

## RF Controlled Multi-Terrain Robot Designed to Travel on Water Surface, Indoor and Outdoor Uneven Surfaces

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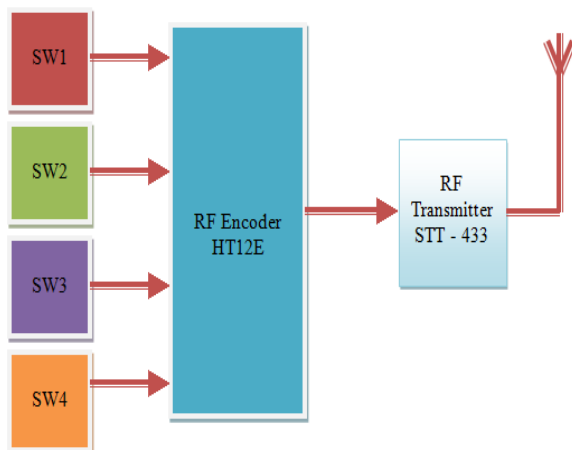
### ABSTRACT:

*This is a robot series utilizes four wheels for sailing. It works on any indoor surface and outdoor surfaces. This is an intelligent robot that can easily move on uneven surfaces too. This robot uses RF technology controlled by 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 LPC2148 as its controller.*

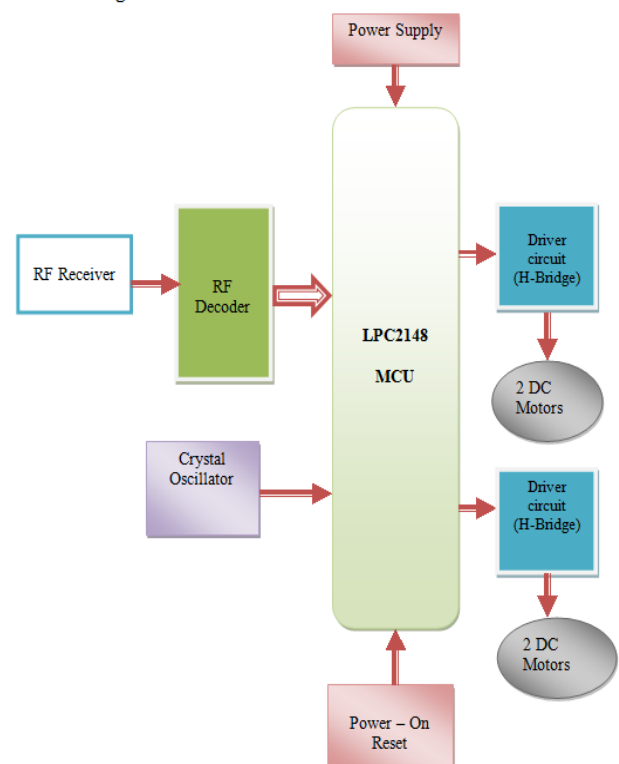
*The RF modules used here are STT-433 MHz Transmitter, STR-433 MHz Receiver, HT12E RF Encoder and HT12D RF Decoder. The switches are interfaced to the RF transmitter through RF Encoder. The encoder continuously reads the status of the switches, passes the data to the RF transmitter and the transmitter transmits the data.*

*This project uses 12V battery. This project is much useful Military applications.*

