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RF and GSM Controlled Spy ROBO with Wireless Night Vision Camera and a Fighting Weapon

Deepak Kuma **Digvijay Singh**
Ms. Ghazala Ansari,
AP, Deptt.-ECE
ELECTRONICS AND COMMUNICATION
SRM UNIVERSITY
NCR CAMPUS

Abstract—
This paper represents the designing of a robotic system using RF technology with wireless camera, laser gun, sensor and with an additional GSM feature. Whenever the sensor is obstructed by anything then the GSM mobile connected at the receiver end by data cable sends a sms to switch on the camera. This robot can be very useful at the time of war for spying purpose. We have a transmitter for controlling the robot with a RF MODULE and push buttons for forward, backward, left, right movements and with camera on/off, shooter control. At the receiver end we receive the data and then the data is decoded by a decoder, then through microcontroller the signals goes to the motor driver and we get the desired movements. RF transmitter circuit transmit the 4 bit code in air. The modulation is done by the RF itself. Here we use 433MHz of radio frequency. Here in this project we use one encoder IC and one decoder IC to encode and decode the data. The transmitter converts the data from decimal to binary in to 4 bit code.

Keywords—8051 Microcontroller, RF tx-rx, Motor driver IC, Encoder IC HT12E, 12D Decoder, push buttons, Diodes IN4007, RF module, resistors, gsm mobile with data cable, Capacitors, WNVC(Wireless Night Vision Camera)

Fig---RF ROBO WITH WIRELESS CAMERA

I. INTRODUCTION

Recent developments in the field of robotics and wireless communication have resulted in many widely adopted wireless standards, with each catering to different needs depending upon the utility of the user. We

have also described here one of the applications of wireless communication by incorporating the wireless technology with a robotic vehicle which will be of optimum use in the war fields. This is a mobile robot mounted with a wireless night vision camera and a trigger gun so that its applications can be expanded from that of a spy to being a warrior in the war field. A sensor has been used to automatically switch ON the camera when any obstacle is detected. Camera can also be switched ON and OFF manually through the RF transmitter or remote control. GSM technology is also used to make the project more user friendly. In this project we have shown that how we can control the movement of the robot with the help of an RF MODULE. The controls for the following operations have been embedded on the RF transmitter: We control all the movement of the robot with the help of the transmitter equipped with encoder circuit and radio frequency transmitter. At the receiver end we receive the data and control the motors for the required movement.In the transmitter section there are total 7 switches. Out of these seven switches four switches is for the robot movement. One switch to on/off the camera, one switch is for the up-down movement of the gun nozzle and one switch is to make the robot halt. All the switches are connected with the encoder circuit with RF transmitter circuit. RF transmitter circuit transmits the 4 bit code in air. Modulation is done by the RF module itself. This particular type of RF module transmits the data in FSK modulation.

In the transmitter circuit we use total seven switches, so we transmit 7 types of data from the transmitter. Data is to be transmitted in the air with the help of the radio frequency.

In the transmitter circuit we use decimal to binary converter circuit to convert the seven switch data into 4 bit code. In the receiver circuit we use RF receiver first. RF receiver receives the data and converts this data into serial data. This data is further connected to the decoder IC. Decoder IC converts the serial data into parallel data. This parallel data is further connected to the micro-controller to compare the signal information. Micro-controller compares the data and controls the motors for the desired movements. Along with the motor we also control the camera for on/off purpose and nozzle control motor for up-down movement. In this project we use one encoder IC and one decoder IC to decode the data through RF module.

