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Wi-Fi Enabled Automatic Metal Detector Robotic Vehicle for Bomb Diffusion

V. Prabhakaran[1*], S. Pavithra[2], P. Sam Daniel[3]

[1]Energy and Environmental Engineering, Saveetha School of Engineering, Chennai

[2]Electronics and Communication Engineering, Saveetha School of Engineering, Chennai

[3]Electrical and Electronics Engineering, Saveetha School of Engineering, Chennai

***Corresponding author: E-Mail: prabhakaran1286@gmail.com**

ABSTRACT

In Today's world landmines are very dangerous arm for defense exploitation. Many army forces use this to attack or to kill the enemies to protect our country. Landmines which are buried inside the earth will blow the trespassers/army forces which intended to kill when they stamp on it. Prior intimation of landmines to our army forces can alert them and make their lives safety, In this paper a robotic vehicle is designed which will sense the presence of landmines which is buried inside the earth through RF signals and intimate the soldiers and alert them from being blowed by them. This also further indicates the distance of the landmines from the robotics vehicle which eventually tells them to handle the situation carefully. This module uses Wi-Fi connectivity for its vehicle operation.

KEY WORDS: Landmine, Proximity Sensor, Wi-Fi, Robot, Economy, Metals, Armed Forces.

1. INTRODUCTION

The worst regions being Angola, Namibia, Mozambique, Somalia, Ethiopia, Eritea, Sudan, Croatia, Iraq, Afghanistan, Russia, Cambodia and Vietnam and mostly gulf countries. On average, there are approximately 70 injuries and death from mines every day. It is this threat posed by mines that places extreme risks on the civilian population who return to the land after a Mines were generally found in 3rd century B.C these were in the form of non metal explosive particles that were inside the earth that which causes threat to the living beings and others.Basically mines were started using in th century and now a days these were using every where in many parts of the world mostly by terrorists in order to clear their demands.

Indian army ranks 3rd in armed forces in the world with 13,25,467 staff today it mainly facing the problem of clearing of landmines. Since many researches are going throughout the world in order to overcome this. Nations like U.S.A, Russia, China and India were doing researches on this. In order to solve this problem my article may helps to an extent "Automatic Metal Detector Robotic Vehicle Using Wifi Technology".

During the second world war mine were evolved the main reason for using mines is kill the people and to destory the property,there are up to 65 countries still affected by mine threats from past conflicts, with the conflict. Inorder to clear a mine the estimated is about US$1 million per one square kilometer area .Inorder to clear the mines there are three methods to clear the mine they are manual demining,mechanical demining and use of exlosive charges in deminig. The rocedure for removal of landmines greatly deend on the following factors such as location, terrain, mine distribution, soil density, e.t.c.

Here, the system consists of transmitter and receiver in which the commands are transmitted from the transmitted and receied by the receiver for its opertaion, it also uses the Wi-Fi technology for its motor operation to move front, back, left and right. It also carries a metal dedector circuit which will sense the bomb and itimate over a buzzer.

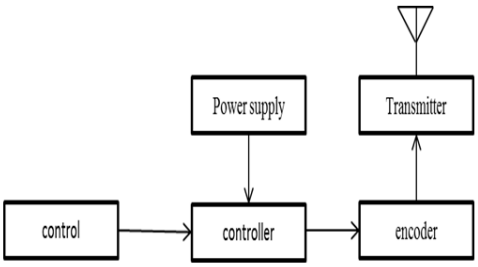

Figure.1. Transmitter Section

Explanation: In Transmitter section the automation is done with the help of remote of joy stick. Through the wireless technique the robot is moved and it starts to search the mines which are present underneath the ground. The controller gives the control signal to the controller.

Right, Left, Front and back direction is controlled by the controller. Here, AT8 series controller is used because of its low power consumption for its operation An 8-bit microcontroller based on the AVR enhanced RISC architecture is used to control the operations of the robot. This Microcontroller consumes low power and cost is very low when compared to other configurations. Since it consists of four orts which are bidirectional each consists

of latch, output driver and an input buffer and it has less complexity instead of using microprocessor. Here the encoder is used for integrating the controller for sending the signals from controller to the transmitter side.

The HT-12E Encoder is used here it is a MOS Low Scale Integration (LSI) for remote operation of the robot. The have a capacity to encode 12 bit of information which consists of N address bits and 12-N data bits. From encoder it is integrated through the transmitter in order to send the information to the receiver.

