LANDMINE DETECTION ROBOT CONTROL USING MOBILE ANDROID APP

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Abstract—The purpose of this robot which is capable of detecting buried landmines and marking their locations, while enabling the operator to control the robot wirelessly from a distance. The ideas and concepts from the theoretical stages are shaped into the physical hardware components by fabrication of a prototype and then software programs are integrated into the system so as to test and experiment the concepts that had been developed. The designed robot is capable of detecting a buried mine, marking the exact location of the buried mine, and controlling itself from stepping over it and detonating the mine. The detection of the buried mine is done by using metal detectors since most land mines contain metal components. The marking of the location of the possible buried mine area will be done by spraying distinctive color paint onto that location

There are many countries affected by landmines which present a major threat to lives and cause economic problems. Landmines are harmful because of their unknown positions and often difficult to detect. The development of new demining technologies is difficult because of the tremendous diversity of terrains and environmental conditions in which mines are laid and also because of the wide variety of landmines. Currently, detecting and clearing mines demand specific expertise with special equipment. This paper presents different techniques used for landmines detection. It discusses the strategies that can enable the robot to detect mines by means of sensors. This paper deals also with the processing of the fused information from different sensors to guide soldiers when passing landmines. The purpose is to give an overview of the landmines detection techniques by using the autonomous robots which are capable of exploring and detecting buried landmines and marking their locations

Keywords— GPS, METAL SENSOR, LPC2148, BLUETOOTH HC-05, L298 MOTOR DRIVER

I. INTRODUCTION

According to the UNICEF, almost 10 000 people per year are killed by land mines,most of whom are civilians. Thousands more people lose limbs, livelihoods or loved ones 1.In many cases, the conflict is long over but the danger remains due to the difficulty of finding and destroying the mines. Yet, destroying them is imperative for long term safety, and with over one hundred million planted world wide it is a daunting task. Substantial action is required, but one must disarm a hundred million death-traps. 1.1 Problem Description The problem is the minefield itself: a large area where a large number of explosive devices are randomly hidden. They cannot be spotted visually, since many are buried or designed to be difficult to detect. Disarming them personally would be extraordinarily hazardous, especially without knowing where the mines are buried. Our solution is a wirelessly controlled robot capable of locating the mines and marking them for future removal. The main goal is to keep humans out of danger, and by remotely locating the mines, disposing of them becomes much easier. Even if a mine is triggered during the marking process, the loss of a robot is a small price to pay in comparison to that of a human life. However, it was still important to design a robot that would not detonate any mines that were discovered. In order to further enhance safety, it was also imperative that the mines be accurately marked and users could operate the robot from a safe distance. 1.2 High Level Description The Mine Detecting Robot system consists of two main parts: the robot itself and the remote control system used to drive the robot and display information to the user. The two parts communicate with each other through a wireless connection that sends control information to the robot and returns sensor information to display on the remote. The core of the robot system is a microcontroller that receives input from the metal detecting sensors as well as from the wireless transceiver. The wireless information is processed and sent 3 to the motor driver circuits and the marking system, while any information from the metal detectors is sent back to the remote through the wireless transceiver. This Project Contains Multiple Sensors For Detecting The Landmines. A Land Mine Detection Robot Is Needed To Employ In Peace Support Operations And In The Clearance Of Contaminated Areas. Also The Robot Shall Be Able To Detect 50-90% Of Landmines (Anti-Personnel Mines) And Mark The Locations Of The Mines Within A Tolerance Of 5cm And It Is Able To Send The Location To The Operator Via Gsm. For The Safety Of The Operator, The Designed Robot Must Be Able To Operate Remotely. Moreover, It Must Be Equipped With

Wireless Data Transmitting Capabilities .Landmines Are Easy-To-Make, Cheap And Effective Weapons That Can Be Deployed Easily Over Large Areas To Prevent Enemy Movements. Mines Are Often Laid In Groups, Called Mine Fields, And Are Designed To Prevent The Enemy From Passing Through A Certain Area, Or Sometimes To Force An Enemy Through A Particular Area. While More Than 350 Varieties Of Mines Exist, They Can Be Broken Into Two Categories, Namely, Anti Personnel Mines And Anti-Tank Mines. Anti-Personnel Mines Are Designed To Kill Or Injure Enemy Combatants. They Are Usually Buried 10mm To 40mm Beneath The Soil And It Requires About 9 Kg Minimum Pressures To Detonate Them. The Face Diameter Of Most The Anti-Personal Mines Ranges From 5.6cm To 13.3 Cm. Hence To Prevent From These Mines We Designed This System Which Is Light Weighted And Will Detect The Mine.

II.HARDWARE DISCRIPTION

Circuit Diagram:- Bluetooth technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). The most popular host controller interface today is either a UART or a USB. Here, I will only focus on the UART interface; it can be easily show how a Bluetooth module can be integrated on to a host system through a UART connection.

