

Solar Operated Metal Detector Robot based on GSM

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Abstract

Proposed designed is solar based metal detector Robot .We can control robot from remote location using cell phone. It contains arduino board with metal detector circuit. Robot contains GSM which able to transmit and receive signal from cell phone. It contain ultrasonic sensor to avoid obstacle. When the robot senses metal it generates an alarm sound & send SMS on cell phone. It can also send it location using GSM. It is useful for different application like detection of land mine.

Keywords: Arduino, GPS, GSM, Solar Panel, Ultrasonic Sensor

I. INTRODUCTION

A moving autonomous robot can go where humans cannot. Robots were created to help humans, especially in high risk or dangerous situations. It able to deactivate or identify land mine ,transport dangerous things, explore the ocean floor and even perform tasks in any environment known to man. There are many different reasons for using a robot but the central reason for most applications is to eliminate a human operator. It can save labor and reduce cost. Basic design of solar based metal detector Robot shown in Fig. 1.

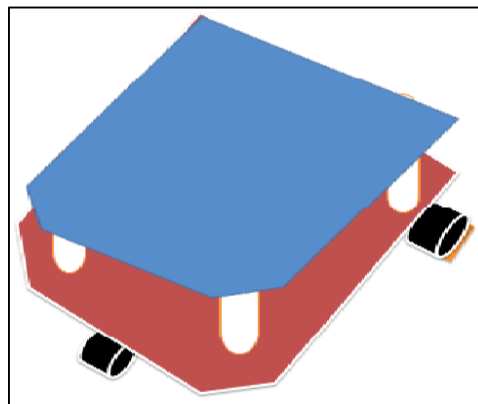


Fig. 1: Solar operated Systems

II. HARDWARE ARCHITECTURE

Proposed design of System is shown in Figure 2. System Contains Aurdino board, Ultrasonic Sensor, LED and GSM Modem. All Devices Controlled By Aurdino. Proposed design can is fully automated. Ultrasonic sensor check obstacle and it sends information to aurdino. Aurdino will initiate GSM for transmitting message. Whole system can generate power using solar panel.

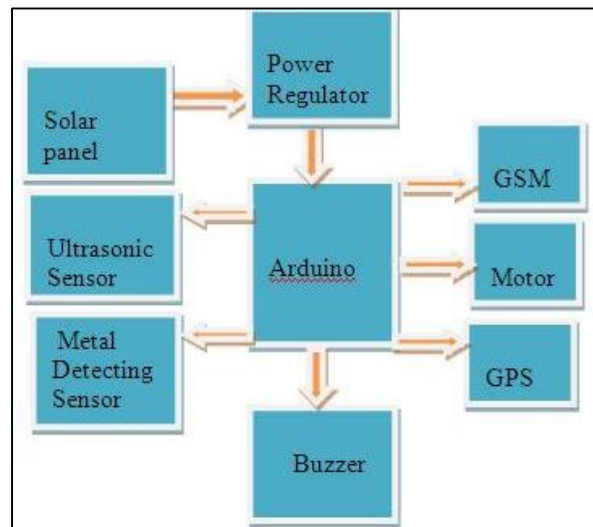


Fig. 2: System Architecture

A. Arduino

Arduino is an open-source prototyping platform. Anyone can use hardware and software easily. Arduino Uno is a microcontroller board based on the ATmega328. Arduino contain 14 digital input /output pins & 6 analog inputs. It also contains 16 MHz ceramic resonator, a USB connection and a reset button. Arduino boards are relatively inexpensive compared to other microcontroller platforms. It is having the entire thing which needed to support the microcontroller.



Fig. 3: Arduino Board

B. GSM

SIM300 is an ultra-compact and reliable wireless SMT (Surface Mount Technology) type quad band GSM/GPRS module designed with a powerful single chip processor integrating AMR926EJS core manufactured by SIMCom Wireless Solutions Ltd. It delivers GSM/GPRS 850/900/1800/1900 MHz performance for voice, SMS and data. It is a low power consumption module.



