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Surveillance Robot for Landmine Detection

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Abstract: ***Landmine detection robots are intended to cover as much of the landmine field as possible in order to detect landmines.The encountered landmines, along with the scanned and residual territory, are represented with millimetre precision on an interactive map.***
This study offers a prototype model of a land mine detecting robot that is strong while being affordable in cost and easy to handle. Graphic user interface is created for mapping landmines, displaying scanned and remaining areas, PID tweaking, and camera alignment.The emphasis is on controlling the differential drive robot in auto, semi-auto, and manual modes. The image processing technology is used to determine the precise position of the robot, which offers live reckoning feedback to the robot's dead reckoning servo control. A metal detector is a sensor that is used to detect landminesThe GUI, or graphical user interface, for the remote terminal computer essentially controls the robot.The procedure is simple, yet effective in achieving the intended results.The method is basic but strong and understandable in order to get the desired goals.
Keywords: Robotic mechanism, metal detector, Ardunio microcontroller.

I. INTRODUCTION

A land mine is an explosive device hidden beneath or on the ground that is meant to damage or cripple enemy targets when they travel over or near it, ranging from soldiers tovehicles and tanks. When a target steps on or drives over such a device, it is normally detonated automatically by pressure, however various detonation techniques are utilised.

A land mine can inflict destruction by direct blast effect, fragments ejected by the detonation,or both. The term comes from the historical practise of military mining, which involved digging tunnels beneath opposing strongholds or army formations. These death tunnels were initially collapsed in order to eliminate the targets above, but became afterwards loaded with explosives.and exploded in order to wreak even more havoc. Land mines are now oftenused to refer to devices designed especially as antipersonnel or anti-vehicle weapons.

Although many types of improvised explosive devices ("IEDs") can be classified as land mines, the term "land mine" is usually reserved for manufactured devices designed for use by recognised military services, whereas "IED" is reserved for makeshift devices assembledby paramilitary, insurgent, or terrorist groups.

Land mines are problematic because they have the potential to be used as indiscriminate weapons. They can be harmful for a while after a fight has finished, causing economic and humanitarian damage.The 1997 Convention on the Banning of the usage, Stockpiling, Production, Transfer, and Disintegration of Anti-Personnel Mines and on their Destruction, also referred to as the Ottawa Treaty, was the result of pressure from a variety of campaign groups organised through the International Campaign to Ban Landmines. The convention has been signed by 162 countries thus far. Land mines are often classed into two varieties based on the sort of explosion that must be initiated: anti-tank mines, which are meant to immobilise or destroy vehicles, and land mines, which are occupants. In US military jargon, destroying the vehicles is referred to as a catastrophic kill, whereas just immobilising them is referred to as a mobility kill.

Anti-tank mines are often bigger and need more pressure to detonate than anti-personnel mines. A high trigger pressure, typically 100 kilogrammes (220lb), precludes them from being activated by troops or smaller vehicles.

Shaped charges are used in more sophisticated anti-tank mines to concentrate the explosives and maximise their armour penetration.

Anti-personnel mines are devices that are meant to kill or harm humans rather than vehicles. They are frequently designed to hurt rather than kill in order to improve the opposing force's logistical assistance (evacuation, medical). Anti-personnel mines of various sorts.

Armoured vehicle tracks and wheels can potentially be damaged. The Parties to the Ottawa Treaty agree not to employ, create, store,or transport anti-personnel mines and to assure their destruction. As of early 2016, the Treaty has 162 signatories.A total of 36 nations, including the People's Republic of China, the Russian Federation, and the United States, may have tens of lacs of antipersonnel mines stored, yet to sign up to the treaty.

II. LITERATURE SURVEY

Majd Ghareeb et al. presented a landmine detecting system based on robotics, communication, and data processing. The system is made up mostly of a raspberry pi, a camera board, a metal detector circuit, and a GPS shield. A moving unit based on the Raspberry Pi for detection, data collecting, and transmission to the central unit, which will subsequently investigate the collected data. Metal detector circuits are used to detect metal. The GPS shield is utilised to pinpoint the precise position of the identified item. To optimise system performance, the kind of detector and camera resolution capacity must be examined.