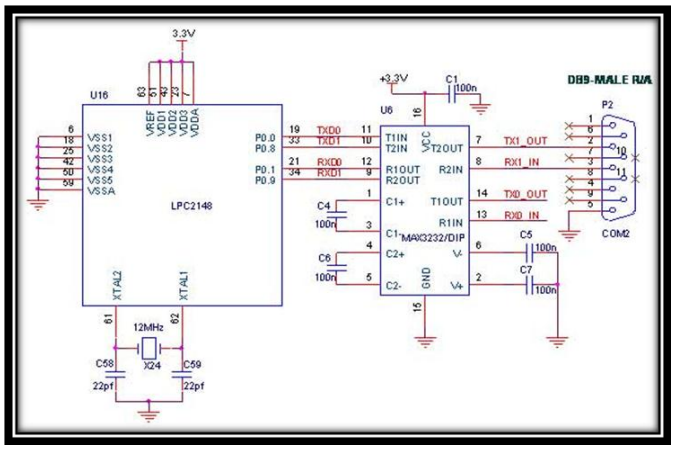

Fig:- (1). Interfacing of Bluetooth with ARM

III.COMPONENT USED

A. DC Driver (L298):-

The L298 is an integrated monolithic circuit in a 15- lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection fan external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

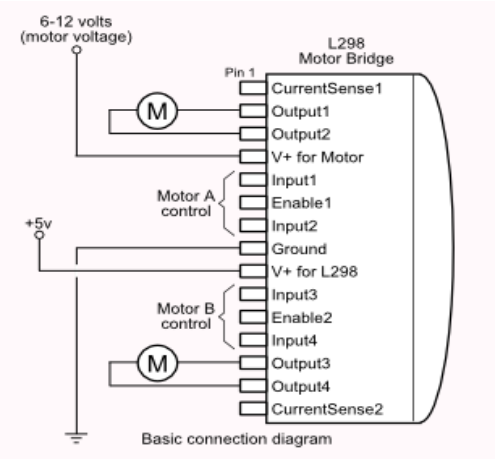

Fig:- (2). L298 DC motor Driver IC

B. Metal Detector:-

A metal detector is an electronic device that comprises of an oscillator which generates an AC current that passes via a coil generating an alternating magnetic field. When a part of the metal is nearby to the coil, eddy current will be induced in the metal object & this generates a magnetic field of its own. If an extra coil is used to measure the magnetic field, the magnetic field can be changed and sensed due to the metal object.

C. GPS (Global Positioning System):-

A GPS device can retrieve from the GPS system location and time information in all weather conditions, anywhere on or near the Earth. A GPS reception requires an unobstructed line of sight to four or more GPS satellites, and is subject to poor satellite signal conditions. In exceptionally poor signal conditions, for example in urban areas, satellite signals may exhibit multipath propagation where signals bounce off structures, or are weakened by meteorological conditions. Obstructed lines of sight may arise from a tree canopy or inside a structure, such as in a building, garage or tunnel. Today, most standalone GPS receivers are used in automobiles. The GPS capability of Smartphone may use assisted GPS (A-GPS) technology, which can use the base station or cell tower to provide the device location tracking capability, especially when GPS signals are poor or unavailable. However, the mobile network part of the A-GPS technology would not be available when the Smartphone is outside the range of the mobile reception network, while the GPS aspect would otherwise continue to be available.

Fig-(4) GPS Module

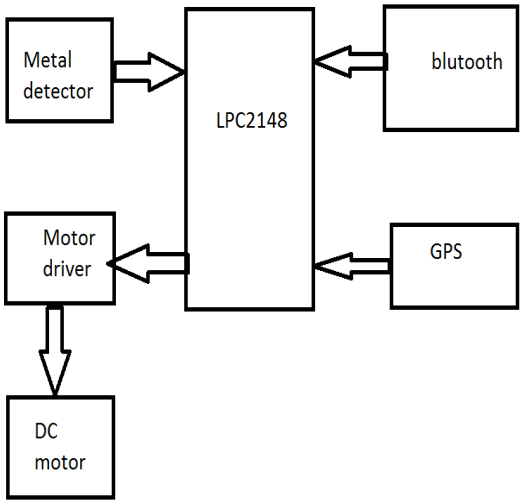

Fig-(3). Block Diagram of Proposed System

IV. BLOCK DIAGRAM

Description*:*

In our system we have designed a robot that can detect a mine underground and it can be controlled using our phone. We will design a android app to control our robot through phone, it will communicate with the robot using the Bluetooth. We will send commands from app to give direction to the robot i.e right , left, forward , backward .if we press forward button on the app it will send the command to robot via Bluetooth, the Bluetooth receiver on the robot will receive the command and give to LPC now LPC will forward bias the motors for forward direction, same for reverse ,in reverse bias it will move all motors in reverse direction .When the robot moves if a metal comes under its metal detector it gives data to lpc now this data is used for further process. The position of the metal detected is obtained by GPS. These co-ordinates are used to map the position of the mine.

V. CONCLUSION

The paper presents an advanced solution and a new direct approach for remote sensing based on the concept of metal detectors to detect the metallic landmines in El Alamein region.

The advanced solution solves three main problems a) The absence of maps that show landmines locations that planted in the Egyptian western desert from WWII, b) The lack of funds, c) The limited use of technology. The solution based on integrated technologies by using the wireless communications, cellular technologies and the packet oriented mobile data service to obtain a full control from a safe distance for landmine monitoring team in fenced minefields or suspicious regions.

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VII. **References**

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