RF Controlled Robotic Vehicle With Metal Detection

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Abstract- *The project was developed to develop a robotic vehicle that could detect metal in front of it on its way almost like land mines. The robot is controlled by an external technology that uses RF technology consisting of a circuit detector installed in the control unit that scares the user behind it after a suspicious suspension mine in front. The microcontroller series 8051 is recognized for its popular function. The control part and the movement of the robot forward, backward, and right or left commands are sent to the receiver using transmitter buttons. Both vehicles are connected to a microcontroller when used for vehicle movement. The transmitter acts as an advantageous RF remote control of up to 200 meters with the right antenna, while the receiver decides before transferring it to another microcontroller to deliver DC motors to the IC driver for the required function. The metal detection circuit is embedded in the body of the robots and its operation is automatically controlled when any underground equipment is detected. The moment the robot hears the bell it produces an alarm sound with a buzzer. This usually knows the potential metal operator (eg land mine) ahead of its path. Continuously the project is often upgraded by installing a wireless camera on the robot so that the operator can control the robot's movement remotely by looking at the screen.*

Keywords- Buzzer, Microcontroller, Metal Detector circuit, RF Technology.

I. INTRODUCTION

The project is a robot that can detect metals before they are on their way almost identical to finding land mines. The main objectives of the project are to use the radio band remote control radio signal using RF Technology. It consists of a control unit next to a detector that produces an alarm sound to alert the user behind it with a small no doubt a hole set in the front. The 8051 microcontroller series is recognized for your favourite activity. Since this uses radiofrequency signals to move the robot, the transmission circuit transmits signals through the air and the receiver communicates with the transmitter via these aerial signals. This robot fully utilizes the transmitter and receiver at 433MHz i.e.at radiofrequency which is available at low cost so it is very good to lead. RF technology-based controls are much more effective compared to Infrared-based controls that limit working distance to just a few meters. Instructions to control the movement of the robot to move forward, backward, and left or right. Instructions are sent to the recipient's cycle using the pressure buttons of the transfer region. The Robot car, where two engines are detected is connected to a microcontroller. The transmitter acts as a remote control so that as far as the required distance is (up to 200 meters) with the appropriate antenna connection, between the receiver and output the codes before giving you another microcontroller to drive DC motors with the IC driver a task that requires assistance. The detector circuit is attached to the body of the robots and its operation is automatically controlled when any metal underneath is detected. At the moment when the robot hears this bell, it produces an alarm sound with a buzzer. This usually notifies the operator of a potential metal object (eg land mines or metal presence) in its path. Continuously the project is usually enlarged by installing a wireless camera on the robot so that images around the robot are transmitted to a remote location and the user can monitor images and alarm detection alarms on Television.

II. LITERATURE SURVEY

The author analyzed different types of designing in robotic metal detection and sensors [1]. Designing a vehicle with a particular type of microcontroller sensors system in detecting landmines underneath [2] The primary purpose of using the robot is to ensure human safety and to reduce human efforts [3]Programing modeling concepts on in single And Multiprocessor system software development [4]. The authors point out the direction of the metal-finding robot in all eight directions. An IR sensor assembly is used to set the robot to travel at a specified angle [5]. Considering human life this robot is allowed in the wild to detonate explosives and a mine-powered robot is where parts are attached is IR sensors, metal detector, and the GPS attached with the vehicle. [6]. Humanitarian de-mining: historical steps and Humanitarian de-mining: the problem has been analyzed through the case[7]. Design and use a robotic platform for the detection of land mines in various sectors; starting from the obstacle avoidance system the importance is evaluated by function [8]. The robot design to reach the destination without any human intervention is developed [9]. The RF radio frequency technology was applied to the metal detectors which are used

in landmines and military safety bases such as explosives in underground rf technology was developed as a safety basis[10].

