted from the search coil into front side of robot Metals in the electromagnetic field will become strengthened & reflect an electromagnetic wave of their own. The metal detector comprises of a search coil which receives the retransmitted electromagnetic wave & sends signals to controller of presence of metal.
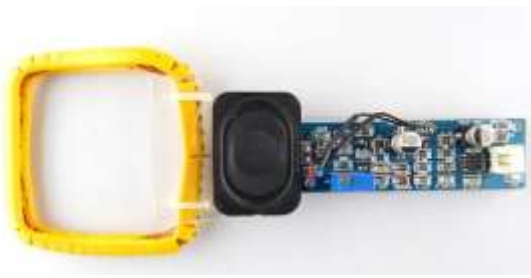
Fig 5. Metal Detector

GPS:

The Global Positioning System is a space-based satellite navigation system. GPS provides location and time of object in information in all weather conditions. It is a network of 30 satellites orbiting the earth at an altitude of 20,000km whenever you are on the planet. The GPS (Global Positioning system) receiver continuously receives the latitude and longitude values for every position of the object or system.

Fig 6.GPS Module

Ultrasonic Sensor:

Third feature is the object detection robot, if robot is going to the bomb defuse then sometimes obstacles are detected using ultrasonic sensor, so we check the obstacles and detect if any object is identified front of the robot.

Fig 6.Ultrasonic Sensor

PIR Sensor:

The PIR Motion Sensor Detector Module HC SR501 allows you to sense motion. It is almost always used to detect the motion of a human body within the sensor's range. It is often referred to using "PIR", "Pyroelectric", "Passive Infrared" and "IR Motion" sensor.
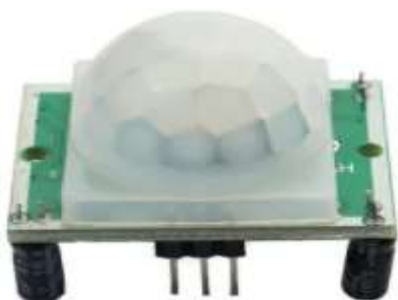

Fig 7.PIR Sensor

IV. ACKNOWLEDGEMENT

V. CONCLUSION

The Internet of Things (IoT) is consisting of physical devices which can be given an IP address and can be uniquely identified. It can be defined on the basis of three types. In this system IoT is used to control vehicle for parameters like Distance, Thermal Activity , Metal Detection and also for this Wi-Fi enabled microcontroller is used provide GPS coordinates for updated position of vehicle after interval of every 5000 milliseconds and send data cloud.

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