IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105269 |

Landmine Detector Robotic Vehicle

Pravin Kumar Dubey, Kundan Kumar, Harshal Kamble

Department of Electronics & Telecommunication, D.Y. Patil College Of Engineering, Pune , Maharashtra ,India

ABSTRACT: Landmines pose a significant threat to both civilian populations and post-conflict rehabilitation efforts. The goal of this project is to create a robotic vehicle that can locate landmines quickly and safely. This robotic metal detector's job is to locate landmines in areas that are being rebuilt after a war. This method is suggested for the safe and efficient detection of landmines with minimal human effort. Here, a microcontroller and inductive sensor are integrated to find landmines. For operator and robot communication, the system uses a Bluetooth module which can operate with mobile.This robot exhibits strong metal detection capabilities during experiments, making it suitable for usage in applications in landmine-affected areas.

KEYWORDS*:* Metal Detector, Landmines, Robot

I. INTRODUCTION

Worldwide, landmines have long posed a chronic threat to civilian populations and impeded post-conflict development and rehabilitation efforts. These undetected battlefield artefacts continue to take innocent lives, hurt people severely, and prevent the efficient use of precious land resources. Due to the widespread threat that landmines pose to civilian populations and the negative effects they have on efforts to recover and develop after a conflict, landmine identification and clearance present significant obstacles around the world. The development of cutting-edge technologies is required to increase the safety and effectiveness of landmine detection because traditional manual demining techniques are cumbersome, risky, and frequently ineffective. With a focus on the usage of robots, this research article intends to examine and assess various methods and technologies used in landmine detection.The time-consuming, risky, and frequently ineffective traditional landmine removal techniques mainly rely on human deminers. Innovative methods to safely and effectively locate and deactivate landmines are now more important than ever.

This study developed a landmine detection rover-robot to help in the field that is more rapid, secure, and accurate than the conventional approach. Metal detecting sensors are typically used to find mines. The critical factor that affects a metal detector's ability to identify landmines is the separation between the sensor head and the mine that is being searched for. The performance of the metal detector can be enhanced by altering the distance and elevation between the sensor head and the landmine. If the sensor heads maintain a consistent gap with ground level, the function of robot assisted land mine detection can be carried out conveniently. The safety of people is given more importance in this project. The robot can be controlled from a more secure distance or from an area that has already been cleared of landmines. The risk of an explosion is eliminated since the landmine detector head is projected in front of the rover. This method protects both the rover and the person using the remote to control it.

Since Bluetooth controller has a low cost and high level of security advantages, it is employed for communication between the rover and the operator. This rover robot is capable of carrying out a variety of defensive tasks.

II. MATERIALS AND METHODS

HARDWARE USED:

1. **ATMEGA (MICROCONTROLLER)**: The architecture-based LDRV (Landmine Detector Robotic Vehicle) Microcontrollers made by ATmega are widely used in embedded systems and applications. A motor, an LED, or internet content can be posted using ATmegas that can read inputs from a metel detector sensor, a user's finger on a sensor button, or a tweet. You may command your board's behaviour by providing the CPU with a set of instructions. The ATmega is a physical programmable circuit board, often known as a microcontroller, and integrated development environment (IDE) software.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105269 |

2. **DC MOTOR:** A DC motor, short for Direct Current motor, is a type of electric motor that converts electrical energy into mechanical rotational motion. It operates on the principle of electromagnetic induction and consists of several key components, including a stator (stationary part) and a rotor (rotating part).

3. **DC Motor Driver:** A DC motor driver, also known as a motor controller or motor driver circuit, is an electronic device that controls the speed, direction, and operation of a DC motor. It acts as an interface between the microcontroller or control system and the DC motor, providing the necessary electrical signals to control motor speed and direction.

4. **GPS MODULE:** A GPS module, also known as a GPS receiver or GPS chipset, is a compact electronic device that integrates a Global Positioning System (GPS) receiver and associated components. It allows devices to receive signals from GPS satellites and determine their precise location, velocity, and time information.

5. **Bluetooth Module:** Bluetooth module that can be used for wireless communication between devices. It provides a convenient way to add Bluetooth functionality to a wide range of applications.

6. **GSM MODULE:** The circuit breaker system can be remotely monitored thanks to the GSM module. Authorised users or monitoring systems can receive status updates, alarms, or warnings via SMS or other communication channels. This makes it possible for users to monitor the landmines location even when they are not present physically.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105269 |

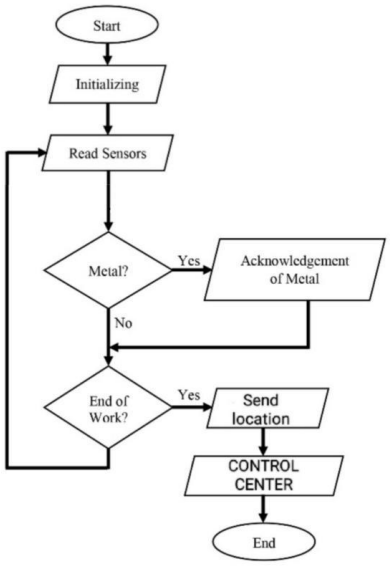
7. **DC TO DC CONVERTER:** The voltage level needed by various circuit breaker system components can be regulated and stabilised using the DC to DC converter. The circuit breaker's control circuits, microcontrollers, sensors, and other electronic components are powered by converting an input voltage, usually from a DC power source, to the appropriate output voltage level.

III. SOFTWARE REQUIREMENT

Embedded C Language: A computer-based application known as an embedded system is one that has at least one programmable computer (usually in the form of a microcontroller, microprocessor, or digital signal processor chip) and is utilised by users who are typically not aware that the system is computer-based.