III.WORKINGPRINCIPLE

This robot car works with RF technology such as radio transmitters and receivers. The instructions required for operating the robot are transmitted by the transmission circuit so the receiver circuit receives these instructions through the radio station located between them and transmits the robot to provide the received commands. A metal circuit is mounted on the side of the receiver and connected to the controller. And the robot movement will be stopped and the buzzer starts ringing whenever any metal is found on or around a certain distance.The performance of the metal circuit is such that, when the electromagnetic field is transferred from the search coil into the ground, the metals in the electromagnetic field will be strengthened and re-transmit their electrical signal. The detector contains a query coil that receives a redirect field and notifies the user about generating a metal response. Metal detectors are operated by discriminating between different types of stones and can be adjusted to ignore unwanted metal objects
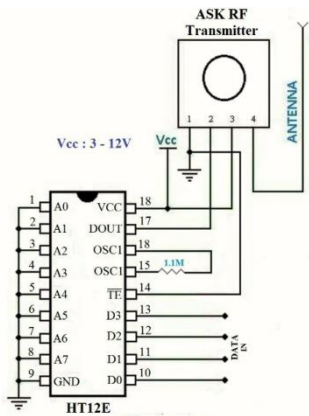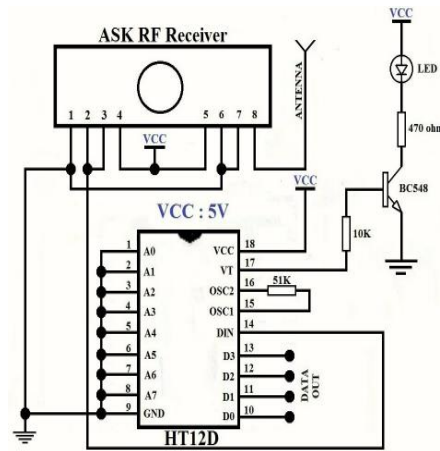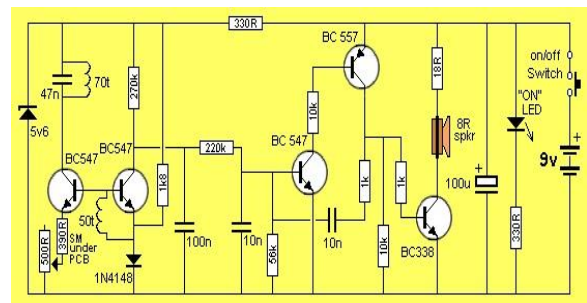

Fig. 1.2: Block diagram Receiver

Fig. 1.3: Circuit diagram of Metal Detector

IV. HARDWARE DESCRIPTION

I, ATMEL 89C51:

The AT89C51 is a low-power microcontroller, a high-performance CMOS 8-bit microcomputer with 4K Flash that can be edited and easily readable memory (PEROM). This device is mass-produced using Atmel's most flexible memory technology and complies with the standard MCS-51 standard set and identified. System memory is allowed to be redesigned to the system or a standard non-removable memory system with on-chip flash. By connecting an 8-bit CPU with Flash that operates on a single monolithic chip, the Atmel AT89C51 is a powerful microcomputer that offers a highly flexible and cost-effective solution that works on many installed control systems
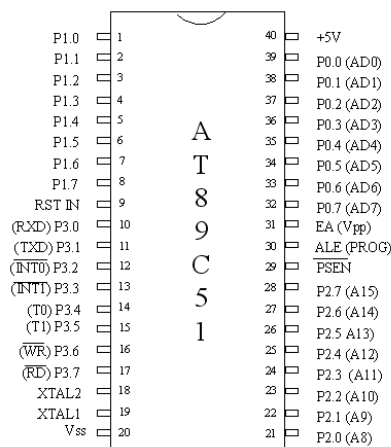

Fig. 1.1: Block diagram Transmitter

Fig. 4.1: Pin diagram of AT89C51

Pin Description of AT89C51

- **VCC**: This pin 40 provides a supply voltage of +5 V to the chip.

- **GND**:-This Pin 20 is the ground pin. XTAL1 and XTAL2 are input and output respectively, for an inverting amplifier this can be configured asan on-chip oscillator and for quartz crystal or ceramic resonator used. The XTAL2 ought to be left unconnected whereas XTAL1 is driven to drive the device from the associate external clock supply. Since the input to the interior duration electronic equipment is through a divide-by-two flip-flop, therefore, there aren't any needs on the duty cycle of the external clock signal, however minimum and most voltage, high and low time specifications should be ascertained.

- **RESET**: Pin 9 is for reset pin for microcontroller 89C51. This is an active-high and also input pin. The microcontroller can reset and terminate all the activities by giving a high pulse to the particular pin. This can be often fixed as a power-on reset

II, **RF RECEIVER STR-433 MHz:**

　　　　The information provided to the location unit of the data anchor received by the frequency receiver from the antenna pin. There is a 2 unit location information an area provided within the reception module. Therefore, this information is often used for useful applications. DC motors may use steam power from existing light-emitting systems to become the most widely used type of robotic vehicle. By abuse, it can be the power of the flexible supply or the flexible current power in its field fields the speed of the DC motor is usually controlled over a large range. A small area unit of DC motors powered by tools, toys, and many other unique items.
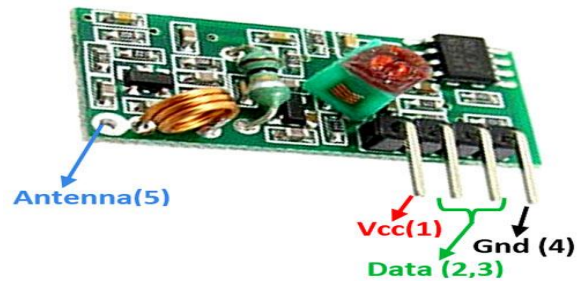

Fig .4.1: Receiver

III, TRANSMITTER 433MHz

About the Transmitter:

1. The STT-433 transmitters are best suited for RF remote control applications at low cost and long-range has a specific purpose.