### Block Diagram: Transmitter



### Block Diagram: Receiver



### Existing system

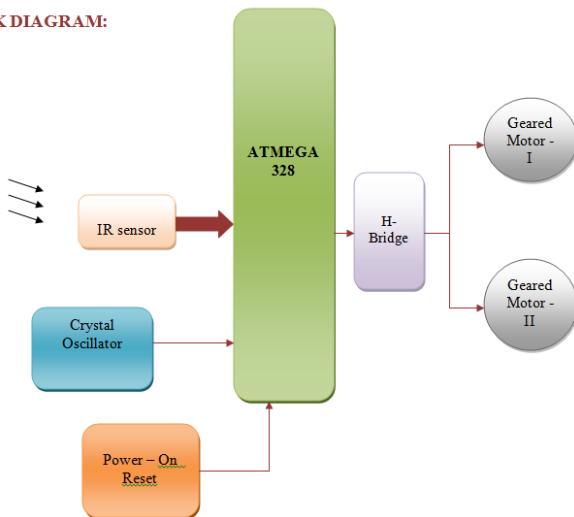
Autonomous Guided Vehicle is new and innovative concept. These vehicles are used for multi purpose. This robot works with IR transmission – reception principle. This vehicle can be moved using geared motors without anybody’s control. Also this robot can take sharp turnings whenever an obstacle is detected. This project uses ATMEGA328 MCU as its controller.

This project has an IR transmitter and a receiver. Whenever an obstacle is detected, the IR light will be reflected, and received by the IR receiver. This sends a signal to microcontroller and the direction of the robot will be changed to avoid collision with the obstacle.

In this project, L293D H-Bridge is used to drive the geared DC motor. The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors.

To simplify use as two bridges each pair of channels is equipped with an enable input. This project uses 12V battery.

**BLOCK DIAGRAM:**



**Drawback:** This robot cannot be controlled by us. It takes own decision about the movement

**Hardware modules**

**LPC2148 controller:**

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ 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.

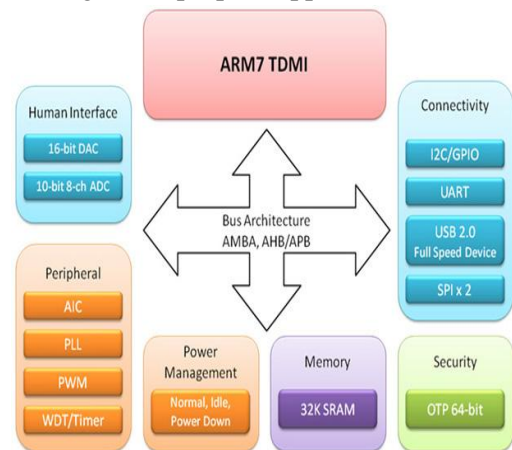


Figure: Architecture

**ARM PROCESSOR:**

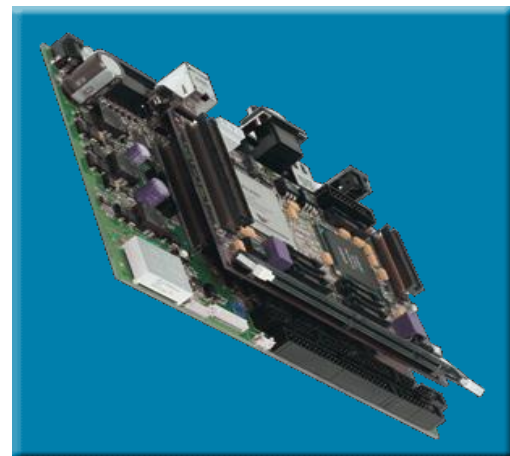


Figure: ARM7 board

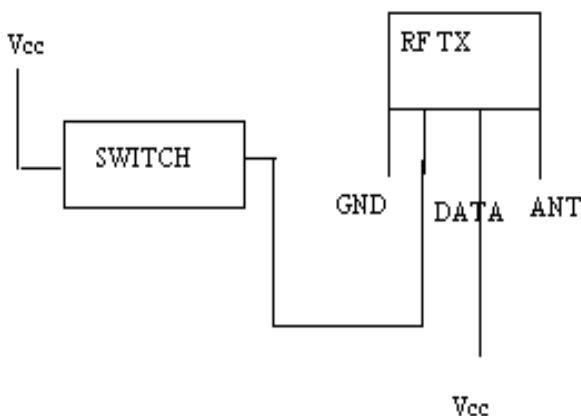
**RF TECHNOLOGY**

**Radio frequency** is a frequency or rate of oscillation within the range of about 3 Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves Since most of this range is beyond the vibration rate that most mechanical systems can respond to, RF