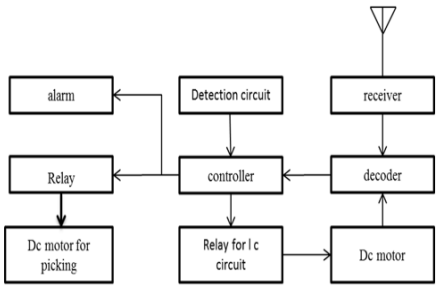

Figure.2. Receiver Section

Explanation: This is used to receive the information from the transmitter side,here it consists of the components like relay,dc motors,alaram,decoder,detection circuit.Here d.c motors were used for the moving of the robot and other motors were used for picking and digging of the mine. In this paper we use 30 RPM (Rotations per Minute) Series DC Motor because of its high quality and low cost. The input rating of the motor is 4-12 Volts DC type and it gives 30 RPM at its full swing.

Here relays were used in order to control the direction of rotation of D.C. motor hence by tis series of relays, the speed of the motor and robot can be controlled.

Now coming to the detection circuit, this is used to detect the landmine and any other waste metals that present inside the earth surface .so here the detection circuit consists of LC circuit and sensor i.e. proximity sensor. The LC circuit consisits of inductors and capacitor connected parallely, this LC circuit trrigers the proximity sensor if it detects any metals near to it. The proximith sensor will make the LED to glow and also it triggers the buzzer. The LC Circuit resonates when exact same frequency material comes near to it. The LC circuit consist of inductor and capacitor connected in parallel, when capacitor is fully charged it then gives to the inductor which will further improves its magnetic field.

Here decoder is used for interfacing the controller and other components of the robot in order to controll the detection circuit to detect the mine or any other metal that present under the earth surface. Here the HT-12D Decoder ICs are series of CMOS LSIs for remote control system applications of the robot. The decoder receives the serial address and data from the decoder which is then transmitted by a carrier by Wi-Fi transmission medium and it is given to the output pins for further processing.

The prototype when placed in the field has some metal bodies similar to landmines. When the detector comes in contact with the metal body of the landmine, it activates the proximity sensor to provide signal to the alarm unit due to mutual inductance, which then activates the alarm. The robot moves some distance over it and the electromagnetic material gets magnetized to attract the landmine without detonating it. Soon with the help of Wi-Fi it send the message to the person who is going to dismantle it and GSM/GPS is used to trace the exact location of the mine and it helps in saving the time and locate the present of the mine easily.

Finally the execution process is done by detecting and changing the position to the safe position from the distant position. Hence the robot is operated at safe distance from landmine fields and it sweeps landmines from mine fields. Robot is operated by a wireless RF module to move in four directions, i.e., forward, backward, left and right directions. Wi-Fi can be operated at a distance of 150m to 300m. Metals can be detected by using simple metal detector circuit with the help of proximity sensor inside it.

Future Aspects: They may be an existence of robot prototype which will find and also remove the landmine which is buried inside the earth. In this paper we have used RF signal for transmission, in future it can be upgraded to use Wi-Fi or Microwave for long range operation. In advent of this, it can also be extended by using image processing technique, just by keeping a camera in-front of the prototype model and tracking the path it covers and also wirelessly streaming the real-time data over a smart phone and also to indicate the presence of the landmine in mobile phone via Graphical User Interface (GUI).

2. METHODS & MATERIALS

In this paper, we have used embedded C as module software coding for pic microcontroller which triggers all the motors, sensors, actuators attached to it. The outer chassis body is crafted in mechanical cad design and developed a rigid metal body which has the ability to claim in the off-road condition. The vehicle is designed as it has to claim up an alterrian condition. The signals from the metal detector are transmitted to the buzzer, which indicates the presence the landmines on the surface. The vehicle is controlled using a remote joystick which enables the vehicle to move front, back, left and right.

3. RESULTS

The developed prototype can be used in defense application, in which all the soldiers are now getting blown up by unpredictable path hunt. The landmines which are buried inside the ground will not be sensed by normal metal detectors. In this prototype, we developed a metal detectors using RLC combination which has the potential to sense the landmines which are buried deep inside the soil. Even more this module is operated in remote conditions so it will be safer for the soldiers to take control over their hunt.

4. CONCLUSION

Finally coming to the conclusion part here we discussed about the types of demining techniques and the present investigation shows current model and how it works on the fields in order to detect the landmine and thus saving the nation's economy and saving the people from live threats. Hoping that this prototype can be useful for military and other applications in order to detect the mines in various types of field's. Since it is less complex, easy to operate, easy to maintain and less cost.

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