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IOT BASED LANDMINE DETECTION AND SURVEILLANCE ROVER SYSTEM

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ABSTRACT:

We now know that land mines pose a major hazard to civilians' lives. A land mine is an explosive device hidden beneath or on the surface of the ground, usually in mine-affected areas, to destroy or disable an enemy. The majority of land mines are planted just beneath the ground's surface and are activated by pressure or trip-wire. Most land mines will have various metallic pieces that can be used to detect them.

Metal detector robot approach, in which a robot with a specific function is used to locate landmines without having to step on them, providing a safe and efficient method of landmine detection.

The "Landmine detection robot," which uses IoT and GPS technology, is a safe approach for detecting land mines.

Keywords: Metal Detector, Landmine detection, Global Position system (GPS), IoT

INTRODUCTION:

A landmine is an explosive device that is implanted in the ground and is triggered by a variety of factors including pressure, magnetic fields, and tripwires. They are one of the most commonly employed weapons in modern combats, and they are most commonly used as preventative barriers and enemy deterrents. They are small, usually circular devices designed to injure or kill individuals through the use of explosives or flying fragments. The majority of mines are built of plastic and have about the same amount of metal as a ballpoint pen's spring. During World War I, the usage of combat tanks aided the development of anti-tank mines. Anti-personnel mines were developed to replace larger mines that were easily undone by enemy troops. Between 1918 and 1939, the invention and usage of modern-day landmines became a major military strategy. Mines were castoff carefully and precisely targeted towards militaries at the period. The unsystematic distribution of landmines did not begin until the 1960s. There are currently tens of millions of anti-personnel mines in the ground in over 60 countries. Thousands of army troops have been injured or killed by landmines in numerous conflicts.

• Landmine casualties rob communities and families of wage workers, as well as valuable parents, relatives, spouses, and relatives.

• Landmines kill or injure over 2,000 people per month, according to the United Nations.

• Over half of those killed by landmines are civilians. Children account for more than 40% of civilian casualties.

• Landmines set in motion a chain of events that might result in environmental harm such as soil degradation, deforestation, and water pollution.

To address these issues, this project focuses on creating and building a robotic vehicle that can detect metals along its path, similar to how land mines are detected. A metal detector circuit that is connected to the control unit and alerts the user when there is a possible metal ahead. The metal detector circuit is fitted on a robotic vehicle and operates by automatically detecting metals beneath it and transmitting the position of the landmine to the concerned authority through GPS module and Cloud platform.

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.EXISTED WORK:

Despite technological advancements, manual landmine clearing remains the favored method due to its consistency, predictability, and reliability. Traditional methods, on the other hand, have the disadvantages of being sluggish and risky to workers.

When humans are involved in the mining and scanning of land mines, they frequently face challenges such as excessive effort, unnecessary time, high costs, and human life dangers. Landmines have been identified in the past using various sensors such as metal detectors (MD), ground penetrating radar (GPR), infrared cameras, and chemical sensors. Land mine detection robots are infrequently deployed in the military because to a lack of operational experience, high development costs, and difficulty operating on uneven ground. These parameters are taken into account when designing and developing the mine detection rover described in this work. This study developed a landmine detection rover-robot to help in the field that is faster, safer, and more exact than the old method.

PROPOSED SYSTEM:

