Elegoo Super Starter Kit for UNO

V1.0.18.12.18

Preface

Our Company

Established in 2011, Elegoo Inc. is a thriving technology company dedicated to open-source hardware research & development, production and marketing. Located in Shenzhen, the Silicon Valley of China, we have grown to over 150+ employees with a 10,763+ square ft. factory.

Our product lines rang from DuPont wires, UNO R3 boards to complete starter kits designed for customers of any level to learn Arduino knowledge. In addition, we also sell products of Raspberry Pi accessories like 2.8'' TFT touch and STM32. In the future we would devote more energy and investment to 3D printer products and so on. All of our products comply with international quality standards and are greatly appreciated in a variety of different markets throughout the world.

Official website:http://www.elegoo.com

US Amazon storefront: http://www.amazon.com/shops/A2WWHQ25ENKVJ1

CA Amazon storefront: http://www.amazon.ca/shops/A2WWHQ25ENKVJ1

UK Amazon storefront: http://www.amazon.co.uk/shops/AZF7WYXU5ZANW

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ES Amazon storefront: http://www.amazon.es/shops/AZF7WYXU5ZANW

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Our Tutorial

This tutorial is designed for beginners. You will learn all the basic information about how to use Arduino controller board, sensors and components. If you want to study Arduino in more depth, we recommend that you read the Arduino Cookbook written by Michael Margolis.

Some codes in this tutorial is edited by Simon Monk. Simon Monk is author of a number of books relating to Open Source Hardware. They are available in Amazon: Programming Arduino, 30 Arduino Projects for the Evil Genius and Programming the Raspberry Pi.

Customer Service

As a continuous and fast growing technology company we keep striving our best to

offer you excellent products and quality service as to meet your expectation and you can reach out to us by simply drop a line at service@elegoo.com or EUservice@elegoo.com. We look forward to hearing from you and any of your critical comment or suggestion would be much valuable to us.

And any of problems and questions you have with our products will be promptly replied by our experienced engineers within 12 hours (24hrs during holiday)

Packing list

www.elegoo.com

Stepper Motor
1PC

Servo Motor
(SG90)
1PC

IR Receiver
Module
1PC

5V Relay
1PC

Uno R3
Controller
Board
1PC

LCD 1602 Module
(with pin header)
1PC

ULN2003 Stepper
Motor Driver
Module
1PC

Power Supply
Module
1PC

Prototype Expansion
Module
1PC

Contact us : service@elegoo.com

4 digit 7 - segment Display 1PC

1 digit 7 -segment Display 1PC

Tilt Ball Switch 1PC

Fan Blade and 3-6V DC Motor (with wire) each 1PC

Joystick Module 1PC

DHT11 Temperature and Humidity Module 1PC

Ultrasonic Sensor 1PC

Button (Small)
5PCS

Potentiometer
1PC

Passive Buzzer
1PC

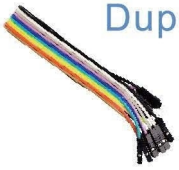
9V Battery with
Snap-on Connector
Clip 1PC

Active Buzzer
1PC

Remote
1PC

USB Cable
1PC

Female-to-male
Dupont wire
10PCS



Breadboard Jumper
Wire 65PCS

74HC595 IC
1PC

L293D
1PC

830 Tie-Points
Breadboard
1PC

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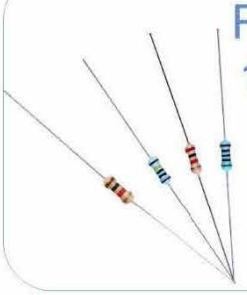
Thermistor
1PC

Diode Rectifier
2PCS

LED
25PCS

Photoresistor
(Photocell)
2PCS

Resistor
120PCS



RGB
2PCS

NPN Transistor
PN2222
2PCS

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Content

Lesson 13 IR Receiver Module

Overview

Using an IR Remote is a great way to have wireless control of your project.

Infrared remotes are simple and easy to use. In this tutorial we will be connecting the IR receiver to the UNO, and then use a Library that was designed for this particular sensor.

In our sketch we will have all the IR Hexadecimal codes that are available on this remote, we will also detect if the code was recognized and also if we are holding down a key.