Transmitter Circuit

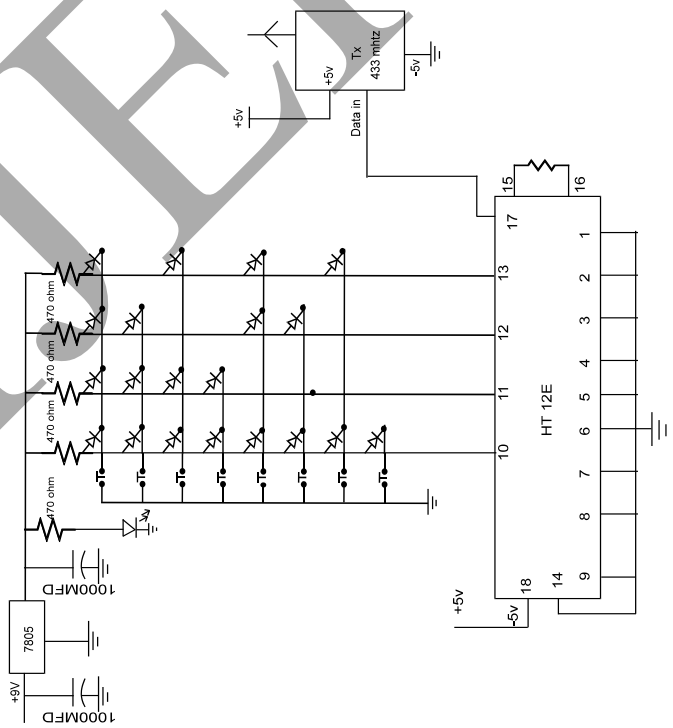


Figure1. The transmitter circuit showing the encoder IC and the converter circuit to convert seven switch data into 4-bit code.

Receiver circuit

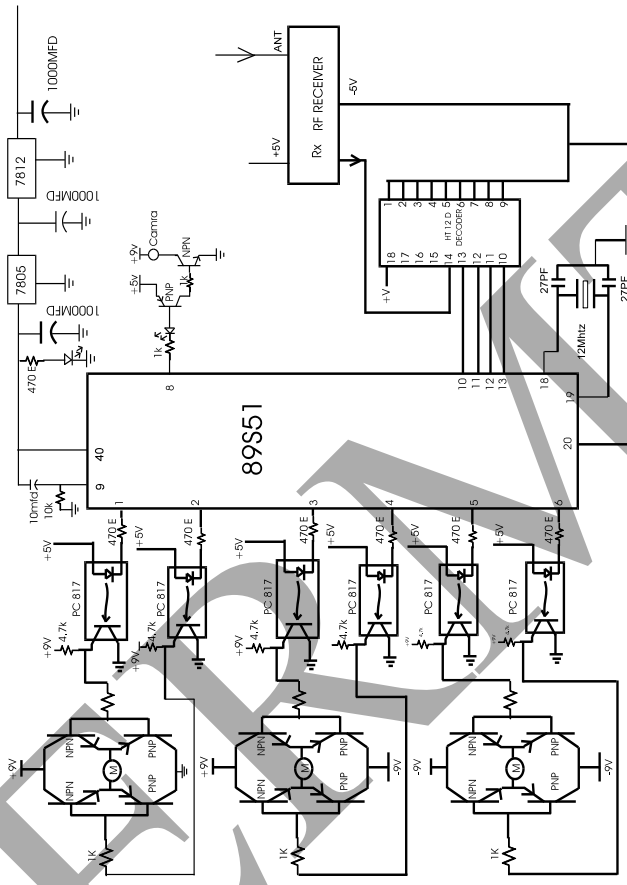


Figure2. The receiver circuit showing the decoder IC and the microcontroller connections with the driver motors.

II. CIRCUIT ANALYSIS

A. At the transmitter end, when we press the push buttons, signals are produced and they are transmitted through a combination of diodes. Diodes IN 4007 has been used here. These combinations of diodes convert the produced signals into the respective 4-bit binary code. This 4-bit signal is then transmitted to the encoder IC HT-12E. The 4-bit binary code is made input to the encoder at the pin no. 10, 11, 12 and 13. The encoder encodes the signals and converts them into the parallel format. The output is driven from pin no. 17 of the encoder. Power to the encoder is provided by a 5V power supply from outside giving input at the pin no. 18 of the encoder. The parallel signals as the output of the encoder are then fed to the RF module. RF module here is capable of transmitting the signals wirelessly at a frequency of 433 MHz. So the RF module transmits the signals wirelessly into the free space via the transmitting antenna.