2. The transmitting power of transmitters ranges from 1.5-12V, which makes for a specific purpose for battery-powered applications.

3. The transmitter performs a function on the SAW-certified oscillator, which ensures precise frequency control for optimal performance. STT-433 is ready for main volume use due to its low SIP vogue package and low cost.

Fig .4.2: Transmitter

IV, METAL DETECTOR CIRCUIT

　　　　The sensor feature consists of an integrated generator that generates a corresponding power supply through the power coil of the power generating coil and is the best type of sensor feature. When a small electric current reaches the level of the coil, the eddy currents are raised inside the metal, which is consistent with the fact that this has its flexible field. Conversion within the energy field due to an argentiferous substance will be obtained by vibrating the other coil to survive the energy field (acting as a magnetometer).
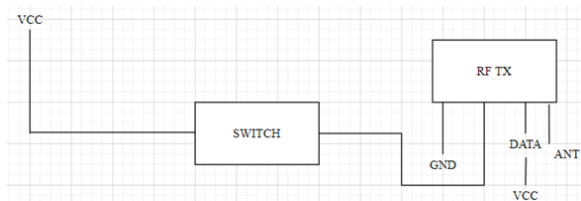
Fig.4.3: Metal detector circuit diagram

V, DC MOTOR

It is a field of electrical equipment that converts direct energy into electrical energy. Common types of DC motors believe in the force exerted by the magnetic field. Periodic change of current flow direction by part of the car and all types of DC motors have a certain internal mechanism which can be electromechanical or electronics. The most similar types of DC cars produce rotational movement as a direct vehicle produces power and movement in a straight line. As DC motors can be heavily charged from existing current systems for conveying the power of light to become the most widely used type of robotic vehicle. By exploitation it can be the flexibility of the power supply or the flexibility of the current power in its field-driven with DC motor motors are usually controlled over a large range. A small area unit for DC motors is used for tools, toys, and much other equipment.
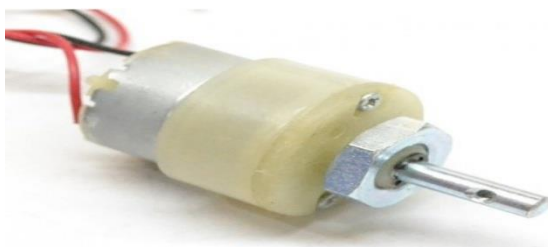

Fig. 4.4: DC motor

VI, PRESSINGBUTTONS

Pressing a button or just a button can be an easy way to change a particular machine feature or method. Button-shaped units are usually made of heavy materials, usually plastic or metal. The face is mostly flat or shaped to carry a human finger or hand, so it is simply pressed or pressed. Unit area buttons are usually of two types. the most common location change is the most common, although 'many neutral buttons (because of their nature) require a spring to return to their non-compressed state. Completely {different | completely different} location terms unit used by different people in the "push" button, such as press, press, mash, beat and tap. This unit of pressure buttons is authorized by electrical code in certain areas of increased security and area of the unit known as emergency position buttons.
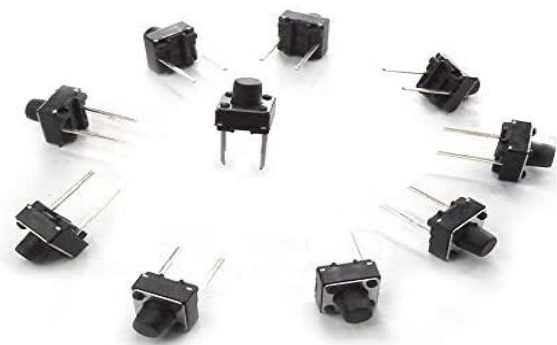

