INFRARED DEVICE CONTROLLER

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ABSTRACT

In today's modern world, science has made life much more comfortable for mankind.We see the wonders which science have done to our lives every day in our homes, offices etc.

In our project, we plan to add another amenity to our day today life. By our project, we plan to control electronic devices in our household like tube light, fan etc. with any normal remote we find in our homes so that we can control the electric equipments of our homes with just a press of a button.

INTRODUCTION

A remote works on wireless communication, sending coded bits of information modulated with an infrared signal of particular frequency. The coded information varies with the button we press. We decoded this information with the help of Atmega 16 microcontroller by giving supply from the microcontroller to the particular device on the press of a particular button.

WORKING

The remote we use sends a train of bits (0's and 1's) of some fixed length modulated with a 38 KHz infrared signal. The sequence of bits which the remote sends is decided by a particular protocol known as RC-5 protocol.

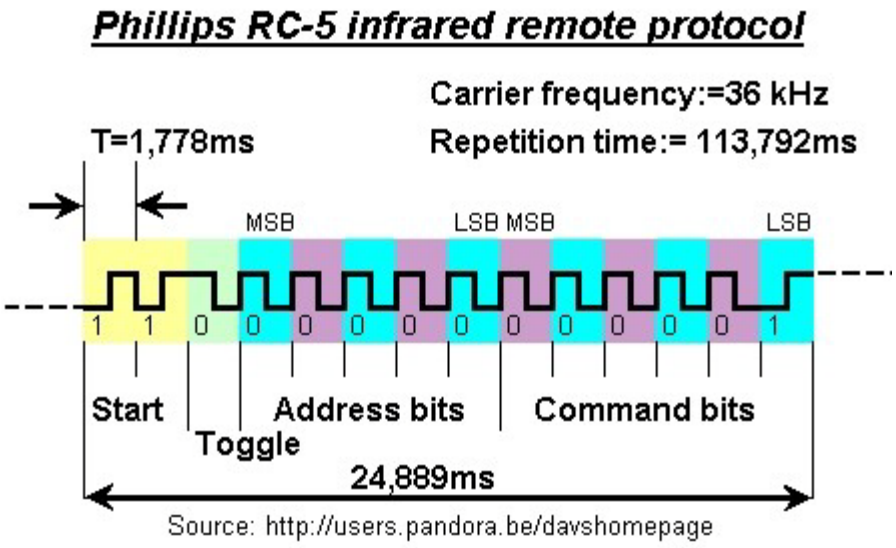
RC-5 PROTOCOL:-

A common used standard protocol for infrared data communication is the RC5 code, originally developed by Philips. This code has an instruction set of 2048 different instructions and is divided into 32 address for different devices the remote belongs to like TV,VCR etc. with each address having 64 instructions each for different buttons on the remote.

Every kind of equipment uses his own address, and every button has its own unique code. So this makes it possible to change the volume of the TV without change the volume of the stereo.
The transmitted code is a data word which consists of 14 bits and is defined as:

2 start bits for the automatic gain control in the infrared receiver.
1 toggle bit (change every time when a new button is pressed on the ir transmitter)

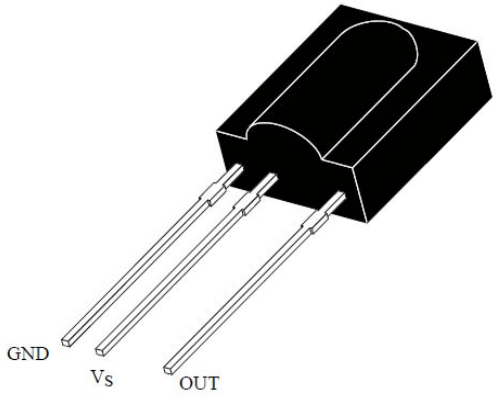
5 address bits for the system address
6 instruction bits for the pressed key



We used a single remote to control all the devices so everything except the toggle bit and the and the command bits are same. We studied the codes for a particular TV remote to be used with our devices.