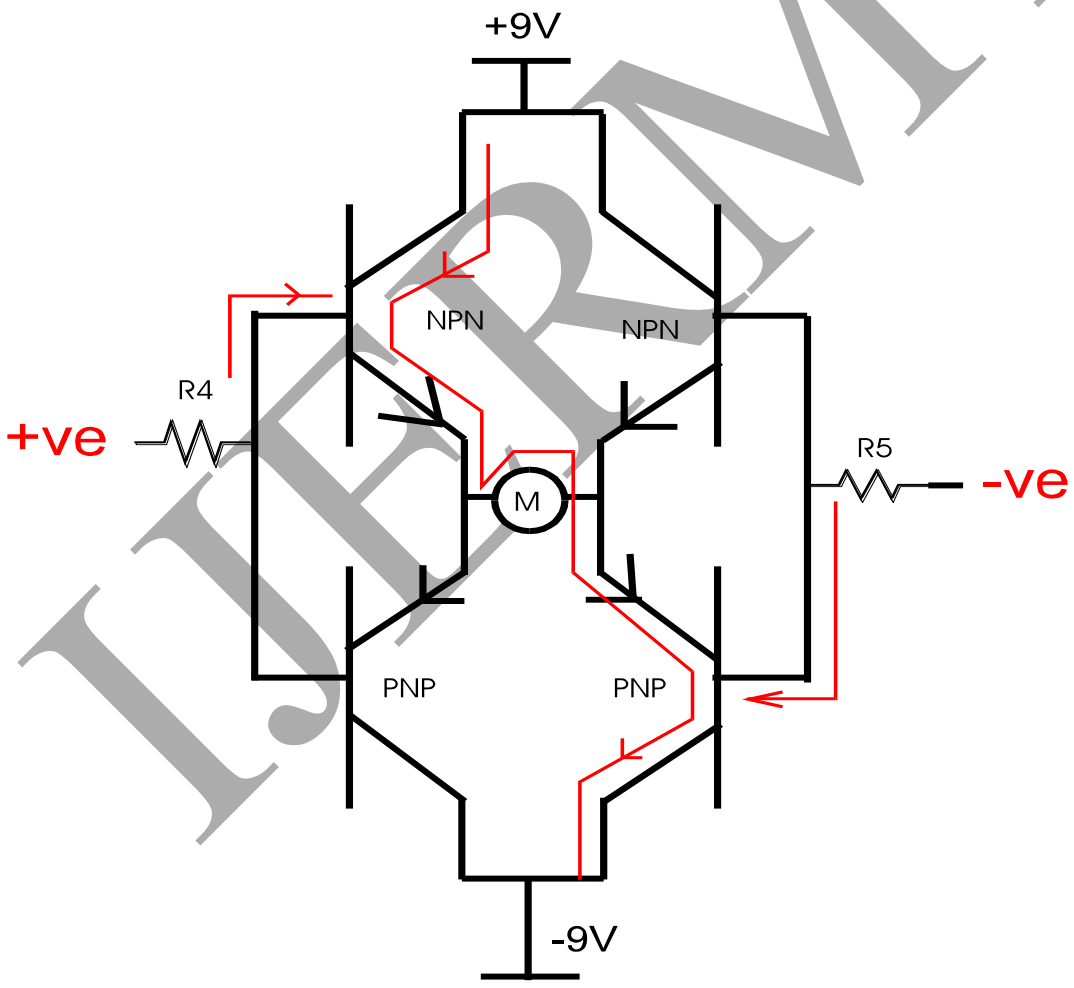
In the receiver circuit we use one decoder IC. This IC is HT 12 D. This IC is a decoder IC. First of all data is to be received by the RF module and then connected to the decoder IC. This signal is connected to the pin no 14 of the decoder IC. Output is available on the pin no 10, 11, 12 and 13. This data is further connected to the 89s51 controller. With the help of this controller we control the movement of the motors.

