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Remote Controlled Metal Detecting Robot with Image Transmission

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ABSTRACT:
Path finder was send to Mars in 1998.The metal detector concerns with the radio frequency. This robot is just like a prototype for the Path finder. The project is controlled by the remote and robot moved in forward, backwards, left, right direction by geared motors. A camera is on the receiver side to see the images surrounding the objects. When the receiver is moving on the land the circuit produces the beep sound when metal is detected. The sound produced will be transmitted to the transmitter part. User can monitor the alarms on television and view the images.

KEYWORDS: Transmitter, STT433 Mhz, receiver, STR433Mhz

INTRODUCTION:

The object of the transmitter ckt is to control the position and moving of robot to detect metals and see the images around the robot. The aim of the project is to use the radio frequency bands. The moving of robot is regulated by radio signals through air. The receiver receives the signal and movement of robot is regulated. It consists of transmitter and receiver part. Transmitter part consists of encoder switches, RF transmitter STT-433Mhz.Receiver consists of decoder, RF receiver STT-433Mhz, microcontroller, geared motors, H bridge, metal detecting circuits. The receiver receives the signal through the air. The radio frequency based control shows to be better than the infrared based control that's limits the operating range to only a few meter of distance. When receiver STR 433MHZ is moving on a land the receiver produce a sound when metal is detected the sound will be transmitted to STT 433MHZ (transitter part).User can see the image and alarms on television.

PREREQUISITE KNOWLEDGE:

Wireless communication means information interchanged between two systems without the use of wires and cables. A wireless cables sends information from system that does not use of keyboard cable, a cellular telephone transmits call from one phone to another without the use of any cables or wires. Without the use of wireless cables documents transferred from one mobile to another without the use of cables or wires. In all the process message is transferred from one device to another using electromagnetic energy also called EM waves. Another example of wireless communication takes place in such a way that one can change the tv channels through remote. All the process takes place wirelessly. Another common source of EM is the sun, another common source include Television and radio signals, LED and microwaves.

RADIO FREQUENCY-ITS NECESSITY:

Radio frequency is any of the EM frequency that lie in the range extending 3KHZ to 300GHZ, which include those frequency used for communication or radar signals. Though Radio frequency is a rate of oscillations, the term radio frequency used in wireless communications as opposed to transmission through electric wires The energy in an RF current can radiate off a conductor into space as electromagnetic waves, this is a basis

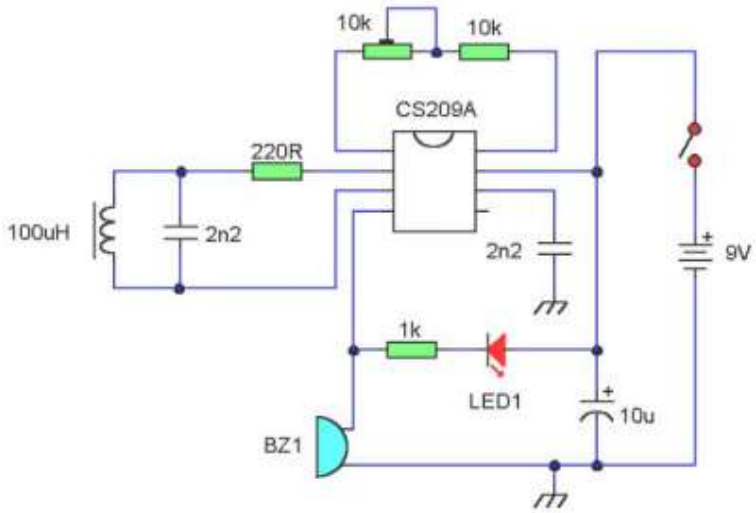
of radio waves. Rf current does not penetrate deeply into electrical conductors but tends to flow along their surfaces, this is known as the skin effect. Rf current applied to the body often do not cause the painful sensation of electric shocks as do lower frequency currents.