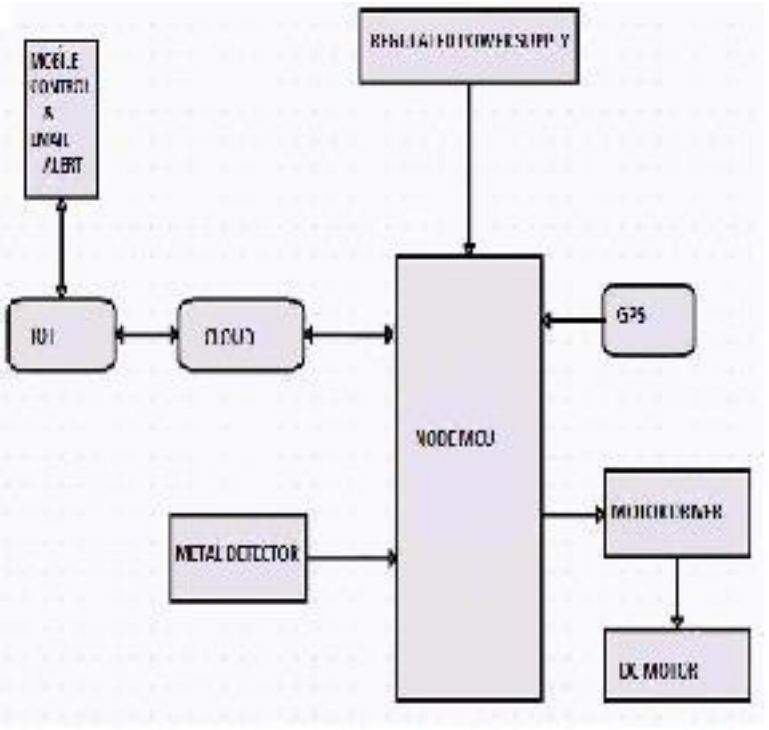
The prototype of Integrated IOT based land mine detection and surveillance rover system within board for military use to detect the land mines without setting foot onto the ground. The device is built on Node MCU (ESP8266) and other components like GPS module, Metal detector sensor, Motor Driver L298N, DC Motor.

The Node MCU is interfaced with -

- Metal detecting sensor to locate concealed underground things or metal objects buried in the ground.
- The motor driver (L298N) controls the supply voltage and current to the motor, allowing it to rotate in both clockwise and anticlockwise directions.
- Satellites of the Global Positioning System (GPS) GPS receivers employ transmission signals from space to offer three-dimensional position latitude, longitude, and altitude.

BLOCK DIAGRAM:

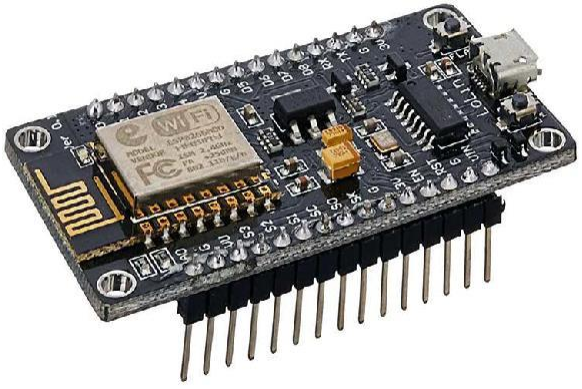
The below figure shows the block diagram of the proposed system



HARDWARE REQUIREMENTS

Node MCU (ESP8266): NodeMCU is an open-source Lua-based firmware that employs an on-module flash-based SPIFFS file system for the Espressif ESP8266 Wifi SOC. The Espressif NON-OS SDK is used to layer NodeMCU, which is written in C.

The firmware was originally created as a companion project to the popular ESP8266-based NodeMCU development modules, but it is now community-supported and may be used with any ESP module.



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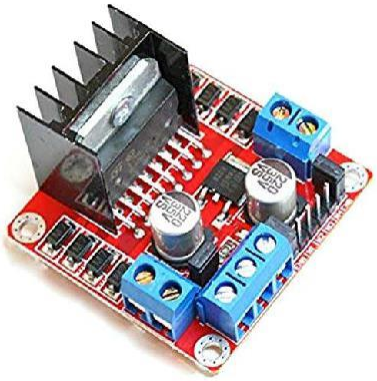
GPS Module: Satellites of the Global Positioning System (GPS) GPS receivers employ transmission signals from space to offer three-dimensional position latitude, longitude, and altitude. When the robot detects a landmine, it comes to a complete stop. The GPS sensor provides the location of the landmine. An antenna is built within the GPS sensor to obtain the longitude and latitude values.

