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Android Based Metal Detecting Robot to Assist Bomb Detection and Rescue Team



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ABSTRACT:

In many situations we hear about landmines which causes 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 ever it is traced. This robot can be moved forward and reverse direction using geared motors of 60RPM. Also this robot can take sharp turnings towards left and right directions.

Existing System:

This robot is controlled by a RF remote. This can be moved forward and reverse direction using DC motors. Also this robot can take sharp turnings towards left and right directions. This project uses AT89S52 as its controller. A high sensitive induction type metal detector is designed using colpitts oscillator principle and fixed to this robot. When the robot is moving on a surface, the system produces a beep sound when metal is detected. The RF modules used here are Transmitter, Receiver, RF Encoder and RF.Decoder. The four switches are interfaced to the RF transmitter through RF Encoder. The encoder continuously reads the status of the switches, passes the data to the RF transmitter and it transmits the data. At the receiver end RF decoder takes the data bit wise and moves the robot accordingly.



Drawback:

Transmitter part is an extra hardware module which increases the cost.

Proposed System:

This project uses LPC2148 MCU as its controller. A high sensitive induction type metal detector is designed using colpitts oscillator principle and fixed to this robot.



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Robot can be controlled using wireless technology like Bluetooth technology. Android app 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.



Hardware Modules: LPC2148 controller:

The LPC2148 are based on a 16/32 bit ARM7TDMI-STM CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



Figure: Architecture

ARM PROCESSOR:



DC Motor:

A DC motor is an electric motor that runs on direct current (DC) electricity.

DC Motor Connections:

Figure shows schematically the different methods of connecting the field and armature circuits in a DC Motor. The circular symbol represents the armature circuit, and the squares at the side of the circle represent the brush commutator system.



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The direction of the arrows indicates the direction of the magnetic fields.



BLUETOOTH:



a wireless technology Bluetooth is standard for exchanging data over short distances (using shortwavelength radio transmissions in the ISM band from 2400-2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security. Created by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization. Bluetooth dongle is simply defined as an accessory to the computer.

By using a Bluetooth dongle a computer can be wirelessly linked to other devices. By using these dongles one can easily connect a computer with any other computer, printer, digital cameras or cellular devices. Actually Bluetooth dongle possesses a small microchip, which makes it capable of connecting and exchanging the data with all other devices which contain such microchips and with all other dongle devices. USB ports are used to connect a Bluetooth dongle with the computer. Just like other USB attachments these dongles also get powered from computers itself. Once we disconnect a Bluetooth dongle it gets deactivated on its own.

Software Tools:

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

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Flash Magic:

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like **ARM Cortex M0, M3, M4, ARM7 and 8051.**



Advantages:

Not blocked by common materials: can penetrate most solids and pass through walls



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- Not light sensitive
- Not as sensitive to weather/environmental conditions

Applications:

- In military Applications
- Forest Applications
- > Agriculture
- ➢ Mining

Future Scope:

This application can be implemented DTMF technology. This is to operate the robot from remote place.

Conclusion:

In this project we have studied and implemented a Metal detecting Robot Designed for safety using wireless communication.

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Smt. B.K Madhavi, She has completed Ph.D in ECE (2007) in Jawaharlal Nehru Technological University, Hyderabad on Low Power High Performance VLSI System design. She has completed M.E.(Microelectronics) in 1993 in Birla Institute of CEERI. technology, Pilani, Raj(With Pilani Collaboration M.Sc (Tech)(Engineering Physics with Electronics & Instrumentation)(1987)S.V.U. College of Engg, Sri Venkateswara University, Tirupati, A.P

Designation and work experience:

Smt. B.K MADHAVI, presently working as Professor in SWEC Hyderabad (Telangana). Also worked as Assistant Professor & Associate Professor in ECE



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department at G. Pulla Reddy Engg. College, Kurnool,(A.P) From September 1993 to August 2006 and as Teaching Assistant in BITS, Pilani (RAJ)(India). From November 1990 to August1993.

Achievements:

She has published 18 papers in national journals and 62 papers International journals.She has attended many national and international conferences. She was awarded"JEWEL OF INDIA AWARD " and a " CERTIFICATE OF EXCELLENCE " for outstanding achievement and remarkable role in the field of education in 2011 from Indian Solidarity Council,New Delhi. And she has received "IIEM ACHIEVERS WHO IS WHO", & "CERTIFICATE OF EXCELLENCE " for outstanding achievement and remarkable role in the field of markable role in the field of education in 2011 from International Institute of education & Management, New Delhi.

Interested Research Areas: Low Power VLSI, Nano Electronics (CNTFET, FinFET based electronics), Signal Processing VLSI, Mixed Signal Processing, Medical electronics etc.

Sadhu Satya Shravani is working as asst professor in SWEC and completed her M.Tech in SWEC.

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