REQUIREMENTS:

Power supply, RF Transmitter (STT 433 MHz), 4 switches, encoder(HT 640L), bridge rectifier, RF receiver(STR 433 MHz), decoder(HT 648L), 89C51MCU, 2 H bride circuits, 2 geared motors, metal detector, wireless camera, zigbee protocol

METAL DETECTING CIRCUITRY:

Different metal detectors work in various different ways, but here's the science behind one of the simpler kinds. A metal detector contains a coil of wire (wrapped around the circular head at the end of the handle) known as the transmitter coil. When electricity flows through the coil, a magnetic field is created all around it. As you sweep the detector over the ground, you make the magnetic field move around too. If you move the detector over a metal object, the moving magnetic field affects the atoms inside the metal. In fact, it changes the way the electrons (tiny particles "orbiting" around those atoms) move. Now if we have a changing magnetic field in the metal, the ghost of James Clerk Maxwell tells us we must also have an electric current moving in there too. In other words, the metal detector creates (or "induces") some electrical activity in the metal. But then Maxwell tells us something else interesting too: if we have electricity moving in a piece of metal, it must create some magnetism as well. So, when you move a metal detector over a piece of metal, the magnetic field coming from the detector causes another magnetic field to appear around the metal.It's this second magnetic field, around the metal, that the detector picks up. The metal detector has a second coil of wire



WORKING:

The project consists of two parts. one is transmitter part another one is receiver part.

RF Transmitter (Remote)

Transmitter consists of following components-

- Four switches
- RF encoder
- RF transmitter

There are four switches in the transmitter part which control the movement of robot which is in the receiver part. Four switches control the movement of robot in forward, backward, left, and right. The four switches are interfaced to the Radio frequency encoder in transmitter part. RF encoder converts parallel bits to serial bits. The data transferred from the four switches are digital in nature. The RF transmitter consists of data, antenna, voltage supply, ground pins. When current is passed through supply antenna generate electromagnetic waves which are transferred through RF. In receiver part RF receiver receives these signals through antenna pin.

RF RECEIVER (ROBOT)
RECEIVER CONSISTS OF FOLLOWING COMPONENTS-

- RF receiver
- RF decoder
- Microcontroller
- H-bridge
- Geared motors
- Metal detecting circuit
- Wireless camera

Receiver (robot) which is controlled by remote (transmitter) part RF receiver consists of antenna, ground, voltage supply, ground.STR 433MHZ receiver is connected to the HT648 decoder. The decoder is interfaced to the ATMEL microcontroller, which in turn connected to the H Bridge. H Bridge connected to the geared motor which moves in forward, backward, left, right controlled by remote in transmitter part. The camera is connected to the receiver parts to see the surrounding of robot. When the Radio waves are sending from the STT 433MHZ to the STR 433 MHZ receivers, these signals are received by the receiver antenna. RF decoder converts the signal into digital form controlled by microcontroller either by H Bridge. Power reset bottom control the receiver parts which can be on and off any time. Metal detecting is a sub section part of the receiver part. As the receiver part moves in any direction and metal is found then the inducting coil present at lower side of the receiver section produces the buzzer sound and LED is glown the metal detection process goes on by induction coil the eddy current in metal due to the variation of magnetic field of the two components coils and metals. The camera is placed on receiver section to view the images surrounding the objects where the metal is detected. The images can be viwed on the television.

LIMITATIONS:
While dealing with this project we had a faced a problem of controlling the Radio frequency. We had tuned the RF frequency in such a way that frequency used in our project should not be use anywhere else. We had tune the frequency between 340MHZ to 415 MHZ. Finally we had set the frequency at 385 MHZ. The another limitation of this project is hard to navigate, Blast resistant wheels of geared motors are not for to be used for soft ground and the unability of the STR 433 MHZ with its specific wheel configuration and a power available to have enough torque to get out of a hole after a blast.

CONCLUSION AND RESULT:
The project shows a metal detection receiver using Radio Frequency communication with wireless audio and video communication and it is implemented and designed with ATMEL 89C51 microcontroller in embedded system. The robot moved in the particular direction and camera is used in receiver section to view the images surrounding the objects. The project has been accomplished successfully. The outcome indicates high efficiency is achieved for the purpose of metal detecting.

RF TRANSMITTER

RF RECEIVER

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