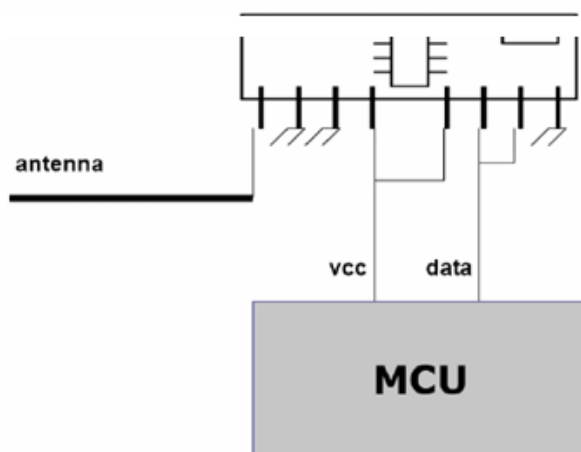
usually refers to oscillations in electrical circuits. RF is widely used because it does not require any line of sight, less distortions and no interference.

### PROPERTIES OF RF:

Electrical currents that oscillate at RF have special properties not shared by direct current signals. One such property is the ease with which it can ionize air to create a conductive path through air. This property is exploited by 'high frequency' units used in electric arc welding. Another special property is an electromagnetic force that drives the RF current to the surface of conductors, known as the skin effect. Another property is the ability to appear to flow through paths that contain insulating material, like the dielectric insulator of a capacitor. The degree of effect of these properties depends on the frequency of the signals.



Transmitter Circuit



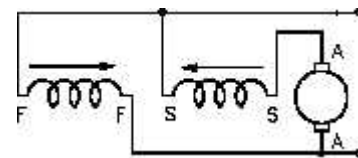
RF receiver

### DC motor

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

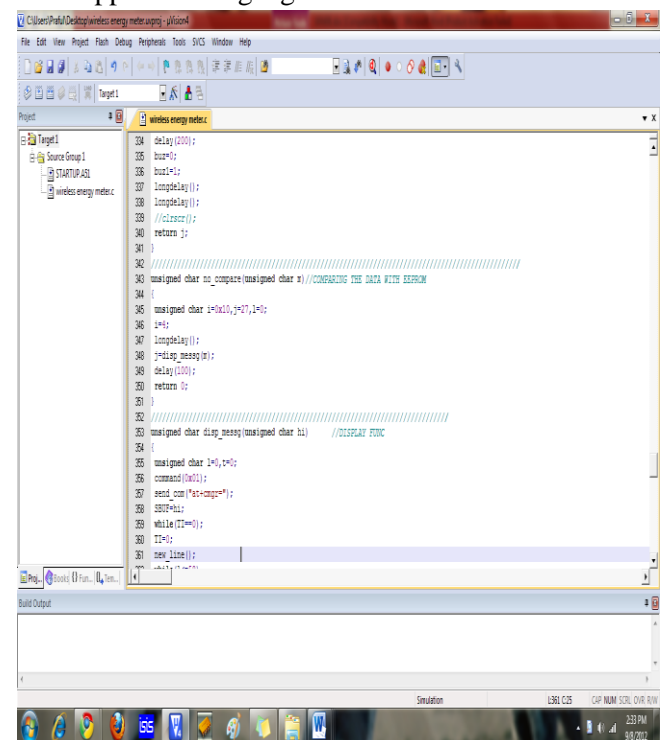
### DC Motor Connections

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



### 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.



## Proload

Proload is a software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller on it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed. As this programmer kit requires power supply to be operated, this power supply is given from the power supply circuit designed above. It should be noted that this programmer kit contains a power supply section in the board itself but in order to switch on that power supply, a source is required. Thus this is accomplished from the power supply board with an output of 12volts or from an adapter connected to 230 V AC.

## Advantages:

- Not blocked by common materials: can penetrate most solids and pass through walls
- Longer range
- 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 Multi-Terrain Robot Designed to Travel on Water Surface, Indoor and Outdoor Uneven Surfaces with the help of RF wireless communication.

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