

Wireless Landmine Detection Robot using GSM/GPS

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Abstract - Land mine detection is most vital throughout war fare to deploy armed vehicle drive within the enemy territory. These armed vehicle or Main battle tanks are accustomed follow the trail of experimental tank operated by hand to avoid damage/disturbance of the battle tank and defense casualties of defense crews. Additionally, post war fare the mines planted throughout war is often detected and subtle by deploying a mine detection mechanism, which may save civilian life to avoid human casualties. During this projected system, the most aim is to notice the Metal (Bomb) detection by mistreatment the wireless unmanned mechanism that has the sensors that detects the presence of any silver object (bomb) through buzzer alarm. Because it could be a wireless mechanism it is often simply mobilized and might be controlled. The mechanism consists of a metal detector at very cheap of it to sense the metal objects. It alerts the user employing a Buzzer on board. During this system we tend to our employing a detector that detects the presence of any silver object (bomb) through buzzer alarm.

Keywords: Metal Detector, Buzzer, Defense, Landmine Detection.

I. INTRODUCTION

National security is of prime importance in today's weapon studded world and therefore the need to consider the safety of the army personnel and people living in war prone areas becomes very vital. A Landmine is basically an explosive device hidden underground by the enemy and explodes when any personnel or vehicle steps or drives over it. The Pressure created by the personnel or the vehicle on the ground below which the mine is laid acts as the detonator for the mine explosion. The damage caused by the Landmine explosion is fatal and hence detecting landmines becomes necessary before the army personnel or vehicle accidentally steps over it. The major challenge is detecting these landmines without causing any explosion and diffusing them once they are detected. The process of detecting landmines is technically termed as minesweeping and process of removing or defusing the mines is known as demining or mine clearance. Minesweeping was earlier done using trained animals like dogs and rats but modern methods includes metal detectors and various tooled attached to the vehicles. But any manual intervention of a human is always dangerous.

Robots are used for various applications in industrial area. Robot performs various activities and is becoming more advanced. That's the reason nowadays Landmine Detection Robotic Vehicles and unmanned robots are used to detect the landmines. Robots are always reliable in terms of perfection in detection and no human life is endangered in the process.

II. LITERATURE SURVEY

Waqar Farooq, Nehal Butt, Sameed Shukat, Nouman Ali Baig, Sheikh Muhammad Ahmed, Wirelessly Controlled Mine Detection Robot [3]. This paper demonstrates the problem and effects of landmines in defense fields. The robot is equipped with special wheels controlled by H-Bridge module, allowing it to move in all possible directions. The robot is equipped with special range sensors that help in avoiding the obstacles in the field by specifically detecting the position of obstacles. A special type of prototype made of lightweight temperature resistant metal is used to carry all objects. A wireless camera is added to the robot, which captures and broadcasts the present location of the robot.

Jebasingh Kirubakaran. S. J, Anish Kumar Jha, Dheeraj Kumar, Sadambi Poornachandran Prakash, Mine Detecting Robot with Multi Sensors Controlled Using HC-12 Module [4]. This paper demonstrates a mine detecting robot guided by HC-12 module that allows it to scan the testing area within 1.8km and metal detector is used as mine detecting sensor placed in front of the vehicle, while GPS is used to provide the exact location of the infected area. The embedded system is based on Arduino technologies and guided by an HC - 12Module.

V. Abilash and J. Paul Chandra Kumar, Arduino Controlled Landmine Detection Robot [5]. This paper demonstrates a prototype model of a land-mine detection robot which can be operated remotely using Wi-Fi Technology. A Global Positioning System (GPS) sensor is employed, which identifies and broadcasts the present location of the robot. Path planning, obstacle detection and avoidance algorithms were used to control accurately and to navigation of the proposed path by avoiding obstacles. Arduino microcontroller is employed in this robot.

Bharath J, Automatic Land Mine Detection Robot Using Microcontroller [6]. This paper demonstrates the landmine

detection robot. In this, the metal detector circuit is interfaced with the robot and it is left on the required search area in order to detect the metallic components used in the landmines.

