

Bluetooth controlled Metal detecting robot with message alert

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Abstract - This project is mainly used for finding metal elements. In army for detecting the land mines the soldiers use handled metal detector so that some times the land mine was explode. That way the soldiers are died. For solving this problem, this project is used. This project have advanced alert system that is message alert. This is designed by using 'Arduino' technology. In this project the metal detector is connected to arduino board, the hole circuit is placed on one robot car. This car is controlled by bluetooth by using radio technology with Bluetooth module. When the metal detector detect the metal the arduino send message to mobile by using GSM module. This project obtain only one arduino board because all three application programs are merged in only one board. Using this project find valuable treasures at under land and covered areas and also detect the land mines at un manned areas. This project also used for security purposes.

Key Words: Land mine detection; Old coins detection; Un wanted metal detection in play grounds; Security.

1. Introduction

The Metal detectors are very useful in our daily life. These are used in different sectors those are Army, Security and Archeology. My project is used for detecting the land mines in army. This project is designed by using Arduino technology. This is the wireless controlled four wheel robot. This is controlled by smart phone with the help of Bluetooth technology. For this we designed one android application. This project have message alert system. This future is useful for knowing the robot output without seeing that. In my project we use different types of modules those are listed below.

- I. Arduino
- II. GSM900 Module
- III. HC-05 Bluetooth Module
- IV. LM-398 Motor controller
- V. Metal detector circuit

The description of each above module is given below.

2. Arduino

In my project Arduino plays major role. The arduino board have ATmega328 micro controller. It is open source software by using this software we dump the the program directly into micro controller in Arduino board. The Arduino board have totally 28pins in this 28 pins 14 are

I/O pins and 6 are Analog pins. In my project the Arduino controle the total robot. In this board we write the code for our project and dump into the micro controller. In Arduino we use total 14pins(either I/O,Analog,GND ,Vin and Vout). In I/O pins we use total eight pins those for motors, Bluetooth and GSM module. For motors controlling we use four pins but the pins number choosing is depend up on our program. These pins only choose between pin-2 to pin-13 only because pin-0,1 are fixed for Rx,Tx. For GSM module we use two I/O pins, these two pins are converted into Rx and Tx pins by writing program. The pins also chose in between pin-2 to pin-13 expect motor controlling pins. Similarly Bluetooth Rx and Tx pins given to Tx,Rx pins(1 and 0) of Arduino board. The Rx ,Tx pins are should connect reversely either GSM module or Bluetooth module. We give +5V input to Arduino board and we take +5V output from the Arduino board for applying Bluetooth module and Metal detector circuit[2].

3. GSM Module

In my project the GSM module is used for sending the alert message. We use GSM900 module. Not only 900 module may can also use any type of GSM modules for example GSM800,GSM700,GSM1800 and GSM1900. The number indicates the operating frequency in MHz In my project GSM Rx,Tx are connect to Arduino Tx,Rx(pin-3 and pin-2). This module require 12V DC supply for operating then we give supply voltage to this module from 12V Li Ion battery[3]. The connection between GSM module and Arduino board is shown below Fig. 1

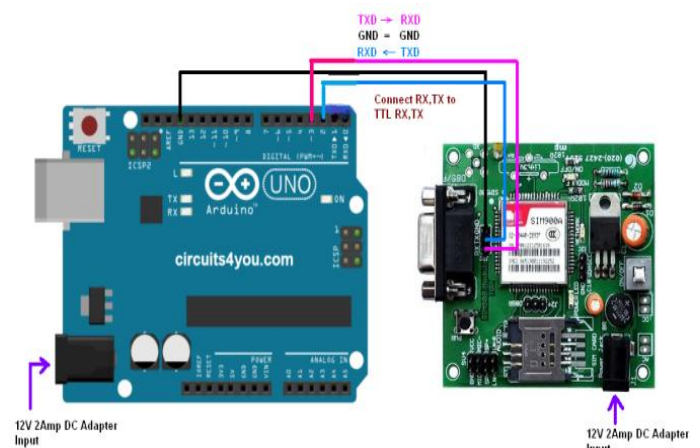


Fig.1 Connection between Arduino and GSM

3. Bluetooth Module

The robot is controlled by Android smart mobile by using Bluetooth technology. For this purpose we use Bluetooth module HC-05. This module is used for controlling and connect to any electronic circuit to Bluetooth. This module also have Rx,Tx pins for receiving and transmitting data. This Rx,Tx pins are given Tx,Rx of Arduino. For operating this we have to apply +5V DC supply. This supply is taken from Arduino board. [4]The connection between Arduino and Bluetooth module is shown below Fig.2

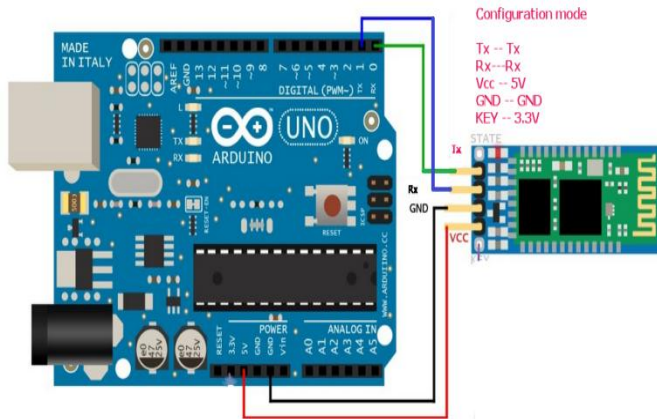


Fig.2 Connections between Arduino and HC-05

4. LM-298N Motor Controller

LM-298 is a motor driver IC. It is a 16-pin DIP or bridge type. This module have 4-input pins,4-output pins,3-enable pins, one +12V(input),one GND and one +5V(output). In my project we use total 4-motors, in this 4-motors one side 2 are parallel and another side two are parallelly connected. Signals for the motors are taken from the Arduino. Based up on program and commends the motors rotation is decided. We used motors all are 12V DC motors, so that we connect 12V battery to motor controller[5]. The connections between Arduino, Motors and Battery is shown in below Fig.3.