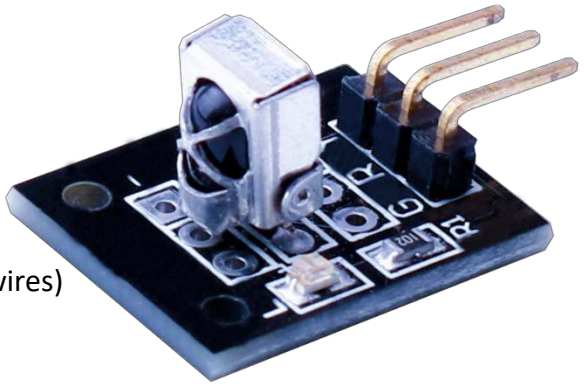
Component Required:

(1) x Elegoo Uno R3

(1) x IR receiver module

(1) x IR remote

(3) x F-M wires (Female to Male DuPont wires)



Component Introduction

IR RECEIVER SENSOR:

IR detectors are little microchips with a photocell that are tuned to listen to infrared light. They are almost always used for remote control detection - every TV and DVD player has one of these in the front to listen for the IR signal from the clicker. Inside the remote control is a matching IR LED, which emits IR pulses to tell the TV to turn on, off or change channels. IR light is not visible to the human eye, which means it takes a little more work to test a setup.

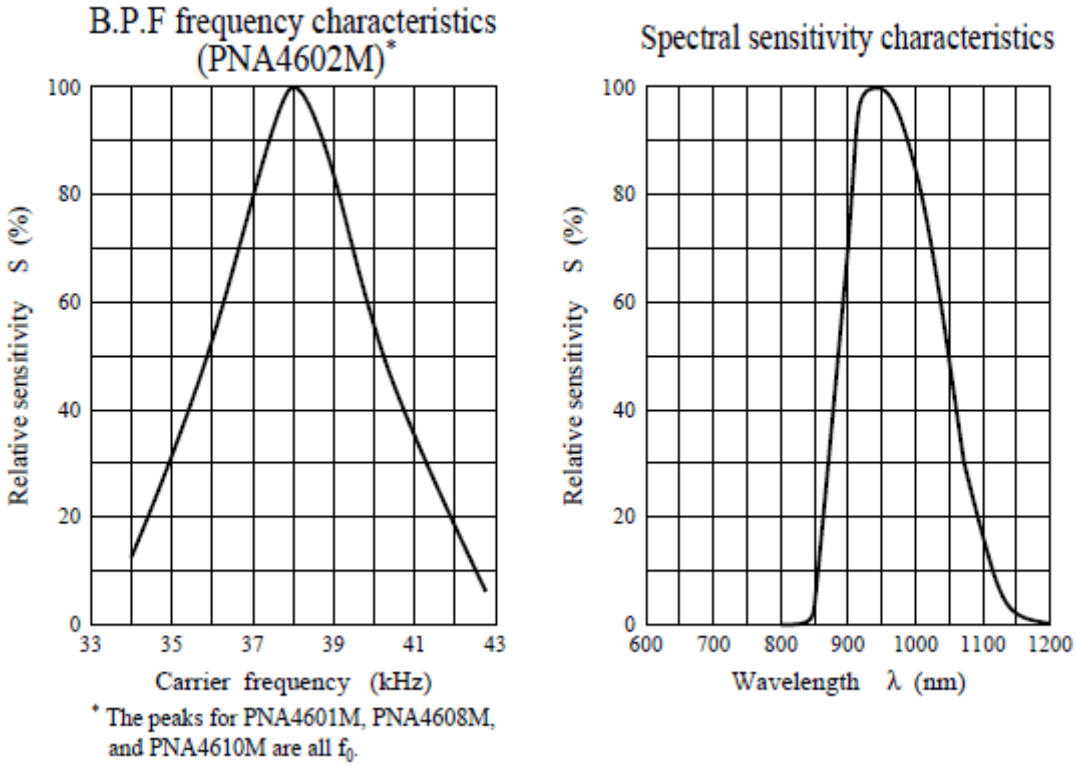
There are a few difference between these and say a CdS Photocells:

IR detectors are specially filtered for IR light, they are not good at detecting visible light. On the other hand, photocells are good at detecting yellow/green visible light, and are not good at IR light.

IR detectors have a demodulator inside that looks for modulated IR at 38 KHz. Just shining an IR LED won't be detected, it has to be PWM blinking at 38KHz. Photocells do not have any sort of demodulator and can detect any frequency (including DC) within the response speed of the photocell (which is about 1KHz)

IR detectors are digital out - either they detect 38KHz IR signal and output low (0V) or they do not detect any and output high (5V). Photocells act like resistors, the resistance changes depending on how much light they are exposed to.