Yuvaraj Ganesh and his colleagues discovered landmines using a surveillance drone. The system consists of a quadcopter, metal detector circuit, IR camera, RF Transmitter and Receiver, Ardunio Uno, GPS module, and GSM module.The GPS module provides the latitude and longitude of the discovered mine. The GSM module is used to convey the user's location through text message. Wireless communication is accomplished through the use of an RF Transmitter and Receiver.The algorithm was executed on the Arduino Uno, which also interfaced with the GPS, GSM, metal detector, and IR camera. The downsides include the operational range of the drone and the cost of implementation.The disadvantages include the drone's operational range and the expense of implementation.

Kishan Malaviya and colleagues presented a self-contained landmine detection and mapping robot. Kuo-Lan Su et al. created a landmine-detection system comprised of a landmine detecting mobile robot and an additional mobile robot. The landmine detection mobile robot leads theway, using a landmine detector to identify landmines and a GPS module to monitor their location. It stores the coordinates and sends them to the next mobile robot through a wireless RF link.

This robot records the landmine detecting robot's location and orientation, as well as thegeographic coordinates of the mines in the area. The following robot approaches the landmine and programmes a route to avoid obstacles autonomously.

William Benn and Stanislao Lauria suggested an image processing algorithm-based approach for robot navigation control centred around monocular pictures. Colour segmentation against a specified floor plane was used to distinguish barriers from traversable space; this was then complemented with canny edge detection to distinguish similarly coloured boundaries from the floor plane. In the resulting binary map, white represents an obstacle-free region and black represents an obstruction. Fuzzy logic was then used to regulate the robot's future moves. According to the results, this image processing method functioned well on solid-colored carpets, timber, and concrete floors butstruggled to separate colours in multicoloured floor types such as printed or decorative carpets.

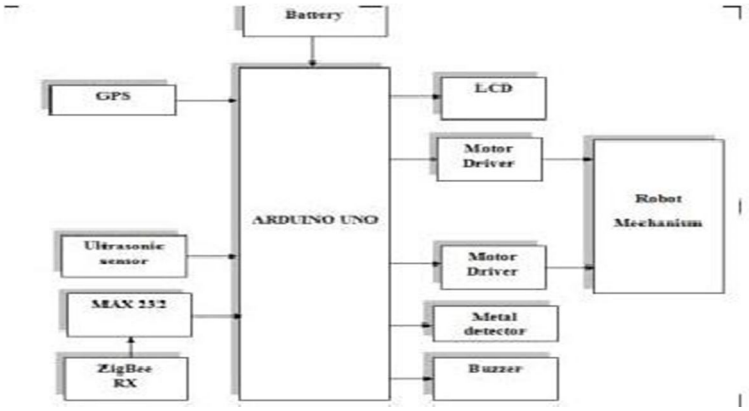
III. PROPOSED METHOD

A land mine detecting robot must be built for use in peacekeeping, operations, and the removal of contaminated regions. To ensure the operator's safety, the robot is controlled bycomputers

To find and avoid the obstruction, the robot is equipped with an ultrasonic sensor. The minemay be located using the GPS sensor's latitude and longitude. The robot's construction is comprised of a substance that can withstand explosions up to a certain point. The robot emits a warning message to surrounding individuals through a buzzer installed on the robot.

IV. BLOCK DIAGRAM

The system contains the robot's brain, an Arduino UNO microcontroller, an ultrasonic sensor, a GPS sensor, a buzzer for warning alerts, DC motors for actuation, and a metaldetector for mine detection. These components are mounted on the robot, and electricity is provided to them through apower supply unit. PC is used to detect mines and determine their location.