In this project we use IC 89s51 as a main processor to control all the sensors and output motors. In this project we use three slow speed dc gear motor for forward, reverse, left and right movement and nozzle movement. When base motors move clock wise then robot move forward. When base motors move anti clock wise, then robot moves backward. If one motor is moving forward and second motor is moving reverse then robot moves in the right direction. If we change the sequence of motors then robot turns right to left. The third motor is used to control the movement for up-down motion of the nozzle.

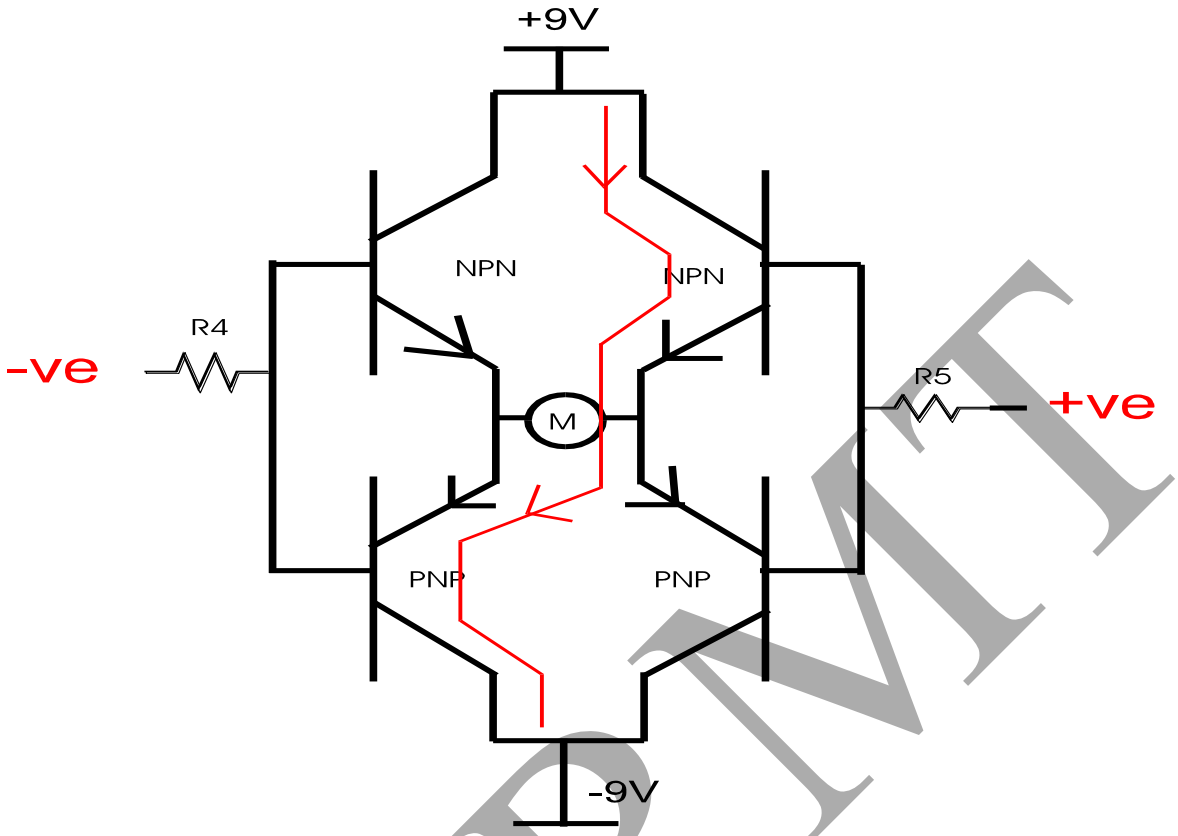
We use slow speed gear motor in this project. Working voltage of these motors are 9 volt to 12 volt dc. We have used two power sources in this project. One for the motors and second for the controller circuit.

For controlling a dc motor we use H bridge circuit. In this project we have used four transistor circuits to control the movement of dc motors in forward and reverse direction.

