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Metal and Gas Detecting Robot Using Android Application to Track Dangerous Prone Areas

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ABSTRACT: In many situations we hear about landmines which cause damage to the life of people when they step on that bomb, usually this is experienced in deserted areas or near forest. To avoid this we have designed a robot which is highly sensitive to such bomb and immediately gives an alert when even it is traced. This robot can be moved forward and reverse direction using geared motor by android application. Also this robot can take sharp turning towards forward and reverse direction. The proposed wireless home gas leakage system consists of three major modules, the gas leakage, level detection and transmission module (GSM/GPRS MODEM), and the receiver module (GSM mobile). The gas leakage detection and transmission module detects the change in concentration of LPG and natural gas and activates an audiovisual alarm when it exceeds a certain threshold. Further more, it sends another alarm message. This project is designed with microcontroller, encoder, decoder, RF transmitter and receiver bomb detector, driver circuit, analog with motors and robot model. Transmitting section consists of keyboard, encoder and RF transmitter. In microcontroller we have already programmed. So it received the signal from decoder and activates corresponding driver circuit. Driver circuit controls the motor. By which the robot movement is control. In any objectives related to metal is their, bomb detecting mechanism finds that one and gives the signal to micro controller. Now the micro controller activates the alarm driver circuits. So the alarm makes sound for indication.

KEYWORDS: Landmine, Mapping, Mine Detection, sensors, Global Positioning System (GPS), Global System for Mobile (GSM), Autonomous Robot

I. INTRODUCTION

HC serial Bluetooth products consist of Bluetooth serial interface module and Bluetooth adapter, such as (1) Bluetooth serial interface module: Industrial level: HC-03, HC-04(HC-04-M, HC-04-S Civil level:HC-05, HC-06(HC-06-M, HC-06-S) HC-05-D, HC-06-D (with baseboard, for test and evaluation) This document mainly introduces Bluetooth serial module. Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands. Master device:HC-04-M, M = master Slave device:HC-04-S, S=slaver The default situation of HC-04 is slave mode. If you need master mode, please state it clearly or place an order for HC-04-M directly. The naming rule of HC-06 is same. When HC-03 and HC-05 are out of factory, one part of parameters are set for activating the device. The work mode is not set, since user can set the mode of HC-03, HC-05 as they want. The main function of Bluetooth serial module is replacing the serial port line, such as. (1) There are two MCUs want to communicate with each other. One connects to Bluetooth master device while the other one connects to slave device. Their connection can be built once the pair is made. This Bluetooth connection is equivalently linked to a serial port line connection including RXD, TXD signals. And they can use the Bluetooth serial module to communicate with each other. When MCU has Bluetooth slave module, it can communicate with Bluetooth adapter of computers and smart phones. Then there is a virtual communicable serial port line between MCU and computer or smart phone. The Bluetooth devices in the market mostly are slave devices, such as Bluetooth printer, Bluetooth GPS. So, we can use master module to make pair and communicate with them. Bluetooth Serial module's operation doesn't

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need drive, and can communicate with the other Bluetooth device who has the serial. But communication between two Bluetooth modules requires at least two conditions. (2) **Selection of Module** The Bluetooth serial module named even number is compatible with each other; The salve module is also compatible with each other. In other word, the function of HC-04 and HC-06, HC-03 and HC-05 are mutually compatible with each other. (3) **Information of Package** The PIN definitions of HC-03, HC-04, HC-05 and HC-06 are kind of different, but the package size is the same: 28mm * 15mm * 2.35mm. The following figure 1 is a picture of HC-06 and its main PINs. Figure 2 is a picture of HC-05 and its main PINs. Figure 3 is a comparative picture with one coin.

II. LITERATURE REVIEW

In 2016 Battala Venkatarathnam, K. Ganesh, Naveen Kumar published a paper about RF based Metal Detecting Robot we propose a novel Metal and Gas Detecting Robot, in which The robot is controlled by a remote utilizing RF innovation. It comprises of a metal indicator circuit interfaced to the control unit that alerts the client behind it around a suspected area mine ahead. The robot is controlled by a remote utilizing RF innovation. It comprises of a metal indicator circuit interfaced to the control unit that alerts the client behind it around a suspected area mine ahead.