Fig. 4: SIM300

C. GPS Receiver

The hardware interfaces for GPS units are designed to meet NMEA requirements. The GPS receiver provides data in NMEA 0183 format with a 1Hz update rate. NMEA is National Marine Electronics Association, and NMEA0183 protocol is most commonly used. GPS sentences are the following specifications: \$GPGGA, \$GPGSA, \$GPGSV, \$GPRMC, and \$GPVTG. And sentences also begins with \$GPMSS, \$GPZDA.



Fig. 5: GPS Receiver

D. Solar Panel

The solar panel is used to trap the incident sunlight and charge the battery to be stored for future use. A solar panel module is a packaged assembly of solar cells. Each module is rated by its DC output power under test conditions, and typically ranges from 100 to 320 watts. The panel is adjusted at specific inclination to enable maximum power tracking. This provides increased efficiency and most of the sunlight that falls on the panel is stored. The panel that we are using of has a rated capacity of 12 volts and 5 Watts power.



Fig. 6: Solar Panel

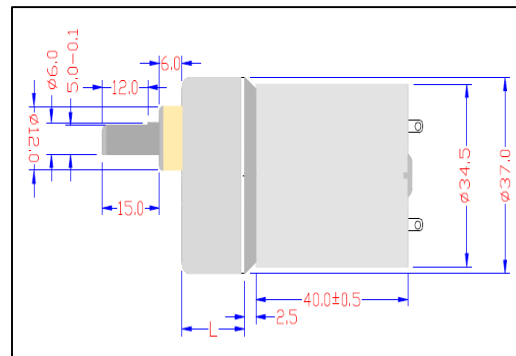


Fig. 7: DC Motor

E. DC Motors

DC motors are designed with the application of modern technology resulting in compact machines featuring excellent dynamic properties, meeting the most severe application in areas that include automation and process control.

F. Motor Driver

L293D is Motor Driver IC. It allows DC motor to drive on either direction. L293D contain 16-pin IC. It able to control a set of two DC motors. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. Voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction. Single L293D chip contain two H-Bridge .It is very useful for robotic application for controlling DC motors. L293D IC contain two Enable pins.

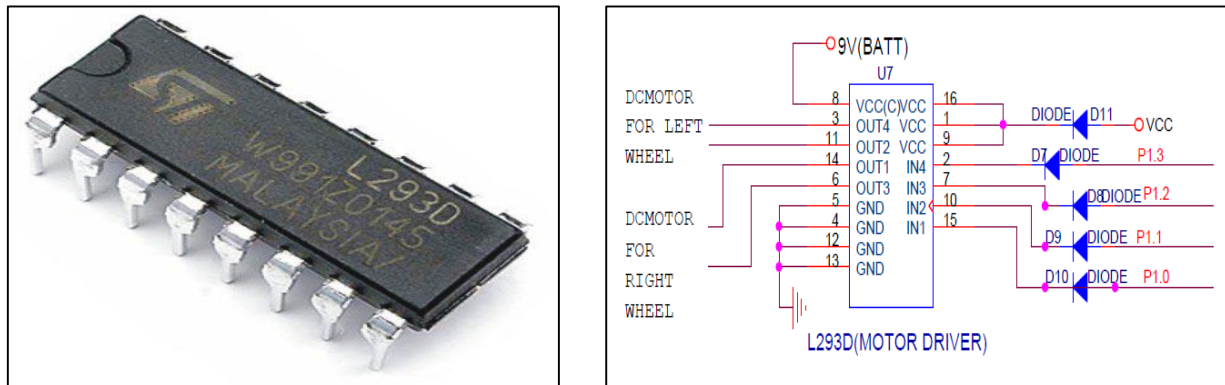


Fig. 8: Pin diagram and configuration of DC Motor Driver (L293D)

G. Ultrasonic Sensors

It known as transceivers it send the signal and also able to receive signal. It based on a principle similar to radar. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

III. RESULTS

Proposed design is completely automated solar based metal detector Robot. The proposed system design useful for detection of land mine. Whole system based on solar energy. It can able to provide effective system. Overall system use to provide automated detection and alerting system. It provides fast response time.

IV. CONCLUSION

The system is simple in design. It is reliable also. The primary applications of this design to detect metal & alert user by sending message .This project design will not require watching regularly when the metal detected it automatic generate SMS to responsible person.

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