Implementation of RF Controlled Robotic Boat with Wireless Video Transmission to Remote Television Using Raspberry Pi

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ABSTRACT:

This project is a prototype boat that can travel in water. This robot is powered by 9V rechargeable battery. The direction of the robot can be controlled by an RF remote. This can be moved forward and reverse direction using geared motors of 60RPM. Also this robot can take sharp turnings towards left and right directions. A high sensitive wireless camera is interfaced to the kit. When the robot is moving on water surface, the system transmits video around the robot to television at a remote place. User can monitor the images and voice signals on Television.

The RF modules used here are Transmitter, Receiver, RF Encoder and RF Decoder. The three 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. The **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation.

The Raspberry Pi has a Broadcom BCM2836 /2837 system on a chip. It does not include a built-in hard disk or solid-state drive, but Uses an SD card for booting and long-term storage. This project uses 12V battery. This project is much useful for Ocean research and surveillance applications.

Block Diagram: Transmitter
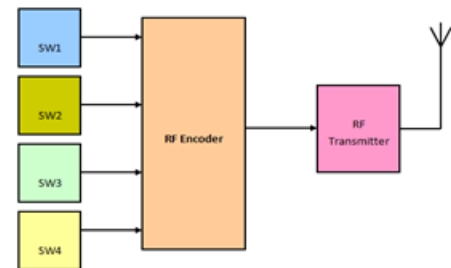
Block Diagram: Receiver
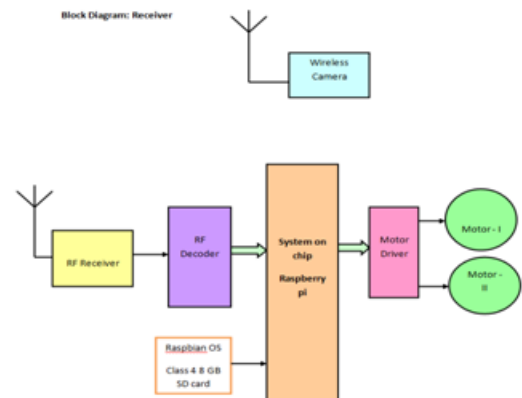
Existing system:

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 any body'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 solenoides, 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:
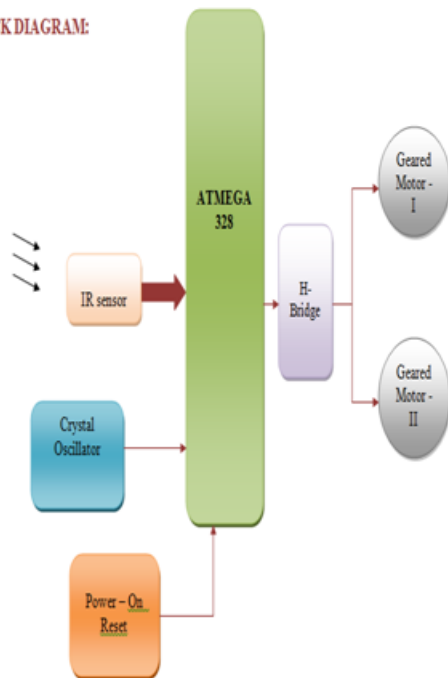
Drawback:

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

Hardware modules
Raspberry-pi

The Raspberry Pi has a Broadcom system on a chip (SoC).

Features:

- System Memory – 1GB LPDDR2
- Storage – micro SD card slot (push release type)
- Video & Audio Output – HDMI and AV via 3.5mm jack.
- Connectivity – 10/100M Ethernet
- USB – 4x USB 2.0 ports, 1x micro USB for power
- Expansion
  2×20 pin header for GPIOs
  Camera header
  Display header
- Power – 5V via micro USB port.
- Dimensions – 85 x 56 mm

Basic Hardware of Raspberry-PI:
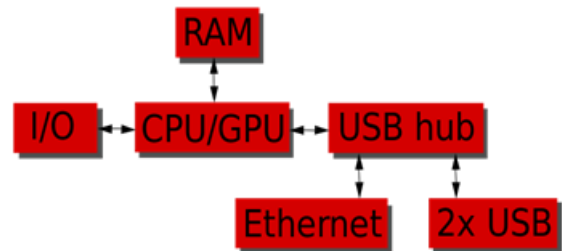
OS used in Raspberry pi is Linux

## Coding will be done in python/C language

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.
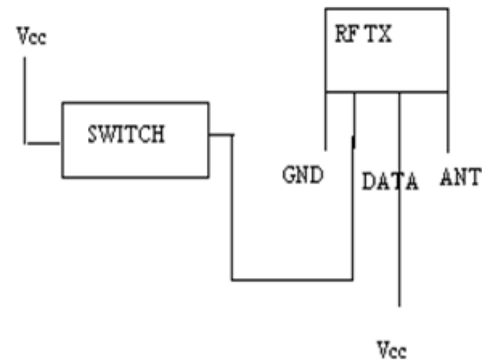

Transmitter Circuit:
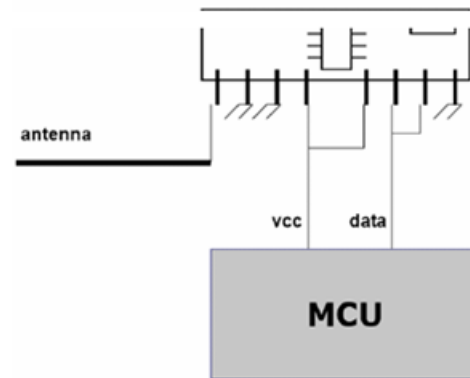
RF receiver

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.
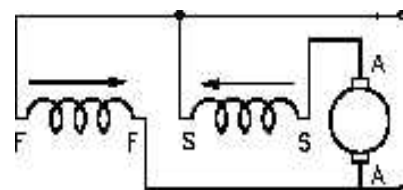
Advantages:

- 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:

- Ocean research applications

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 Robot Designed to Travel on Water Surface with the help of RF wireless communication.

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