HOW TO SET UP AN IR REMOTE AND RECEIVER ON AN ARDUINO

Preeti Shriwal

Preetishriwal@gmail.com

Abstract :using arduino we are going to set up an ir remote sensor and receiver.This uses a remote which has an led at the ir sensor and that ir rays are modulated by arduino.This is user friendly tutorial for making a very simple IR Remote decoder using an Arduino and IR receiver. This tutorial will cover everything from setting up the software to using the IR Receiver and decoding the signals. These signals can be used later for multiple projects including IR Remote control Robot, Home automation and similar IR controlled projects.

Keywords : arduino , ir rays, infrared, signal modulation

I Introduction:

Infrared (IR) communication is a widely used and easy to implement wireless technology that has many useful applications. The most prominent examples in day to day life are TV/video remote controls, motion sensors, and infrared thermometers.

II WHAT IS INFRARED?

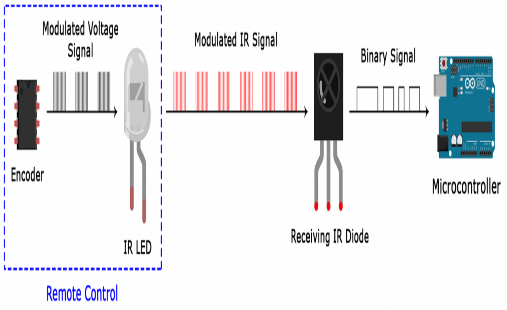
Infrared radiation is a form of light similar to the light we see all around us. The only difference between IR light and visible light is the frequency and wavelength. Infrared radiation lies outside the range of visible light, so humans can't see it:Infrared radiation is a form of light similar to the light we see all around us. The only difference between IR light and visible light is the frequency and wavelength. Infrared radiation lies outside the range of visible light, so humans can't see it:

III HOW IR REMOTES AND RECEIVERS WORK

A typical infrared communication system requires an IR transmitter and an IR receiver. The transmitter looks just like a standard LED, except it produces light in the IR spectrum instead of the visible spectrum. If you have a look at the front of a TV remote, you'll see the IR transmitter LED:

IV IR SIGNAL MODULATION

IR light is emitted by the sun, light bulbs, and anything else that produces heat. That means there is a lot of IR light noise all around us. To prevent this noise from interfering with the IR signal, a signal modulation technique is used.In IR signal modulation, an encoder on the IR remote converts a binary signal into a modulated electrical signal. This electrical signal is sent to the transmitting LED. The transmitting LED converts the modulated electrical signal into a modulated IR light signal. The IR receiver then demodulates the IR light signal and converts it back to binary before passing on the information to a microcontroller:



The modulated IR signal is a series of IR light pulses switched on and off at a high frequency known as the carrier frequency. The carrier frequency used by most transmitters is 38 kHz, because it is rare in nature and thus can be distinguished from ambient noise. This way the IR receiver will know that the 38 kHz signal was sent from the transmitter and not picked up from the surrounding environment.The receiver diode detects all frequencies of IR light, but it has a band-pass filter and only lets through IR at 38 kHz. It then amplifies the modulated signal with a pre-amplifier and converts it to a binary signal before sending it to a microcontroller.

V IR CODES

Each time you press a button on the remote control, a unique hexadecimal code is generated. This is the information that is modulated and sent over IR to the receiver. In order to decipher which key is pressed, the receiving microcontroller needs to know which code corresponds to each key on the remote.

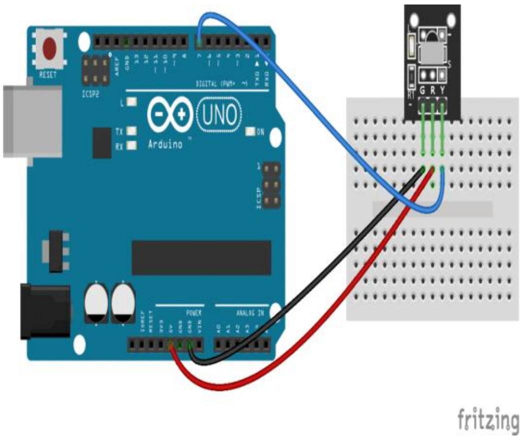
Different remotes send different codes for the keypresses, so you'll need to determine the code generated for each key on your particular remote. If you can find the datasheet, the IR key codes should be listed. If not though, there is a simple Arduino sketch that will read most of the popular remote controls and print the hexadecimal codes to the serial monitor when you press a key. I'll show you how to set that up in a minute, but first we need to connect the receiver to the Arduino…

VI HOW TO CONNECT AN IR RECEIVER TO THE ARDUINO

There are several different types of IR receivers, some are stand-alone, and some are mounted on a breakout board. Check the datasheet for your particular IR receiver since the pins might be arranged differently than the HX1838 IR receiver and remote set I am using here. However, all IR receivers will have three pins: signal, ground, and Vcc.