Michael YU. Rachkov, Lino Marques, Anibal T. De Almeida, Multi-Sensing Demining Robot [7]. The paper describes an advanced multisensory demining robot. The robot transport system is based on a simple structure using pneumatic drive elements. The robot has a robust design and can carry demining equipment up to 100 kg over rough terrains. Due to the adaptive possibilities of pedipulators to obstacles, the robot can adjust the working position of the demining sensors while searching for mines. The detection block consists of a metal detector, an infrared detector, and a chemical explosive sensor. The robot is controlled by means of an on-board processor and by an operator remote station in an interactive mode. Experimental results of the transport, control, and detection systems of the robot are presented.

Seong Pal Kang, Junho Choi, Seung-Beum Suh, Sungchul Kang, Design of mine detection robot for Korean mine field [8]. The design includes a track type main platform with a simple moving arm and a mine detection sensor (consists of a metal detector and a GPR at this stage). In addition, in order to maintain the effective distance between the landmine sensors and ground surface, a distance sensing technique for terrain adaptability was developed and briefly introduced in this paper.

Zhenjun He, Jiang Zhang, Peng Xu, Jiaheng Qin and Yunkai Zhu, Mine Detecting Robot Based on Wireless Communication with Multi-sensor [9]. This paper put forward a control method and device of robot, Robot based on wireless communication with multi-sensor, which can carry out robot's motion control, video surveillance, temperature and humidity detection, gas detection and data exchange, etc. In a timely manner, it can also upload real-time monitoring information to the upper machine to carry on the dynamic measurement and real-time monitoring, and give security alerts.

Majd Ghareeb, Ali Bazzi, Mohamad Raad, Samih Abdul Nabi Wireless. Robo-Pi for Landmine Detection [10]. The main idea is to design and implement a prototype of an efficient low cost automated mine detector that will replace the current employed human detectors in the mission of detecting and extracting mines in a suspected area of land. This detector will wirelessly communicate with a server to transmit the detected information such as the location of the metal object and captured images of the land where does it exist.

III. PROBLEM STATEMENT

There are many personnel mines remaining from wars, it is desirable to provide a safe, inexpensive tool which civilians can to detect the mines. The robot has a capability to detect the path of going forward and backward. The movement can be done with the motor which has been turn easily. Normally the wheel conducting vehicle facing hard to turn left or right but our robot does not create those issue. It is common to evaluate the performance of a metal detector by calculating the probability of detection.

IV. METHODOLOGY

The block diagram of the proposed work is shown in Figure which explains different components of the system.

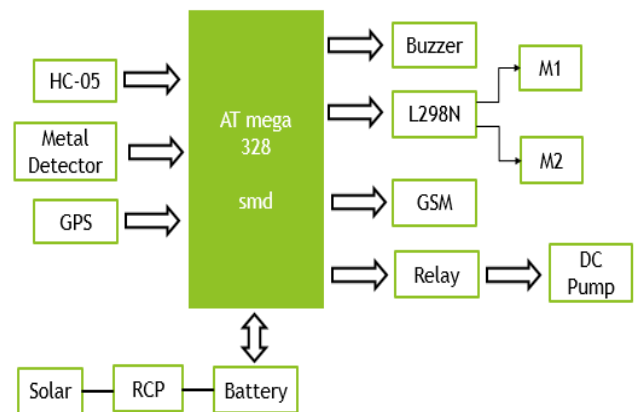


Figure 1: Block Diagram

The block diagram consists of Atmega 328, HC-05 Bluetooth module, Metal Detector, GPS Module, GSM Module, Buzzer, Relay, L298N Motor Driver, DC Motors, Solar Panel (3 Watt), Battery, etc.

Robot is controlled using Bluetooth module to move forward reverse left right. Whenever it will detect some input to metal detector, it will send GPS location to GSM mobile number via GSM Module. Relay will get ON and Buzzer will be turned ON.

Power Supply is given by 12V 1.3A Battery connected to Solar Panel of 3Watt.

V. CONCLUSION

Nothing should be more important than the lives and safety of our country's army men who risk their lives for our safety from external enemies. There have been many cases of fatalities and injuries due to explosion of landmines. Till date a lot of research and development has been done and different types of landmine detection robots have been developed each having its own advantages and disadvantages. The variation in

these robots is based on the controller or processor used, sensor interfaced, GPS tracking system and the locomotion technique used.

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