In 2016 Luay Fraiwan, Khaldon Lweary Aya Bani-Salma, Nour mani published a paper about A Wireless Safety Gas Leakage Detection System we propose a novel Metal and Gas Detecting Robot, in which The system design consists of two main modules: the detection and transmission module, and the receiving module. The detection and transmitting module detects the change of gas concentration using a special sensing circuit built for this purpose. This module checks if a change in concentration of gas(es) has exceeded a certain pre-determined threshold. If the sensor detects a change in gas concentration, it activates and alert the people

In 2015 Petros Spachos, Liang Song and Dimitros Hatzinakos published a paper about Gas Leakage Detection and Localization System through Wireless Sensor Networks we propose a novel Metal and Gas Detecting Robot, in which In this demonstration proposal we use a prototype of a Wireless Sensor Network (WSN) to monitor and locate gas leaks of a complex indoor environment. Specifically, a mobile node is moving inside a building to monitor any leakage of carbon dioxide (CO₂), supporting and displaying the level and the location of the leakage. Throughout the demonstration, the technological advantages of cognitive networking along with multihop routing are explored

In 2014 Kishan Malaviya, Mihir Vyas, Ashish Vara published a paper about Autonomous Landmines Detecting and Mapping Robot we propose a novel Metal and Gas Detecting Robot, in which The land mine crisis is globally alarming since there are presently 500 millions unexploded, buried mines in about 70 countries. Governments are looking into this situation seriously since land mines are claiming the limb and lives of civilians every day. The purpose of this project is to design a robot which is capable of detecting buried land mines and marking their locations, while enabling the operator to control the robot wirelessly from a distance. The project was started from the brainstorming phase together with the research phase and then proceeded into the conceptualization or designing phase. 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.

III. PROPOSED SYSTEM

➤ SYSTEM DESIGN

In our proposed system, it is a movable robot that consists of fire sensor for detecting the fire, metal sensor for the detection of bomb, accelerometer placed in the mobile application to control the gear motor and motor driver for the movement of the robot. If any gas leakage occurs, by using GPS we can detect the accurate location and send alert message by using GSM. In the extinguishing process, whenever the detection of gas is positive the robot will stop at the place of gas leakage occurred and identify the accurate location by GPS. This project uses Arduino as controller. A high sensitive induction type metal detector is designed using Colpitts oscillator principle and fixed to this robot. Robot can be controlled using wireless technology like Bluetooth technology. Android app

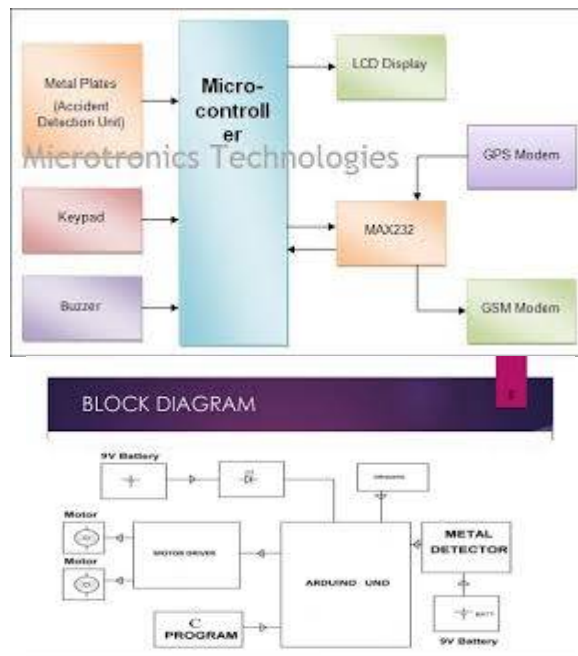
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which is in your hand (mobile phone) is used as remote to control the action of robot by using Bluetooth. The Bluetooth module is used here. Bluetooth is wireless technology standard for exchanging data over short distances (using short-wavelength radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, building personal area networks (PANs). When the robot is moving on a surface, the system produces a beep sound when metal is detected. This beep sound will be transmitted to remote place. This project uses 12V battery. This project is much useful for mines detection and surveillance applications.



A. ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



B. SIM900GSM MODULE

Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet through simple AT commands.

FEATURES :

- Dual band GSM/GPRS 900/1800MHz.
- Configurable baud rate.
- SIM card holder.
- Built in network status LED.

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- Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS.

C. GPS(GLOBAL POSITIONING SYSTEM)

The SKG13BL is a complete GPS engine module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.



D. GAS SENSOR

The MQ-2 Gas Sensor module detects gas leakage in home and industry. The MQ series of gas sensors use a small heater inside with an electrochemical sensor. They are sensitive to a range of gasses and are used indoors at room temperature. The output is an analog signal and can be read with an analog input of the Arduino.

E. SENSITIVITY ADJUSTMENT

Resistance value of MQ-5 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm H₂ or LPG concentration in air and use value of Load resistance (RL) about 20 K Ω (10K Ω to 47K Ω). When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

➤ TEMPERATURE SENSOR

Temperature is the most often-measured environmental quantity. This might be expected since most physical, electronic, chemical, mechanical, and biological systems are affected by temperature. Certain chemical reactions, biological processes, and even electronic circuits perform best within limited temperature ranges. Temperature is one of the most commonly measured variables and it is therefore not surprising that there are many ways of sensing it. Temperature sensing can be done either through direct contact with the heating source, or remotely, without direct contact with the source using radiated energy instead.



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IV. RESULTS



In Fig.1 Protocol of Metal Detecting Robot.



