

Controlling Blinds.com RF Dooya Motors with Arduino and Vera

Sunday, March 23, 2014

Disclaimer

I am new to Vera, microcontrollers and pretty much everything related to home automation. I am by no means an expert and this solution is really just pieced together from other people's prior great ideas. This may not work for you (although I hope it does) and as always, use at your own risk.

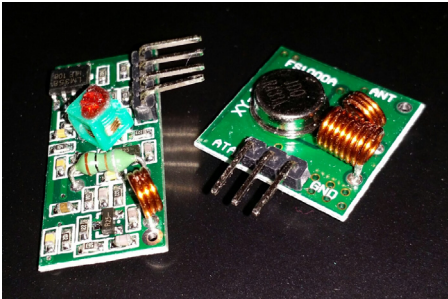
Overview

My goal was to be able to control my [Blinds.com motorized cellular shades](#) with my Vera 3. The blinds have [Dooya DV24CE](#) motors (which use a 433 MHz RF for remote control) built into them but I couldn't find any already built RF transmitter that integrated directly with the Vera. I had recently started building Arduino sensors with Henrik's (HEK) amazing [MySensors Arduino Sensor Plugin](#) so I decided to try to build my own. Thanks to many helpful resources (cited throughout this document) I was able to control my blinds for less than \$20 in Arduino parts.

Parts list

Note: the parts below can be found many different places. It seems a lot of people are getting them on ebay.com for a low price (but slow shipping). If you want faster shipping you can do a quick web search for other sellers.

- A Vera
- You will need to build the Arduino Gateway from HEK's MySensors. Details here: <http://www.mysensors.org/build/components>. Also see the buying guide: <http://www.mysensors.org/store/#guide>
- You will also need the parts to build a sensor. For example, an Arduino Pro Mini, NRF24L01+ radio module, voltage regulator etc. See link above.
- A 433Mhz RF transmitter receiver link kit for Arduino. Make sure it's 433MHz and not 315MHz!



- A pair of broken/cheap headphones that you can cannibalize the 3.5mm jack from.
- 5v DC power supply (I used an old USB phone charger and cut off the end to get the power wires - Red = 5v, Black = Ground)
- Resistors - 39k and 10k (if you think you will be making other sensors it may be worth getting a variety kit. Just make sure they have a 1% tolerance).
- Useful but not necessary
 - A small breadboard will make things easier
 - Multimeter
 - Soldering Iron
- If you think you will be doing other stuff with Arduino you may want to pick up an extra Nano or an Uno. They make it easier to test than the Pro Mini chips.
- A computer

Note: you may want to browse around the MySensors store <http://www.mysensors.org/store/> and pick

up some additional parts for more sensors. This gets addicting fast and it sucks to have to wait for things to ship from China. Also, you may want to get duplicates of the cheap parts. That way if you have any issues with your sensors you can switch out the parts to rule out hardware issues. Just my 2 cents.

Quick overview of the process

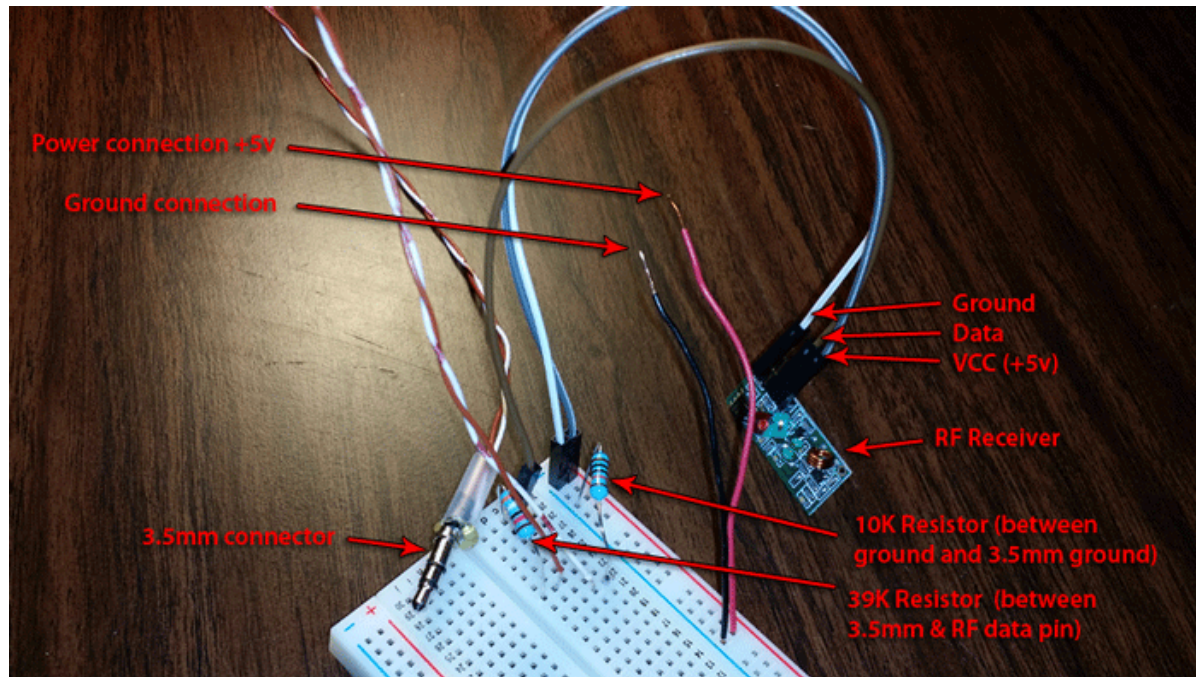
1. We need to "sniff" the RF signal from the blinds.com remote. To do this we will use a computer with a sound card and the RF receiver
2. Decode the signal
3. Add your signal to the Arduino program
4. Build the Arduino Gateway and sensor and add them to Vera