Collector of both the transistor is connected to the positive supply of 9 volt. This 9 volt supply is for the DC motor. If we use 12 volt motor then we have to use 12 volt dc supply here. Emitter of both the transistor is connected to the DC motor. Emitter of the PNP transistor is connected to the emitter of NPN transistor. Collector of both the PNP transistor is connected to the ground potential. Base point of both transistors is joined together. On this point we provide the voltage.



If we give a positive voltage to the base of left junction and negative voltage to the right junction then motor moves to one direction. Because due to positive on base NPN is on and due to negative on base PNP is on. If left side NPN is on and right side PNP is on then motor moves to the one direction. If the voltage is reverse on the base point then motors moves to the reverse direction.



For attaching the H Bridge to the logical output of the micro-controller, we have to use an interface between the two. So to interface the micro-controller with this H Bridge we have connected an OPTO-COUPLER with the controller. Opto-Coupler is a special optically isolated device to interface the input with output using light. Opto-Coupler provide an electrical isolation between the input and output circuit.
Pin no. 40 of the controller is connected to the positive supply and pin no 20 is connected to the ground pin. Pin no 9 is for the reset pin, on this pin we connect one resistor and capacitor to provide an auto reset circuit. With the help of the auto reset circuit micro-controller reset automatically and starts from the zero location every time when power is on.

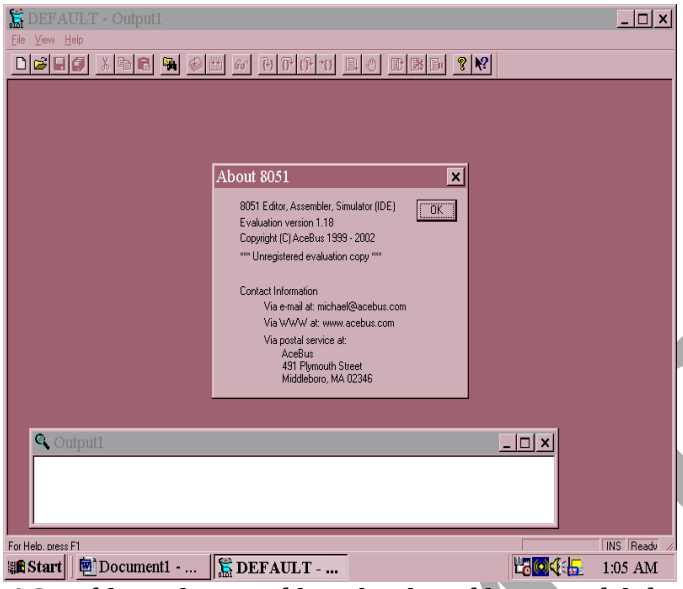
III PROGRAMMING OF A BLANK CHIP

Intel 8051 micro controller

Intel 8051 is CISC architecture which is easy to program in assembly language and also has a good support for High level languages.
The memory of the microcontroller can be extended up to 64k.
This microcontroller is one of the easiest microcontrollers to learn.

The 8051 microcontroller is in the field for more than 20 years. There are lots of books and study materials are readily available for 8051.

First of all we select and open the assembler and write a program code in the file. After writing a code we assemble the software by using internal assembler of the 8051 editor. If there is no error then assembler assembles the software and 0 error shows the output window.



Now assembler generates an ASM file and HEX file. This hex file is useful for us to program the blank chip.

Now we transfer the hex code into the blank chip with the help of serial programmer kit. In the programmer we insert a blank chip and transfer the hex code from the computer to the blank chip.

Main program is written in the assembly language for this robot. Input signal from the decoder is connected to the port p3 and motors are connected to the port p1.