METHODOLOGY:

The metal used in landmines is detected by metal detecter sensors if there are any. Microcontroller receives signal from sensor.After finishing his duty, an SMS is sent to inform the user that a landmine has been spotted along with its location. The system's correct operation will be impacted by the network issue because it has a GSM modem and GPS module.



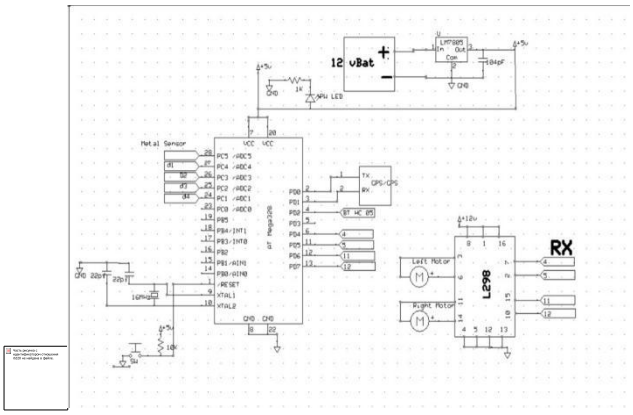
Flow chart

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

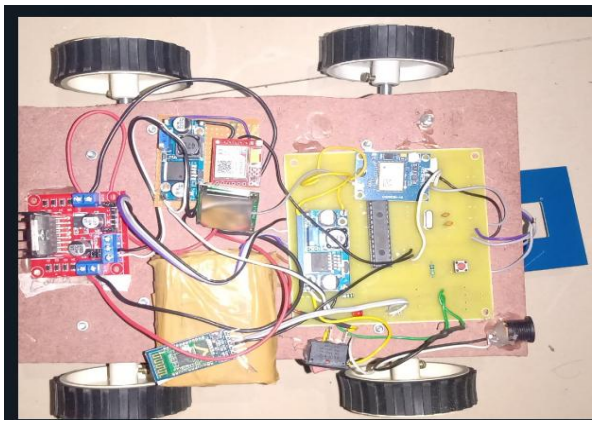
| DOI: 10.15680/IJIRCCE.2023.1105269 |



Circuit Diagram

IV. RESULT

A landmine detector robotic vehicle's main objective is to precisely pinpoint the presence and position of landmines. The increased safety that a landmine detection robotic vehicle provides is one of its main advantages. The risk to human operators is reduced in potentially hazardous environments by using mobile-controlled vehicles. The effectiveness and speed of landmine demining operations can be increased by the vehicle's capacity to navigate challenging terrain and scan huge regions.



Setup

V. CONCLUSION

A landmine detector robotic vehicle has a lot of potential to improve landmine detection and make demining operations safer. These vehicles provide a number of advantages and capabilities by utilising cutting-edge sensing technologies and mobile-controlled operation. The robotic vehicle's specialised sensors, such metal detectors, enable precise landmine identification. Potential landmines can be located and their presence can be determined by the vehicle.

VI. ACKNOWLEDGMENT

We sincerely thank the professors who contributed to the first phase of this project's accomplishment. We want to thank our mentor, Mrs. Aparna Shinde, for her unwavering support, insightful recommendations, and technical direction throughout the project. A special thank you to our H.O.D. Dr. Rutuja Deshmukh for her gracious assistance and encouragement in official capacities. Additionally, we are grateful to Mrs. Shailaja Yadav, our project coordinator, for

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105269 |

her insightful advice. Finally, we would like to express our gratitude to all the instructors, staff, and students of the E & TC Department who contributed in any way to the successful completion of this effort

REFERENCES

[1] Suraj Namdeo Rathod, Dagade Megha T, Nakhate Mayur V, Lokare Supriya S, "Wireless Underwater Metal Detector Robot," International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, Issue 4, April 2016.

[2] K.S.Ruchitha, Soumya Anand, Anurima Das, Rajasree P.M, "Design and Development of Landmine Detecting Robot," International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 4, April 2016

[3] Sandesh Gowda "autonomous robotic landmine detection, mapping and avoidance" master of science in electrical engineering, The university of texas at arlington, May 2015.

[4] Prithviraj Dasgupta, K. R. Guruprasad, Angélica Muñoz-Meléndez, and JanylJumadinova, "The COMRADE system for multi robot autonomous landmine detection in post conflict regions," Journal of Robotics, Hindawi Publishing Corporation, Volume 2015, Article ID. 921370

[5] Dr.F.Y.C. Albert, C.H.S Mason, C.K.J. Kiing, K.S. Ee, K.W. Chan, "Remotely Operated Solar- Powered Mobile Metal Detector Robot International," Conference on Robot PRIDE 2013-2014 - Medical and Rehabilitation Robotics and Instrumentation, ConfPRIDE 2013-2014.

. [6] Mohammad C. Ratto, P. Torrione, K. Morton, and L. Collins, "Context dependent landmine detection with ground-penetrating radar using a hidden Markov context model," in Proceedings of the 30th IEEE International Geoscience and Remote Sensing Symposium (IGARSS '10), pp. 4192–4195, Honolulu, Hawaii, USA, July 2010.

[7] S. Bermudez iBadia, U. Bernardet, A. Guanella, P. Pyk, and P. ´ F. M. J. Verschure, "A biologically based chemo-sensing UAV for humanitarian demining," International Journal of Advanced Robotic Systems, vol. 4, no. 2, pp. 187–198, 2007

[8] T.Fukada, Y. Hasegawa, Y. Kawai, S. Sato, Z. Zyada, and T. Matsuno, "GPR signal processing with geography adaptive scanning using vector radar for antipersonal landmine detection," International Journal of Advanced Robotic Systems, vol. 4, no. 2, pp. 199–206

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details