Fig. 4.5: Pressing buttons

This robot car uses the HT12E Encoder that converts 4 data into serial output value when it is integrated into a radio frequency transmission module by transmitting transmissions similar to those received by the radio receiver output provided by the HT12D serial decoder IC, which is supplied by the microcontroller pin 1-4 The end of the controller is attached to a set of pushbutton switches. When a popular button is inserted into the system the deadline transmits the 4-bit sequence information of that location and is transmitted sequentially.Details obtained at the end of the port one management car receiver by the driver of the car IC L293D need to be interrupted from Microcontroller output port 2. The transmitter is supplied with a 6v battery serial with a semiconducting material diode to ultimately improve the required power of the microcontroller circuit. Receiving power is powered by a 12v battery series with a silicon diode to protect circuits from unintentional battery connection. The 5V DC from 12V available on the IC 7805 controller is supplied with a controller, decoder, hence the car driver IC L293D pin 8 for vehicle use. Using a sensor circuit using a turbulent circuit containing a coil Two C2 capacitor and C3 determine the selected frequency of reactivation of the oscillator by Q4. Sensitivity is common to 5k power. The output of this resonant is consumed in Q2 which is a quarter in the suspension of the appropriate filter stopper to pass Q3 which forces Q4 to be out of shape and therefore a well-associated buzzer gives the collector of this fall does not get that sound. When any metal object comes in contact with the coil the resonance frequency moves away from the drive voltage to Q3 which changes sequentially to the fall of the buzzer to absorb power and sound as a result of L, a growing diode to indicate the presence of a similar object.

V. SOFTWARE AND HARDWARE REQUIREMENTS

5.1 Software requirements:

- Kiel is an ARM company that makes C compilers, real-time kernels, simulators, debuggers, integrated locations, macro assembler test boards, and ARM7 / ARM9 / Cortex

emulators- M3, XC16x / C16x / ST10, 251, and 8051 MCU families.

- Incorporates programs that have been used to convert high-level language into a code opposition. Instructions are generated from the desktop integration and the output code for the basic microprocessor, and not for other types of microprocessors.

5.2 Hardware Requirements:

1) AT89c51 Microcontroller
2) RF Encoder and Decoder
3) Push Buttons
4) Buzzer
5) Metal Detector
6) RF Transmitter Receiver
7) Dc Motor
8) Battery
9) Dot Board
10) Vehicle Chassis
11) Motor Drive
12) Switch
13) L293d Module
14) Rs 232 Cable
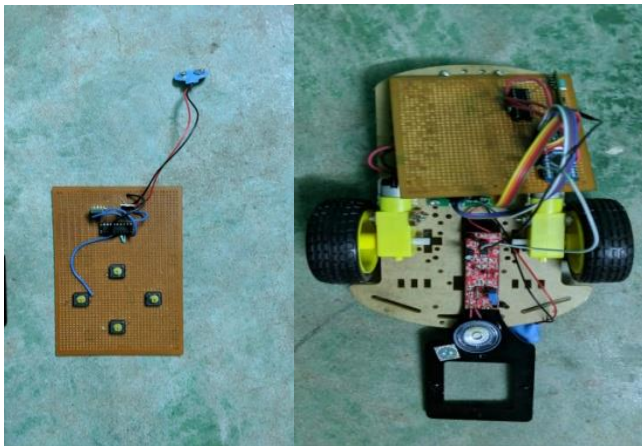15) Led

VI. HARDWARE SETUP

Fig. 10: Snapshot of the hardware

OUTPUT OBTAINED:

According to this project RF controlled robotic vehicle which detects mainly the explosives, minerals, and metal underneath on its path by using input commands from the transmitter and receiver. Initially, the code is burned into the mAT89c51 by use off lagship and power on the supply to the circuit. By sending an instruction "1" to the receiver by a transmitter. On the Receiver side, the robot moves according to the commands received from the transmitter. The signals are transferred by RF (radio frequency) method. The commands give the robot to move in a particular direction such as

- Front direction
- Back direction
- Left direction
- Right direction

On the Transmitter side, the HT12E pin is used as an RF encoder where the input is used and sent in the same way to the sender. The receiver, side contains the AT89c51 Microcontroller such as RF decoder, metal detector, buzzer, L293d IC, and robot.L293d is an IC-driven motor. bridge inside. When a robot finds a metal object in its path while moving, it stops and blows a buzzer so that a person can point to the metal as quickly as it can.

VII. CONCLUSION& FUTURE SCOPE

The project represents a metal receiving robot that uses RF technology and wireless audio transmission and is designed and operated with the Atmel 89C51 MCU in the embedded system. The robot is fully tracked using switches so the Beeping sound is performed The test task is handled with care. The results are very efficient and the highest results are obtained using an embedded system. The proposed approach is shown to be more favorable for security and industrial purposes. The sensory element of the mine attempts at a steady pace without interruption however its expansion, to meet the specificity required for the object to detect mining recognition. It contributes to the enjoyment of the discovery level and improves performance as guaranteed by completing all acquisition work as usual. Experiments have confirmed that the golem will not make any reduction in performance by setting the object for the discovery of the mine.This project introduces the metal discovery using the Arduino Nano. Testing is indicated so the robot has no problem with any operating problem to install a mining detection sensor.

- This project can be developed using live streaming in the future.
- This project can also be used wirelessly using Wi-Fi modules on a robot

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