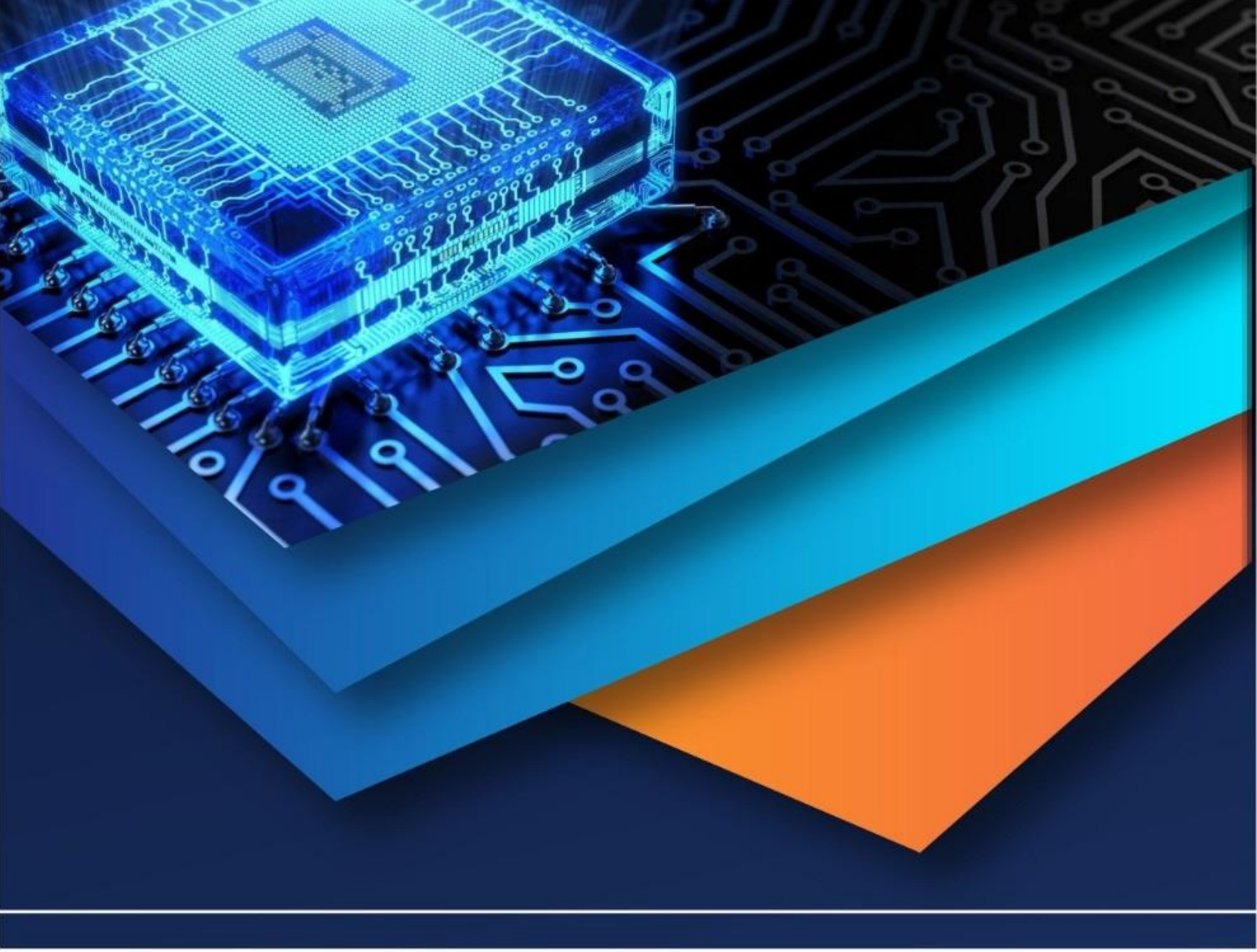
BLOCK DIAGRAM OF THE SYSTEM

V. CONCLUSION AND FUTURE SCOPE

This study describes the entire design and execution of a wheeled robot for land mine detection. The wheeled robot is less costly, more sturdy, and a useful tool in the armed forces for surveying and monitoring. The future focus is on improving body designs by including a suspension system to absorb stress from uneven surfaces. The robot is outfitted with a camera that's used for checking its condition. To provide continuous power, the powersource is built by replacing the batteries with solar panels. For distribution, the robot is outfitted with a robotic arm.

REFERENCES

[1] Habib M.K., "Mine detection and sensing technologies new development potentials in thecontext of humanitarian demining," in Industrial Electronics Society,
[2] Zhenjun He, Jiang Zhang, Peng Xu, JiahengQin andYunkai Zhu, "Mine detecting robotbased on wireless communication with multi-sensor"
[3] J. Bharath, “Automatic Landmine Detection and Sweeper Robot using Microcontroller”, International Journal of Mechanical Engineering and Robotics Research, Vol.4, No.1, Jan2015.
[4] Yuvaraj Ganesh, et.al, “Surveillance Drone for Landmine Detection”, InternationalConference on Advanced Computing and Communications, 2015



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