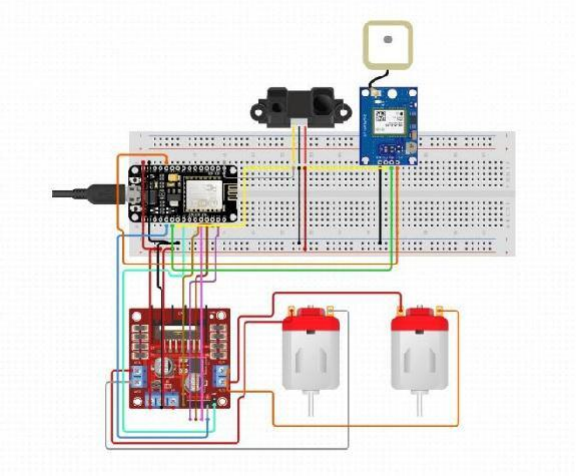
L298N Motor Driver Module: This L298N Motor Driver Module is a high-performance motor driver for DC and Stepper Motors. An L298 motor driver IC and a 78M05 5V regulator make up this module. Up to four DC motors can be controlled by the L298N Module, or two DC motors with directional and speed control.



Metal Detector Sensor: A metal detector is an electronic device with an oscillator that generates alternating current (AC) that flows through a coil, producing an alternating magnetic field. If a component of the metal is close to the coil, eddy current is created in the metal, which creates its own magnetic field. The change in the magnetic field due to the metallic object can be detected if another coil is used to measure the magnetic field. Metal detectors are used to detect weapons such as guns and knives in airports, as well as steel reinforcing bars in wires, concrete, and pipes buried in floors and walls in the construction sector.

CIRCUIT DIAGRAM

The below figure shows the circuit diagram of the project



SOFTWARE REQUIREMENTS

Arduino IDE: The Arduino Integrated Development Environment (IDE) consists of a textual content editor for writing code, a message area, a textual content console, a toolbar with buttons for commonplace features, and a menu system. It links to Arduino hardware to add apps, allowing entrepreneurs and businesses to prototype and expand IoT projects to

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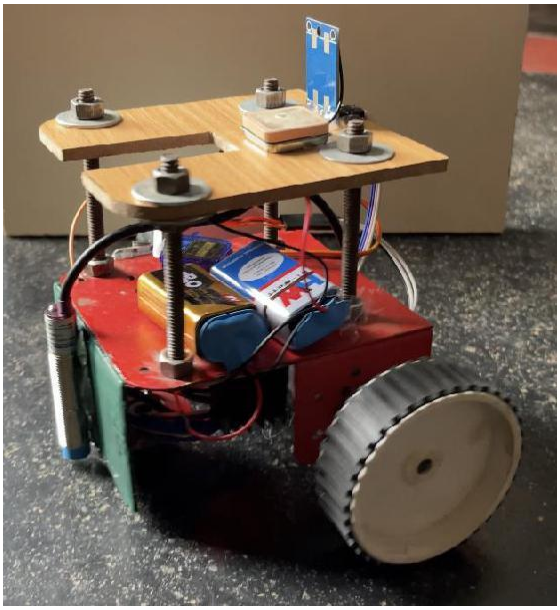
production. Send data to the cloud using the Blynk platform from any Internet-connected device.

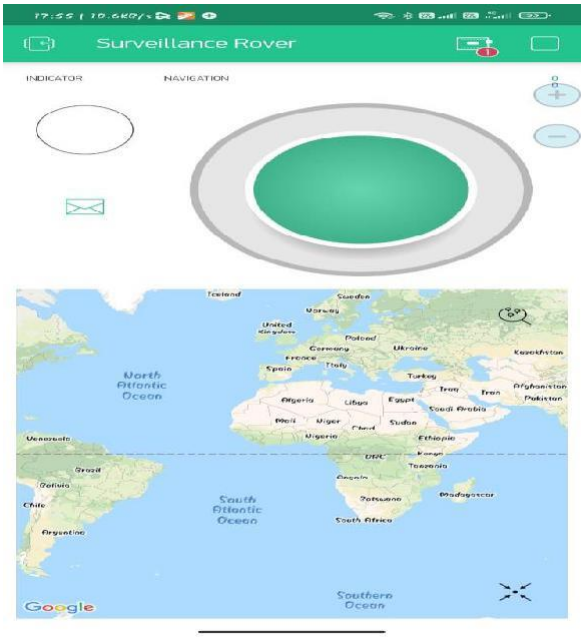
RESULTS

All ferrous objects, such as metals, coins, and iron alloys, are correctly detected by the metal detector sensor. The metal detector sensor fitted on the robot carrying vehicle detected these metals up to a depth of 10cm. Landmines are usually buried on the surface of the ground or within 10 centimeters of it. The robotic vehicle's power supply was turned on, and the WiFi hotspot was enabled. A Customized UI has designed in the BLYNK app for controlling the landmine detection rover and monitoring the landmine detection. Once a landmine was detected an email alert with the location information of the landmine has sent to the corresponding authority. This is a novel attempt to integrate multi-purpose field robot to cloud technologies.