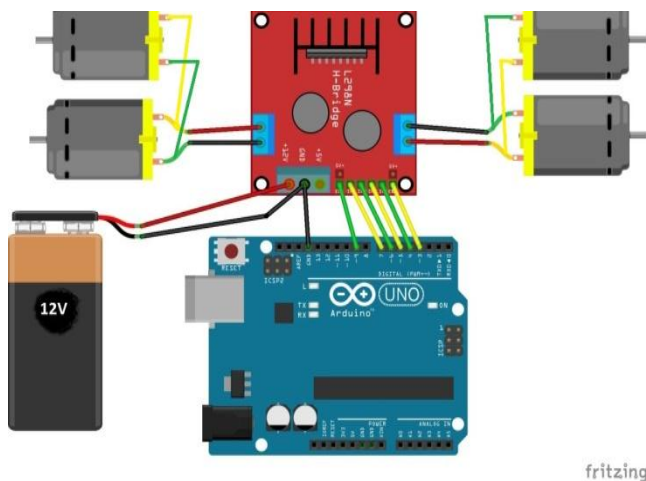


Fig.3 Connection between Arduino, Motors and Battery

Enable pins connection is not mandatory. The connecting pins between Arduino and Motor controller is depend upon our program.

5. Metal Detector

The metal detector is a combination of active and passive of elements. This circuit is designed by different types components, for example some circuits are designed by transistors and some circuits are designed by IC-555 timer. In my project the circuit is designed by transistors(s9012,s9015,s9018). The metal detector working principle is “electro magnetic induction”. According to this principle when the current carrying through the conductor, the magnetic field is established around current carrying conductor. This circuit have two copper coils(L1 and L2,where L1>L2). This two coils connect to transistors according to circuit diagram. [1]The circuit diagram is shown in below Fig.4.

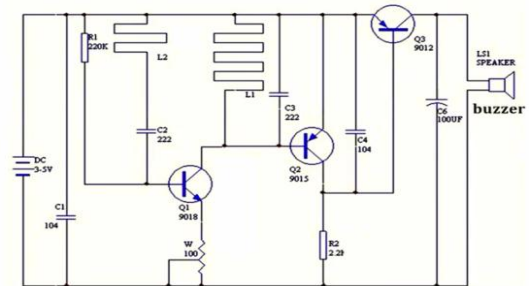


Fig.4 Circuit diagram for Metal Detector

The working principle of “electro magnetic induction “is shown in below Fig.5.

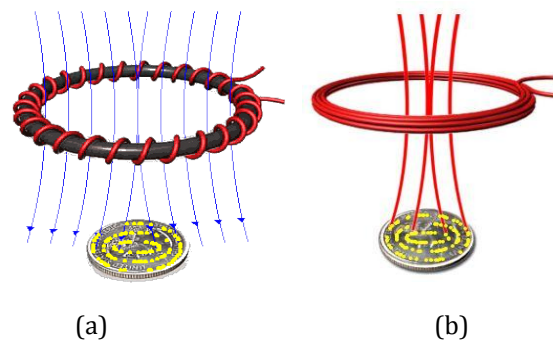


Fig.5 working principle of electromagnetic induction

In above Fig the blue(in Fig.5a) lines indicate the magnetic lines of force due to current carrying through coil. The red lines in Fig.5b indicates the established currents due to the magnetic lines of forces move towards the magnetic material. This current is called “eddy currents”, due this this currents the metal detector is excited and indicate by the buzzer or any other indicating setup. In my project we take output response from the metal detector circuit and it give to Arduino analog pin(because the output of circuit is

analog voltage). When the metal detector circuit detect the metal element the input is applied to the Arduino at analog pin that's why the Arduino send the message to our mobile. This whole process is work by program.

6. Circuit diagram for project:

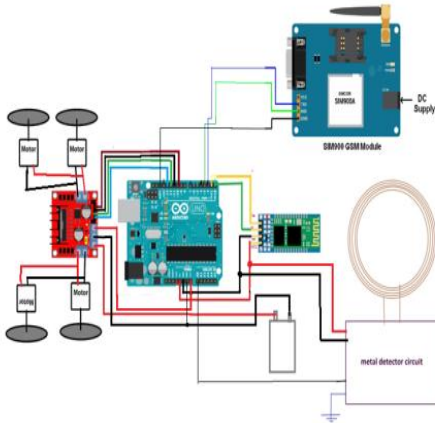


Fig.6. Circuit diagram for whole project

In above circuit the metal detector circuit is shown in above Fig.5

7. CONCLUSION

This project deals with metal detecting purpose in unmanned by using Arduino, GSM, Motor controller, Bluetooth module, android mobile. The designed project is basic stage for detecting metal elements and dynamites. This project is used for military and police departments. And also this is used for detecting the small pins in play grounds. This cost effective and easy control.

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