Sniffing the RF signal from your Blinds.com remote

Until someone smarter than me codes a way to sniff the signal from the Dooya remote with an Arduino we have to do this the old fashioned way. For some great info on this process go here:

<http://rayshobby.net/?p=3381>

Set up the hardware



Above is a picture of the sniffer setup. The goal is to get the data pin of the RF receiver connected into your computer. You should connect a 10K resistor between the ground from the USB and the ground of the 3.5mm connector. You will then connect a 39K resistor between the data pin from the RF receiver and the 3.5mm connector. Note: there are two data pins on my RF receiver but either one can be connected to the 3.5mm connector.

Recording the RF signal

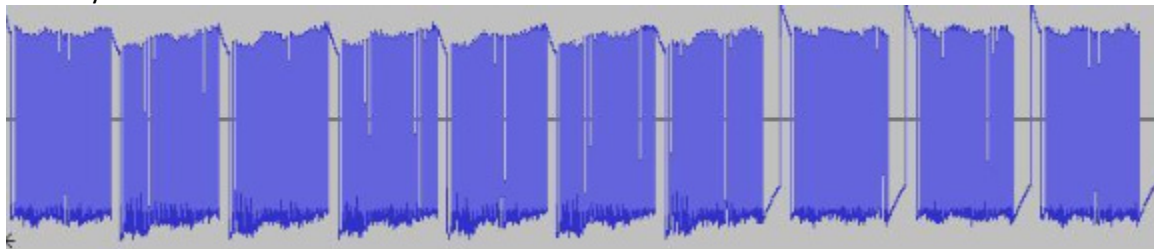
Note: when I was reading about this process people warned about only connecting to a Line In Jack (pink connector on your computer). I read that some people used the normal headphone (green) jack and it worked fine but I wanted to at least warn you that there could possibly be a problem. I personally had a line in connector so I used that.

You will need an audio program to record the signal. I used [Audacity](#) because it's free. After you have

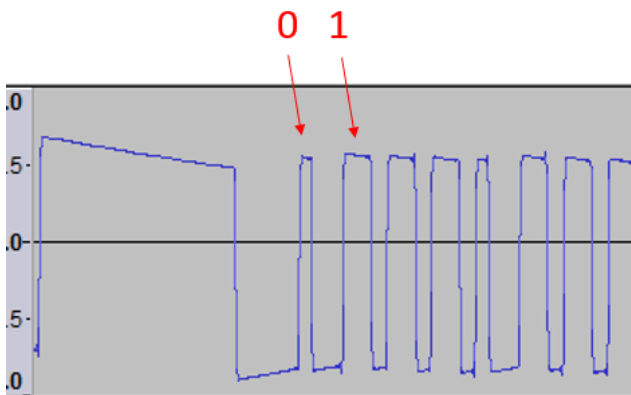
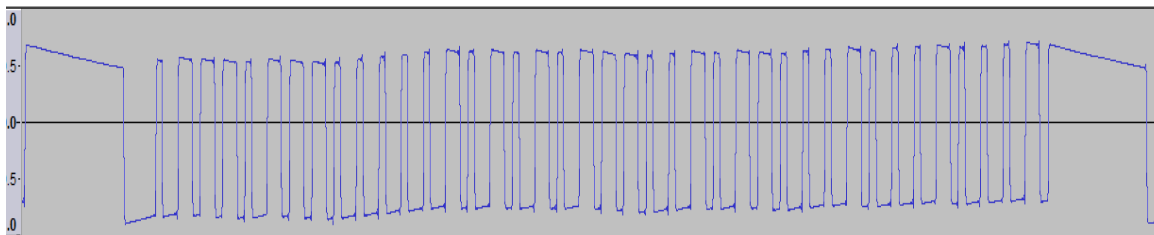
your audio program of choice, make sure you configure your audio in setting correctly so you are actually recording the RF signal. Now you need to plug the 3.5mm connector into the Line In on your computer. I also plugged in some headphones in my computer so I could listen to make sure it was configured correctly before I messed around with trying to record. When you press a button on your remote you will hear a short series of electronic beeps.