The below figure shows the complete set up for integrated IOT based land mine detection and surveillance robot system for military and security applications.

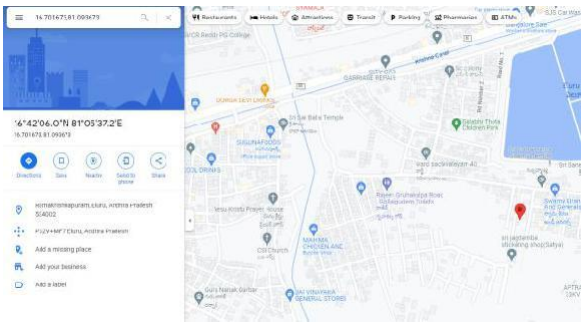


The below figure shows the screen shot of the BLYNK application for rover controlling and landmine detection.



The below figure shows the screen shot of the EMAIL alert on detecting the landmine sent by the landmine detection rover.

The below figure shows the screen shot of the location information of the alert showing in the GOOGLE MAPS.



CONCLUSION

The current investigation has shown that an existing prototype of an autonomous landmine detection and sweeper robot may be manufactured affordably. As a result, expenditures in landmine detection can be made more cost-effective in nations where landmines are a problem. This prototype has a simpler structure and a lower cost to create a landmine detection robot. It can identify landmines under uneven ground surfaces, alert the user, and successfully deliver landmine coordinates, which may then be safely diffused without the risk of detonation.

FUTURE SCOPE

The sensors could be updated in the future to work with a camera with night vision for enhanced image visualization of buried mines. Shock absorbers, self-balancing systems, and adjusters that may be mounted to the wheels so that the robot can run swiftly on any challenging terrains may be included in the hardware. If an image processing system is integrated, it can also be used in the future to save lives in crisis situations such as building fires and collapses. It could possibly be upgraded in the future to dig land mines on its own if a suitable arm set is provided, along with the required safety precautions.

REFERENCES:

1.V. Abilash and J. Paul Chandra Kumar.'Arduino Controlled Landmine Detection Robot'.IN 'Third International Conference on Science Technology EngineeringandManagement (ICONSTEM)' 2017.

2.Waqar Farooq, Nehal Butt, Sameed Shukat 'Wireless Controlled Mines Detection Robot'. In 'Department of Electrical Engineering, the University of Lahore, Pakistan' 2016.

3. Prof. R.M. Sahu, Mamata .S. Sawant, Komal .S. Salve, Mangesh .N. Nakade. 'Wireless Detection of Landmines using GPS & GSM'. In 'International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJIREEICE)' 2016.

4. Gaurav Golatkar, Prathmesh Ambekar, PrashantJadhav, Rohan Jadhav, Prajakta Borole. 'Border Surveillance Using IpCamera'. In 'IOSR Journal of Engineering (IOSRJEN)' 2018.

5. Bharath J. 'Automatic land mine detection and sweeper robot using microcontroller'. In 'International journal of Mechanical Engineering and Robotics Research'.

[6] "Landmines - the tragic statistics." Landmine Action Week, 20-26 May 2006. Web. 18 Oct. 2009.

[7] Cristina Turcu, Cornel Turcu and Vasile Gaitan, "Integrating robots into the Internet of Things", Issue 6, Volume 6, 2012, INTERNATIONAL JOURNAL OF CIRCUITS, SYSTEMS AND SIGNAL PROCESSING

[8] Tania Alauddin, Md. Tamzid Islam and Hasan U. Zaman, "Efficient Design of A Metal Detector Equipped Remote Controlled Robotic Vehicle", 978-1-4673-6621-2/16/2016 IEEE frequency communication"; JAIR volume 4,issue 2 july 2015 pp 51-55