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RF CONTROLLED SURVEILLANCE CAR

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ABSTRACT- Surveillance of inaccessible areas can be cumbersome and requires a lot of manpower. It can also be dangerous to do it manually. This article deals with creation of a RF controlled device which allows us to do remote surveillance of inaccessible areas using RF Technology and cellular networks.

Keywords- RF, remote surveillance, RC car

I. INTRODUCTION

In today's world, the safety of people is the utmost priority for everyone. Governments invest a ton of money on public safety like Fire department, Hospitals and the army. Every life is Important and worth saving. Surveillance is one of the key factors of planning. Knowledge of the situation plays a key role in taking right decisions. But in some cases, the surveillance work is very tough and even dangerous, like Surveillance of wreckage after an earthquake or surveillance of the no man's land. The risk of losing lives can be eliminated by making the process automated. Technologies like Radio Frequency and cellular networks can be utilized to create low cost surveillance system which can help in monitoring purposes. This paper deals with the creation of one such device. The goal is create a remote control car with a mount to carry a mobile device or camera which will transmit video surveillance data to the receiver. Here, a couple of ICs and motor are fixed with the chassis. The brief idea is to transmit control signals through radio frequency and receive it through the receiver module. The controller module will have two switches to control each motor. The state of these switches (on or off) is the data to be transmitted. This data is encoded, sent and again decoded in the receiver. This is achieved using an RF module and an encoder (HT12E) decoder (HT12D) pair. The video data is captured using the inbuilt camera of an android device which will telecast the video in real time in the control module through cellular network.

Radio frequency (RF) is a rate of oscillation in the range of around 3 kHz to 300 GHz, which corresponds to the frequency of radio waves, and the alternating currents which carry radio signals. RF usually refers to electrical rather than mechanical oscillations; although radio frequency is a rate of oscillation, the term "radio frequency" or its abbreviation "RF" are also used as a synonym for radio – i.e. to describe the use of wireless communication, as opposed to

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communication via electric wires. Electric currents that oscillate at radio frequencies have special properties not shared by direct current or alternating current of lower frequencies.

II. Architecture

The project consists of two parts- The car and the controller. The car consists of two sets of motor and motor controller. These two motors are controlled by two separate switches on the controller. The state of switches (On and Off) is communicated between the car and the controls through radio waves. RF transmitter is used by control panel or controlling person and RF receiver is connected to the robotic vehicle that is to be controlled remotely. Radio frequency remote control works over an adequate range by facilitating with proper antenna. L293D is a motor driver IC which has two channels for driving two motors. L293D has Two inbuilt Transistor Darlington pair for current amplification and an separate power supply pin for giving external supply for motors.

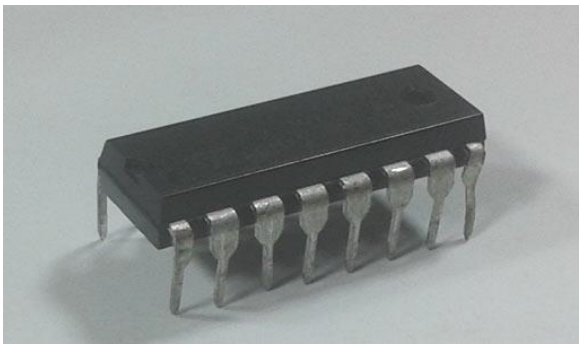

Fig 1 ASK hybrid transmitter

This is a ASK Hybrid Transmitter and receiver module operates at 433Mhz frequency. This module has a crystal stabilized oscillator for maintain accurate frequency control for best range. There we have to need only one antenna externally for this module.

Here we are using an ASK transmitter receiver module. Remote which is having a transmitter is used to transmit the signal from one point to another. There are controlling switches used which are used pinpoint which way the car should take a turn and move. The supply when applied to the switches it gives to the encoder which encodes the signal.

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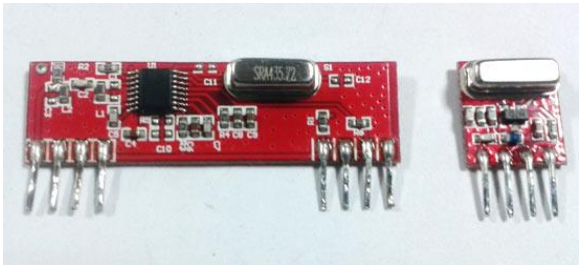

Fig 2 Receiver and transmitter modules

This encoded signal is then sent to the RF-Tx transmitter which is used to perform the task of transmitting the signal from one end to the receiver. The antenna is attached on both the modules which acts as a source to catch and transmit the signals. The signal which is transmitted by the transmitter is caught by the receiver in the receiving section with the help of the antenna. This signal is then sent to the decoder IC. The decoder sends the signal to the motor driver which then ultimately drives the motor connected to it.

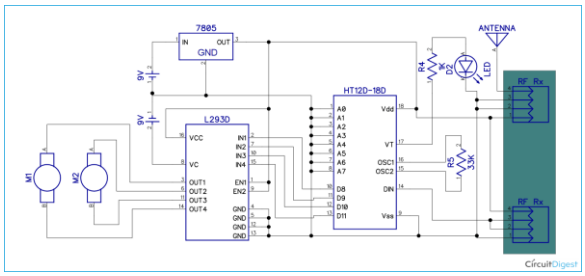

Fig 3 circuit diagram of car module

In the transmitter section circuit has there are 5 switches used in the circuit for controlling the direction of the car. Four of them are used to give the direction instruction to the receiver and the fifth switch is used to switch on or off the switching control. It acts as the main switch for the transmitter section. The diode in the circuit with the help of the logic gates using binary language instructs the receiver for performing the tasks. Transmitter uses an encoder which IC i.e. HT-12E which encodes the voltage signal in the binary language which is the connected to the switches. There is a transmitter ASK-RF-TX used which is capable of sending data to the other end. The receiver section has three ICs and one receiver module. It consists of a decoder HT-12D, driver IC L293D, voltage regulator IC 7805 and the receiver module ASK-RF-Rx. The working of the car starts with the 7805IC voltage regulator wherein the input voltage given to it is 12 volt DC and it converts that 12 volt to 5 volt DC. There are two 16 pins ICs as encoder and the decoder

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which are connected to the switches and transmitter and to the driver IC along with the voltage regulator respectively. Each of the IC has its own basic properties and functions which have been discussed in detail in the below section.