Lets get started with the hardware connections. The pin layout on most breakout boards looks like this:

To connect a breakout board mounted IR receiver, hook it up to the Arduino like this:



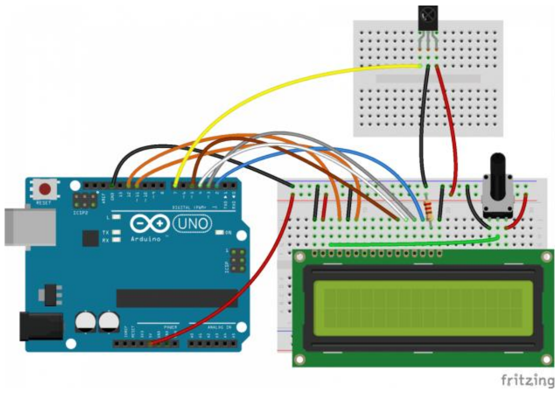
VII FIND THE CODES FOR YOUR REMOTE

To find the key codes for your remote control, upload this code to your Arduino and open the serial monitor: Using the program above, I derived a table of keys and their corresponding codes from the remote that came with my HX1838 IR receiver and remote set. Note that you will receive a 0XFFFFFFFF code when you press a key continuously.

Key	Code
CH-	0xFFA25D
CH	0xFF629D
CH+	0xFFE21D
<<	0xFF22DD
>>	0xFF02FD
>||	0xFFC23D
–	0xFFE01F
+	0xFFA857
EQ	0xFF906F
100+	0xFF9867
200+	0xFFB04F
0	0XFF6897
1	0xFF30CF
2	0xFF18E7
3	0xFF7A85
4	0xFF10EF
5	0xFF38C7
6	0xFF5AA5
7	0xFF42BD
8	0xFF4AB5
9	0xFF52AD

VIII PRINT KEYS TO AN LCD

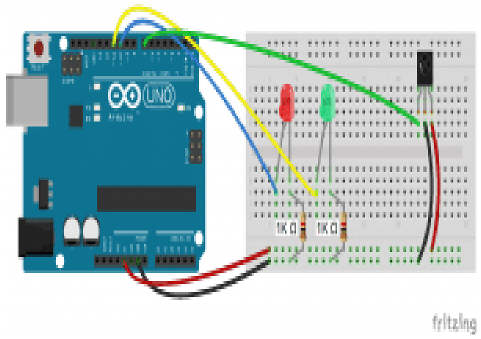
Instead of printing the key values to the serial monitor, you can also display the information on an LCD. Check out our article on setting up and programming an LCD on the Arduino for more information on programming the LCD, but the basic setup looks like this:



XI USING THE IR REMOTE TO CONTROL THINGS

Now I'll show you a simple demonstration of how you can use the IR remote to control the Arduino's output pins. In this example, we will light up an LED when a particular button is pressed. You can easily modify the code to do things like control servo motors, or activate relays with any button press from the remote.

The example circuit has the IR receiver connected to the Arduino, with a red LED connected to pin 10 and a green LED connected to pin 11:



X Conclusion:

The future of IoT is virtually unlimited due to advances in technology and consumers' desire to integrate devices such as smart phones with household machines. Wi-Fi has made it possible to connect people and machines on land, in the air and at sea. It is critical that both companies and governments keep in ethics in mind as we approach the fourth Industrial Revolution (Pye, 2014). With so much data traveling from device to device, security in technology will be required to grow just as fast as connectivity in order to keep up with demands.Governments will undoubtable face tough decisions as to how far the private the sector is allowed to go in terms of robotics and information sharing. The possibilities are exciting, productivity will increase and amazing things will come by connecting the world.

XI References :

[1] Richard D. De Veaux, Paul F. Velleman, and David E. Bock, **Stats Data and Models**, 4th Edition, 2015, **Pearson Publishing**.

[2] Sheldon M. Ross, **Introductory Statistics**, 3rd Edition, Academic Press, 2010.

[3] Vijay madisetti and ArshdeepBagha , " **Internet of Things**" 1st edition ,vpt, 2014.