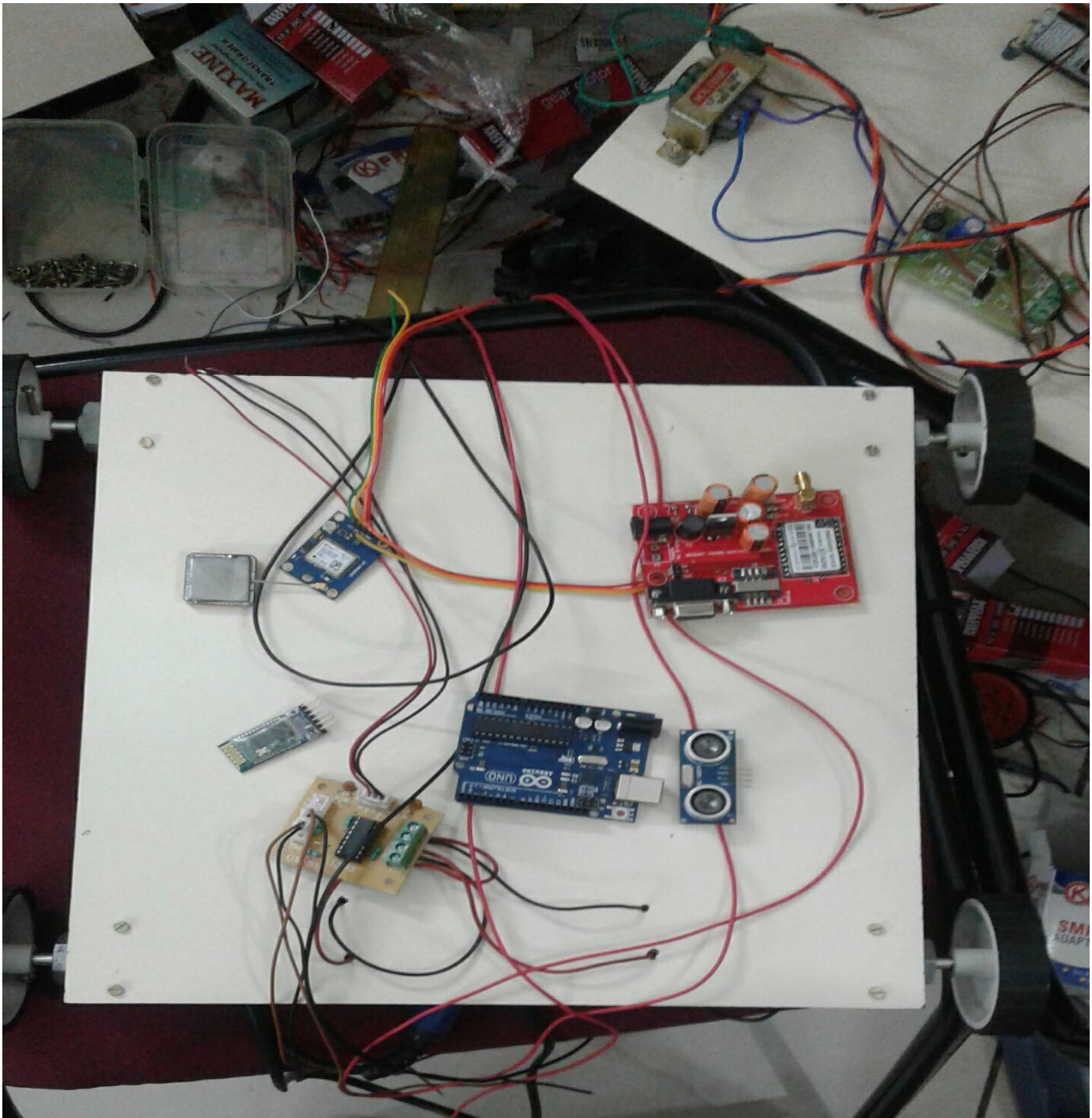
In Fig.2. In this project we use this hardware description to controlled Metal and Gas Detection Robot by using protocol.

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In Fig.3, Hardware snapshot of Metal and Gas Detecting Robot

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V. CONCLUSION

In this project we have studied and implemented a Metal detecting and gas leakage detection robot Designed for safety using wireless communication. The integration between the hardware and software was successful where the longitude, latitude and the speed of the robot were displayed on the developed mapping. After the position of the robot was displayed Results are being investigated at different combination of temperature and humidity by keeping any one of the variable constant either temperature or humidity and check the response of change in sensor resistance with respect to time. It has been found that these models are mimicking the real time responses in a quite good manner with variations in environment conditions. Further the sensors arrays designing has been considered using the performance specification of four sensors in respect to their variations in presence of organic gases ethanol, methane and their mixtures. For this purpose the change in conductance of sensors is being considered using the parameters related to pre exponential factor, power law exponent and activation energy of the sensors. In this sensor model the effect of circuit noise is also being considered for improving the generated signal waveform realization with adding uncertainty in data response.

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