IV ENCODER AND DECODER CIRCUITRY

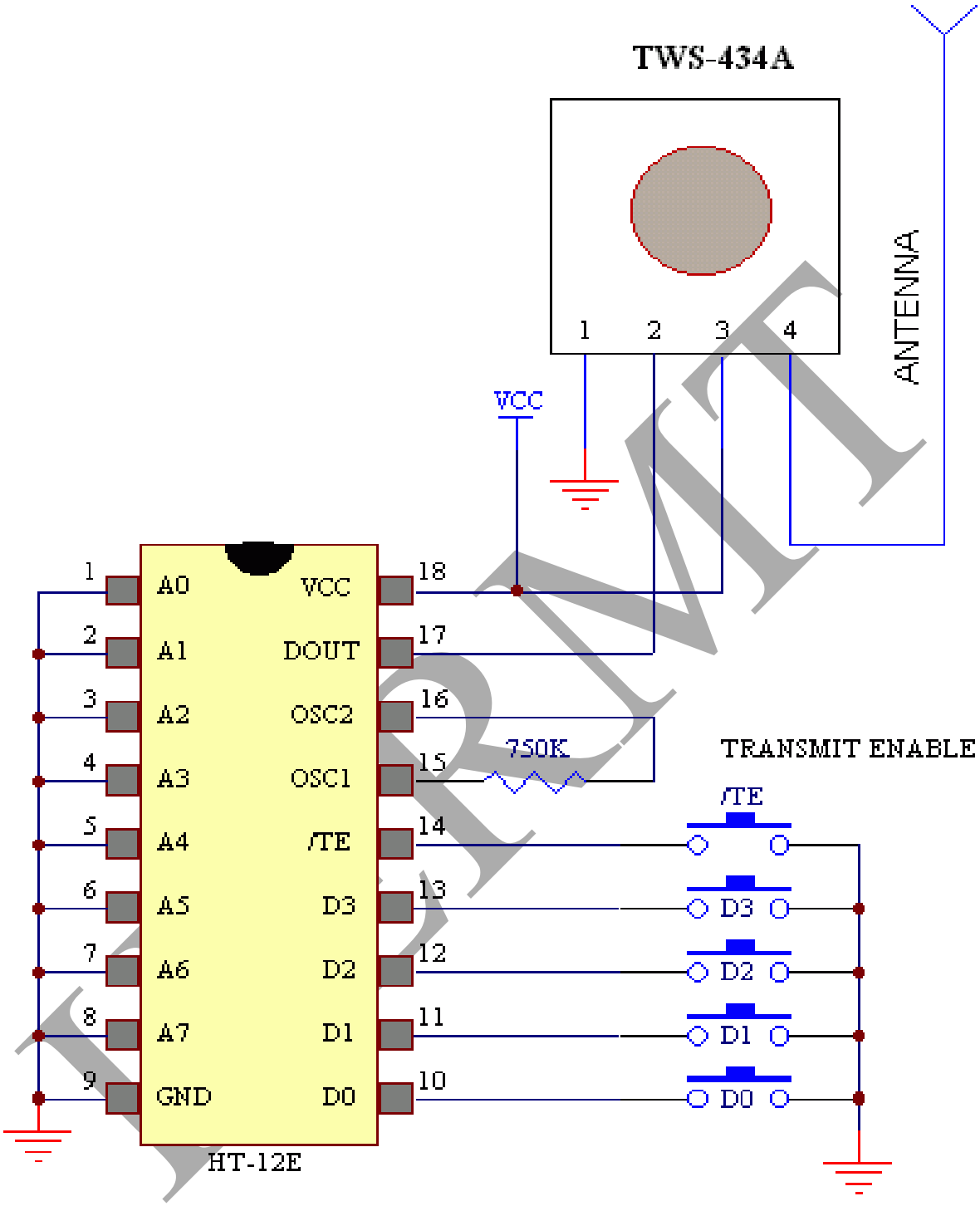
In this project we have used one 433 MHz transmitter and one 433 MHz receiver in the respective circuits. The picture shown below is of RF module and it can be used for many RF application circuit. This type of RF module is available in the market for different applications. We have used one pair of transmitter and receiver in our project.

The TWS-434 and RWS-434 are extremely small, and are excellent for applications requiring short-range RF remote controls. The transmitter module is only 1/3 the size of a standard postage stamp, and can easily be placed inside a small plastic enclosure.