When you are confident you have everything set up correctly, it's time to record! The goal is to record a button press (I used stop so my blinds weren't going up and down while I was testing) then zoom in to read the waveform. It should look something like this:

Partially Zoomed



Zoomed More



Now that you have captured your signal, you need to translate your waveform into 1s and 0s. The longer waveform peaks will be 1s and the shorter peaks will be 0s. You just need to get the first 28. I would recommend checking the first two or three patterns to make sure you have the correct sequence. You want to make sure you get this right or nothing will work.

Add your signal to the Arduino program

Now that you have your 28bit signal you need to add it to the Arduino program. Open the program and scroll (or ctrl +F) until you see the standardBits variables.

```
unsigned char standardBits1 = 0b00000111;  
unsigned char standardBits2 = 0b01110000;  
unsigned char standardBits3 = 0b01010101;  
unsigned char standardBits4 = 0b11001011;
```

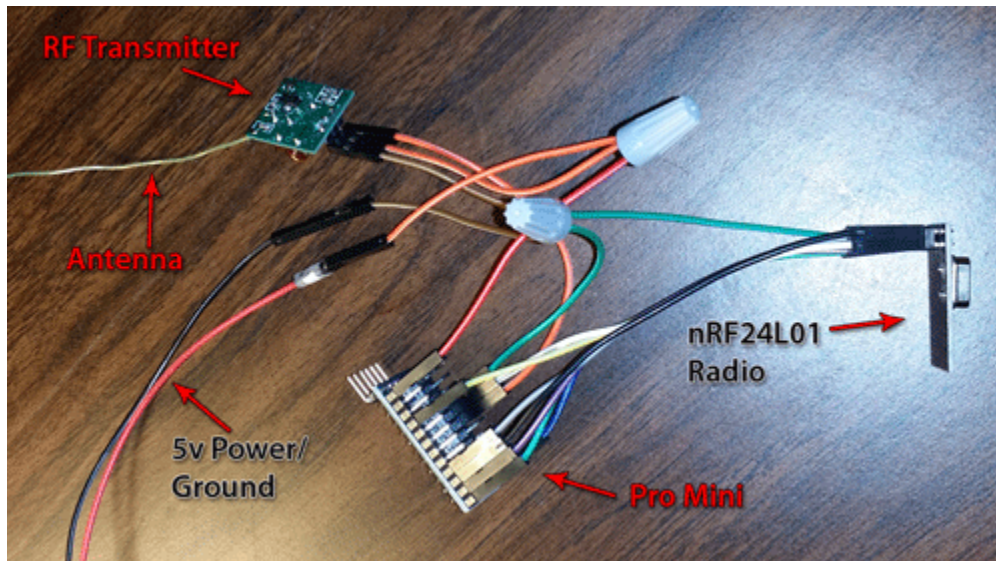
You need to enter your bits in here. Make sure to keep the first 4 zeroes in the standardBits1 variable.

As you can see from the above screenshot of my image my first bits are 0111011.... So standardBits1 is 00000111.

Build the Arduino Gateway and Sensor and add them to Vera

You will now need to build the Arduino Gateway and connect it to Vera. There are great instructions for doing that here: <http://www.mysensors.org/build/> Make sure you read and understand the whole process. There is also a great forum that you can read through if you get stuck: <http://forum.micasaverde.com/index.php/board,55.0.html> & <http://forum.mysensors.org/>

After that you will need to set up the RF sensor. Basically it will be set up the same as all the other sensors except you will need to connect the data pin on the RF sensor to data 3 on the Arduino. I found some recommendations online that suggested adding a 17cm wire as an antenna. Seems to be working well for me so far.



Once you have built the sensors and the Gateway is up and running you can pair the RF Sensor with the Vera. To do this, press the inclusion button in the Vera UI then power up the sensor. I power my Pro Mini sensors with an external 5v power supply as I had trouble trying to power it from the computer USB.