

## RF CONTROLLED METAL DETECTOR USING ROBOTICS

Shubham Chavan, Harshal Pilane, Vignesh Paulraj, Sanket Shinde, Prof. Arun Ukarande

Department of Instrumentation Engineering  
Bharati Vidyapeeth College of Engineering, Navi Mumbai

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**Abstract** - RF Controlled Robotic Vehicle with Metal Detection Project. Our project proposes a Metal detection robotic vehicle operated using RF remote control wirelessly. The project demonstrates real life robotic vehicles used to detect land mines or other metal base objects on its path. The vehicle is fitted with a metal detection system that senses metals and then alarms the user about it through a buzzing sound of land mine possibility. The system works in conjunction with an 8051 series microcontroller to achieve this operation. The push buttons are used to send commands to move the vehicle forward, backward, left and right. Two motors at receiving end operate the vehicle as per the commands received. As soon as a command is sent it gets transmitted through rf transmitter. At receiving end an RF receiver reads the command and passes it to an 8051 microcontroller for processing. The microcontroller then operates the motors to move the vehicle through a motor driver IC. The metal detection system attached to the system detects any metal underneath it. On detection it automatically sends on a small buzzing alarm to notify user about it. Thus, the metal detection system coupled with a robotic vehicle allows for operating the robotic vehicle on a long radius remotely through RF technology.

### 1. INTRODUCTION

Industrial control system (ICS) is a general term that encompasses several types of control systems and associated instrumentation used for industrial process control. Such systems can range from a few modular panel-mounted controllers to large interconnected and interactive distributed control systems with many thousands of field connections. All systems receive data received from remote sensors measuring process variables (PVs), compare these with desired set points (SPs) and derive command functions which are used to control a process through the final control elements (FCEs), such as control valves.

The larger systems are usually implemented by Supervisory Control and Data Acquisition (SCADA)

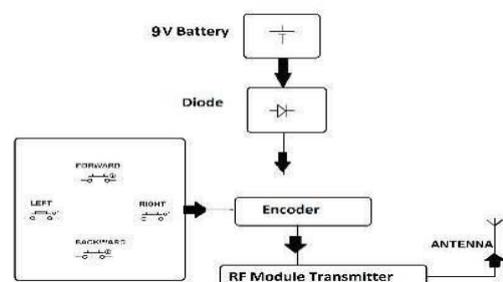
systems, or distributed control systems (DCS), and programmable logic controllers (PLCs), though SCADA and PLC systems are scalable down to small systems.

Our project proposes a Metal detection robotic vehicle operated using RF remote control wirelessly. The project demonstrates real life robotic vehicles used to detect land mines or other metal base objects on its path. The vehicle is fitted with a metal detection system that senses metals and then alarms the user about it through a buzzing sound of land mine possibility. The system works in conjunction with an 8051 series microcontroller to achieve this operation. The push buttons are used to send commands to move the vehicle forward, backward, left and right. Two motors at receiving end operate the vehicle as per the commands received. As soon as a command is sent it gets transmitted through rf transmitter. At receiving end an RF receiver reads the command and passes it to an 8051 microcontroller for processing. The microcontroller then operates the motors to move the vehicle through a motor driver IC.

### 2. BLOCK DIAGRAMS

About the Transmitter:1. The STT-433 is ideal RF transmitter for remote control applications where low cost and longer range is

#### Transmitter

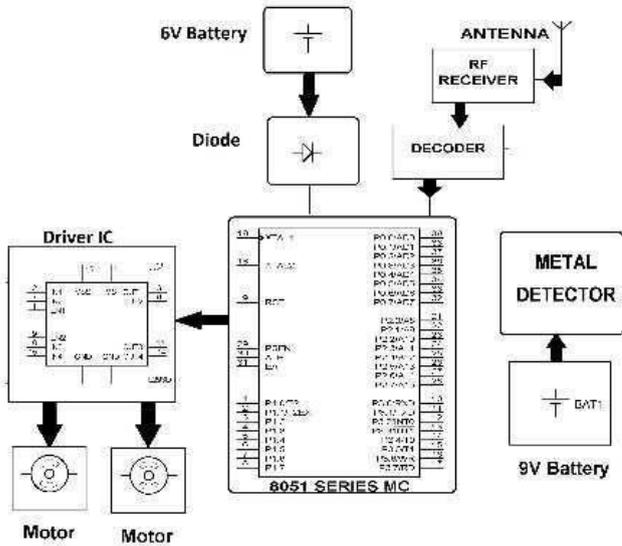


requisite.2. The transmitter operating supply voltage ranges from 1.5-12V, making it ideal for battery-powered applications. 3. The transmitter employs a SAW-stabilized oscillator, which ensures accurate frequency control for best range performance. The STT-

433 is suitable for high volume applications because of its manufacturing-friendly SIP style package and low-cost.

XC16x/C16x/ST10, 251, and 8051 MCU families. Keil  $\mu$ Vision<sup>®</sup> IDE and Compiler

**Receiver**



The data available on the data pins are received by the radio frequency receiver from the antenna pin. There are two data pins are provided in the receiver module. Thus, this data can be used for useful applications.