TWS-434: The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 foot (open area) outdoors. Indoors, the range is approximately 200 foot, and will go through most walls.....

TWS-434A

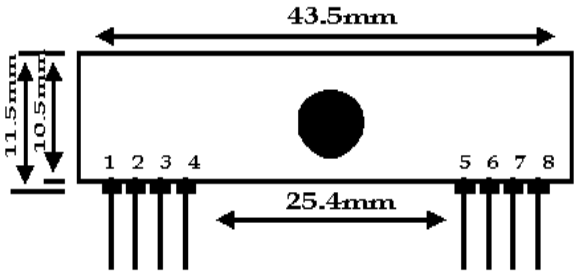
The TWS-434 transmitter accepts both linear and digital input, can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The TWS-434 is approximately the size of a standard postage stamp. Below given is a sample transmitter circuit showing the way an RF module is connected with the different elements of the transmitter. The pins 2 and 3 for the data input and the voltage supply respectively are connected to the encoder. Pin 4 for the RF output is connected with the antenna and pin 1 has been grounded.



Sample Transmitter Application Circuit

RWS-434: The receiver also operates at 433.92MHz.

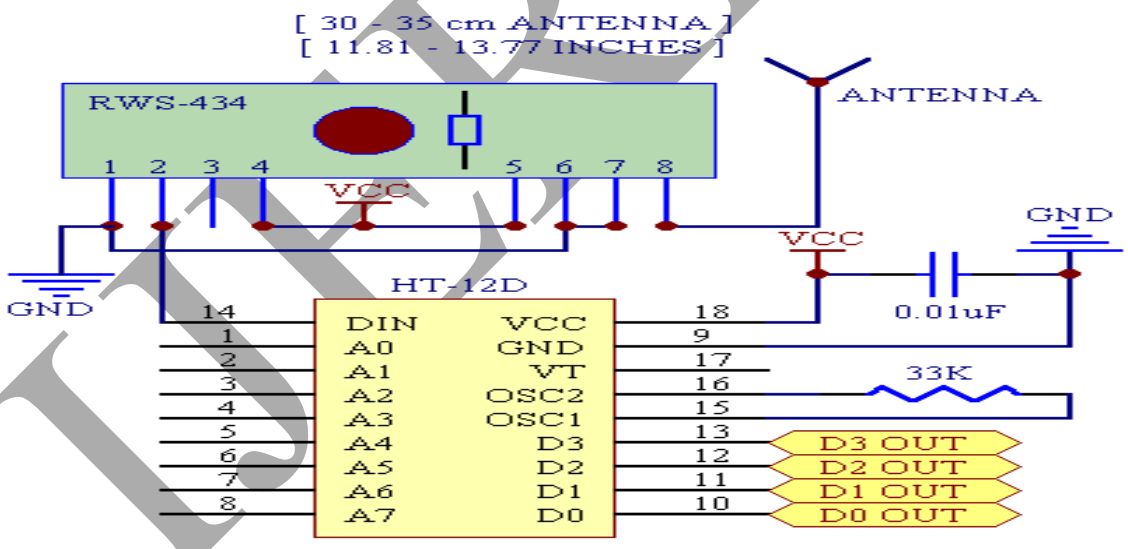
Pin diagram of the receiver RF module is shown below:



pin 1 : Gnd
pin 2 : DigitaL Output
pin 3 : Linear Output
pin 4 : Vcc
pin 5 : Vcc
pin 6 : Gnd
pin 7 : Gnd
pin 8 :Ant (About 30 - 35 cm)

RWS-434 Pin Diagram

Below given is a sample receiver circuit showing the way an RF receiver module is connected with the different elements of the receiver. The pin 2 for the digital output is connected to the decoder. Pins 4 and 5 are connected with the voltage supply. Pin 8 for the RF output is connected with the antenna and pin 6 and 7 has been grounded.



Sample Receiver Application Circuit

V. ACKNOWLEDGEMENT

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