The next challenge was to get something which would detect these codes so that Atmega 16 microcontroller would read these codes. The solution is TSOP 1738.

TSOP 1738:-



The TSOP 17XX series are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. TSOP 17XX is the standard IR remote control receiver series, supporting all major transmission codes. Here XX refers to the frequency of the infrared carrier signal on which the code is modulated, which is 38 KHz in our case. It has three pins .GND and Vcc are connected to the power supply with VCC as 5V and Vout which becomes 0V, or GND when the

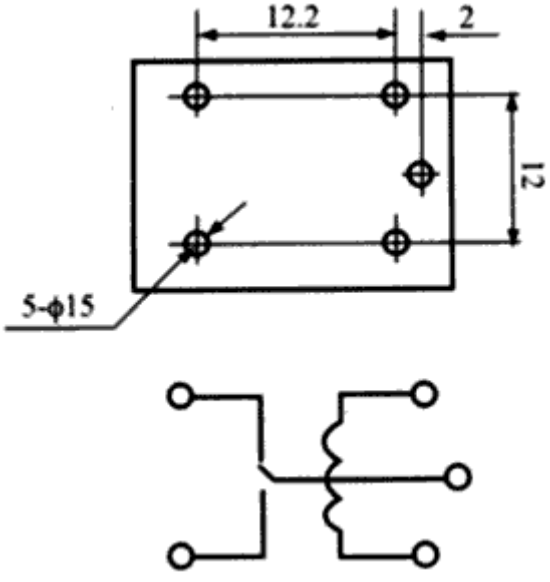
demodulated bit received is high i.e. 5V and vice versa.

CODING:-

After we have the code transmitted from the remote on the press of a button to the microcontroller through the infrared receiver, we wrote a code using CVAVR, a C compiler that would make a corresponding port of a microcontroller high when the incoming code matches the corresponding button code. We read the incoming code bit by bit by reading the Vout pin of the sensor to a port of the microcontroller. To ensure each bit is read properly, we used a delay of 889 ms, which is the time period of the demodulated signal which we receive from the remote and stored it a character array .As we cannot store a bit directly in an array due to data type mis-match, we stored 1 in the array whenever the bit was high and vice versa. Then we compared the part of the code stored which changes from button to button i.e. the command bit to distinguish between different button presses and when a particular code matches, we make corresponding port high, i.e. give an output of 5V from that port which depends on the supply voltage we provide to the microcontroller i.e. if the supply would have been 6V; the high would correspond to the port giving 6V.
The ON OFF condition of a device. I.e. the device turns on when we press a button one time and turns off when we press again is fulfilled by taking care of the toggle bit.

We now needed a device which would turn a equipment on when it receives a particular voltage from the microcontroller. The device is relay.

RELAY:-



It basically is a switching device. On providing a definite specified DC voltage across the induction coil, it gets magnetized and causes the switch (the middle one) to flip its position from where it was previously to the other pin, causing the device attached across it to turn on. But we had a problem, we were provided with only 12 volt relay (it operated on 12 V) and the microcontroller gave 5V.So we used a BJT transistor in Common emitter mode to amplify

5V to 12 V.
We finally attached our device across the relay to get it working when the relay received 12 V, otherwise not.

PROBLEMS FACED

1. We tried to use Op amps for the amplification, but all in vain because it could not provide sufficient current to the Relay.

2. We faced difficulty in getting the microcontroller recognize when the first bit of the code train has been reached to the sensor and the microcontroller may start taking down the code.

FUTURE EXTENSIONS

1. We plan to attach timer system to our devices, so that they can be turned on for a fixed duration and then turned off.

2. We plan to controlled devices like fan which have other features like regulating speed, not only turning on and off.

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1. Arpit Mathur

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REFERENCES

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