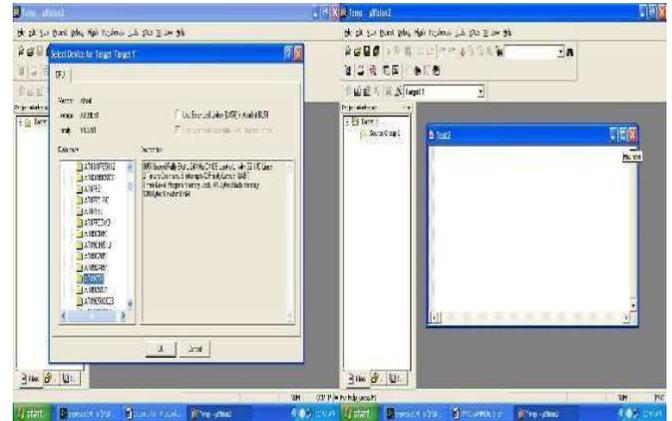
**3. WORKING**

The project uses HT12E Encoder which converts 4 bit data to serial output which is then fed to the RF module for transmitting the same to be received by the receiver RF module the output of which is fed to HT12D the serial decoder IC, the output of which is fed to controller pin 1-4. The data so received at the receiver end of port 1 operates the motor through motor driver IC L293D as required being interfaced from the Microcontroller output port 2.

The transmitter is powered by a 6v battery in series with a silicon diode to finally develop required voltage for microcontroller circuit. The receiver is powered by a 12v battery in series with a silicon diode to protect the circuits from accidental reverse battery connection. 5V DC out of the 12V available from regulator IC 7805 is fed to the controller, decoder, the motor driver IC L293D pin 8 for operation of the motor.

**SOFTWARE REQUIREMENTS**

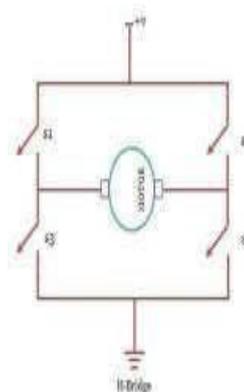
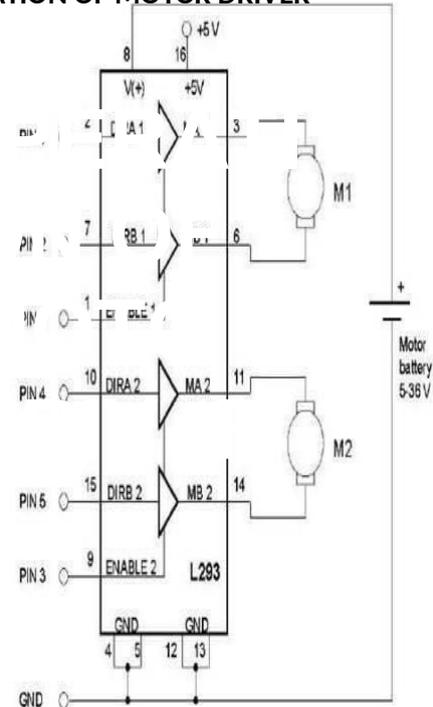
Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3,



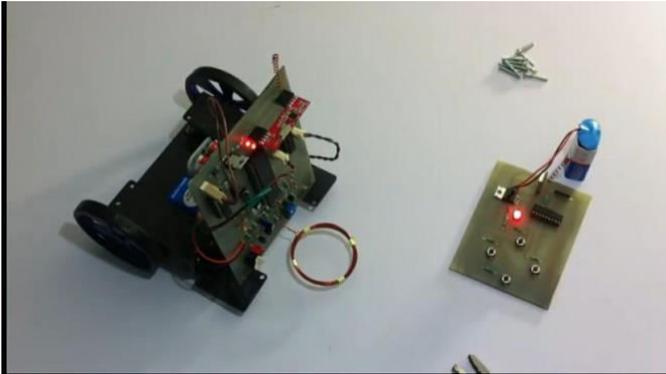
**MOTOR DRIVER L293D**

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

**OPERATION OF MOTOR DRIVER**



## 4. RESULT



The project demonstrates real life robotic vehicles used to detect land mines or other metal based objects on its path. The vehicle is fitted with a metal detection system that senses metals and then alarms the user about it through a buzzing sound of land mine possibility. This results showed that the system worked at a constant speed without any problem and was tested severally. This research work can be verified to be highly beneficial for security and industrial purposes. Abstract In this work, is an indoor metal detector robot using Radio Frequency (Rf) technology was designed.

## 5. CONCLUSION

The Metal Detector Robotic Vehicle is used to find the land mine when the robot moves on the earth.

The main purpose of this system is to detect and remove the land mine in a short span of time and sense the metal ahead of it.

This project can be improved by mounting a wireless camera on the robot and the operator can control the movement of the robot easily by visualizing it on a screen.

## 6. ACKNOWLEDGEMENT

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## 7. REFERENCES

- Raj Kamal, "Embedded Systems", Pearson Education Publications.
- Mazzidi, "8051 Microcontroller and Embedded Systems", Prentice Hall Publications, 2nd Edition, 2005.
- Edwin S. Grosvenor and Morgan Wesson, "Alexander Graham Bell: The Life and Times of the Man Who Invented the Telephone", New York, Abrams, 1997.
- ATMEL 89S52 Data Sheets.
- Kuo-Lan S, Hsu-Shan S, Sheng-Wen S. Jr-Hung G. Motion planning for a landmine-detection robot. 15th International Symposium on Artificial Life and Robotics, Volume. 16, Issue 3, p. 277-280. 2010 February 4-6; Oita (Japan).
- Garcia E, Gonzalez de Santos P. Design and Control of a Manipulator for Landmine Detection. Proceedings of the 7th International Conference on Climbing and Walking Robots. 2004 September 22-24; Madrid (Spain).
- Zubair M, Ahmad Choudhry M. Land Mine Detecting Robot Capable of Path Planning. WSEAS Transactions on Systems and Control. ISSN: 1991-8763, Issue 4, Volume 6, 2011 April.

- Maurtua I, Susoerregi L, Fernandez A, Tubio C, Perez C, Rodriguez J, Flesch T, Ghrissi M. MAIBBOT-mobile robots for inspection and maintenance in extensive industrial plants. SolarPACES 2013, Energy Procedia 49 (2014), p. 1810-1819.