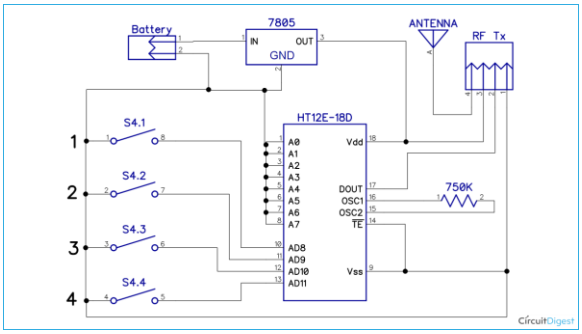

Fig 4 circuit diagram of control module

Wireless transmission can be done by using 433MHz or 315MHz ASK RF Transmitter and Receiver modules. In these modules digital data is represented by different amplitudes of the carrier wave, hence this modulation is known as Amplitude Shift Keying (ASK). The surveillance video is captured by a mounted smartphone on the car and is transmitted to a remote location using cellular networks. An app is developed to capture and cast this video to a remote computer from where the car will be controlled. The app is developed using Android studio for for android devices. It is installed on the phone mounted on the car.

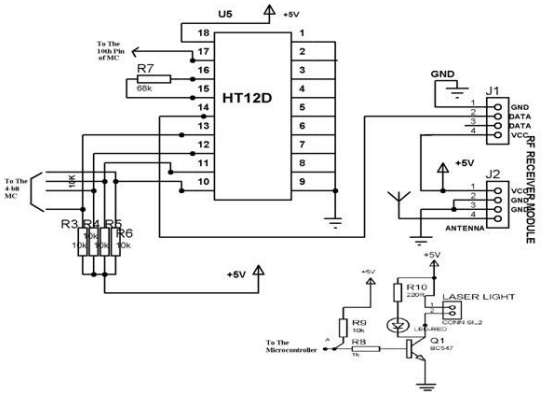

Fig 5 Circuit diagram

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III. Working

The car is controlled from the control module. The two buttons for movement controls each motor. The car moves forward when both the motors are switched on. To turn the opposite motors are turned on. For example, to move right, the left motor is turned on. The all-terrain wheels allow the user to maneuver the vehicle in difficult areas to reach. The video transmission can be started remotely from the control module. The power is supplied to the car using 2 9V batteries.

RF modules are usually very small in size and operate with voltage range of 3V to 12V. RF transmitter modules are designed to work with 433MHz frequency. If transmitting logic is zero, then no power is drawn by transmitter (consumes very low power if carrier frequency is fully suppressed). For transmitting logic one, it consumes power about 4.5mA with 3V. The transmitter and

RF receiver modules are also designed to work with 433MHz (that should match with the transmitter frequency for communication purpose to receive signals from the transmitter).

By using the push buttons of transmitter, we can send commands to the receiver for controlling the movement of the wireless robotic vehicle. The receiver and two motors used for movement of robot are interfaced to the microcontroller of the robotic vehicle. The transmitter encodes the input commands given by the controller and transmits the encoded data using radio frequency.

This encoded data transmitted from the RF transmitter is received by the receiver at the receiving end, which is connected to the robotic vehicle. The receiver consists of RF antenna designed to work over an adequate range of 200 meters. This, receiver after receiving the data from the transmitter, decodes the data and sends it to another microcontroller for driving the DC motors using a motor-driver IC to move the robotic vehicle. A laser pen mounted on the robotic vehicle can be operated using output from the microcontroller based on the signal received from the transmitter.

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The Video transmission module uses a phone to send videos to the controller. An android phone with the app is mounted on the chassis. When the user pressed the button, the app starts recording and sends the video to the user in real time.

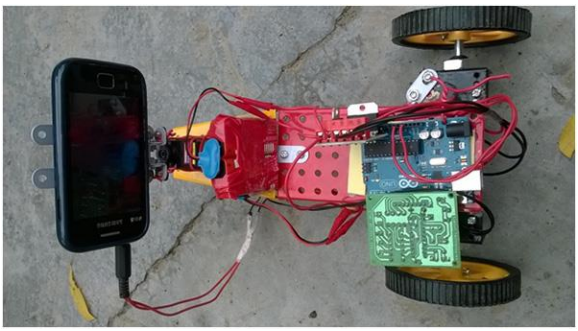

Fig 6 Car with phone attached

IV. Conclusion

Radio frequency which helps in the communication of the information has increased its value for the use of the same in future. With the advancement of technology in the radio frequency controlled car is one of the finest projects which can be worked upon. From the project made it is understood that the use of the radio frequency can be used in the driving a simple RF car with the use of transmitter and receiver. The driver IC which is being connected to the decoder is also a great help to the project which can get programmed and can give out the called instruction for various occasions signalled by the transmitter with the help of antenna and the encoder. The Project is mainly focused on the advancement of the technology with the help of which we can use this project in numerous ways. The main focus is on the security. This project is wonderful in case of security as we can convert this project in a spy agent or even be used in the military departments.

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