What You Can Measure

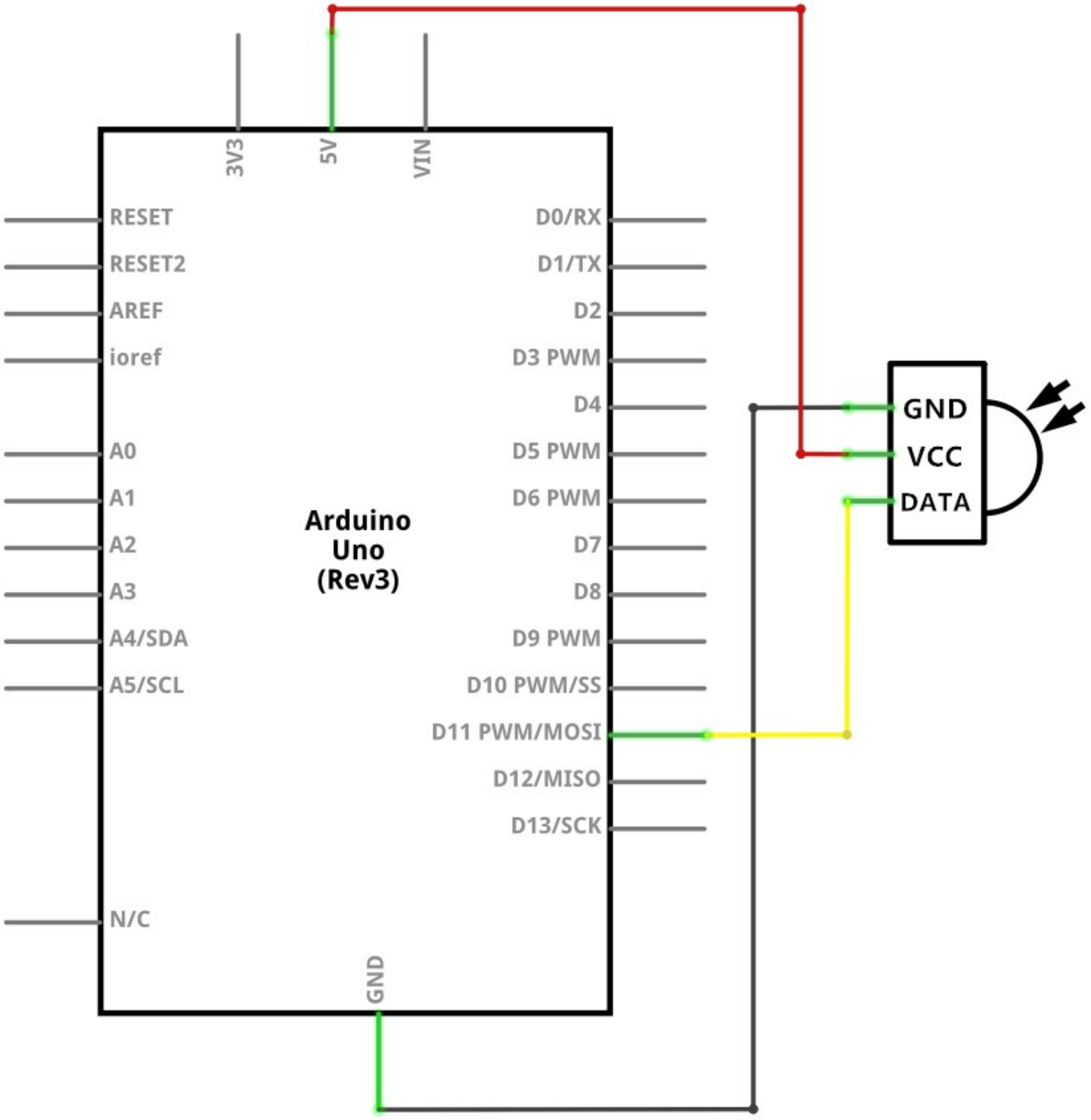


As you can see from these datasheet graphs, the peak frequency detection is at 38 KHz and the peak LED color is 940 nm. You can use from about 35 KHz to 41 KHz but the sensitivity will drop off so that it won't detect as well from afar. Likewise, you can use 850 to 1100 nm LEDs but they won't work as well as 900 to 1000nm so make sure to get matching LEDs! Check the datasheet for your IR LED to verify the wavelength.

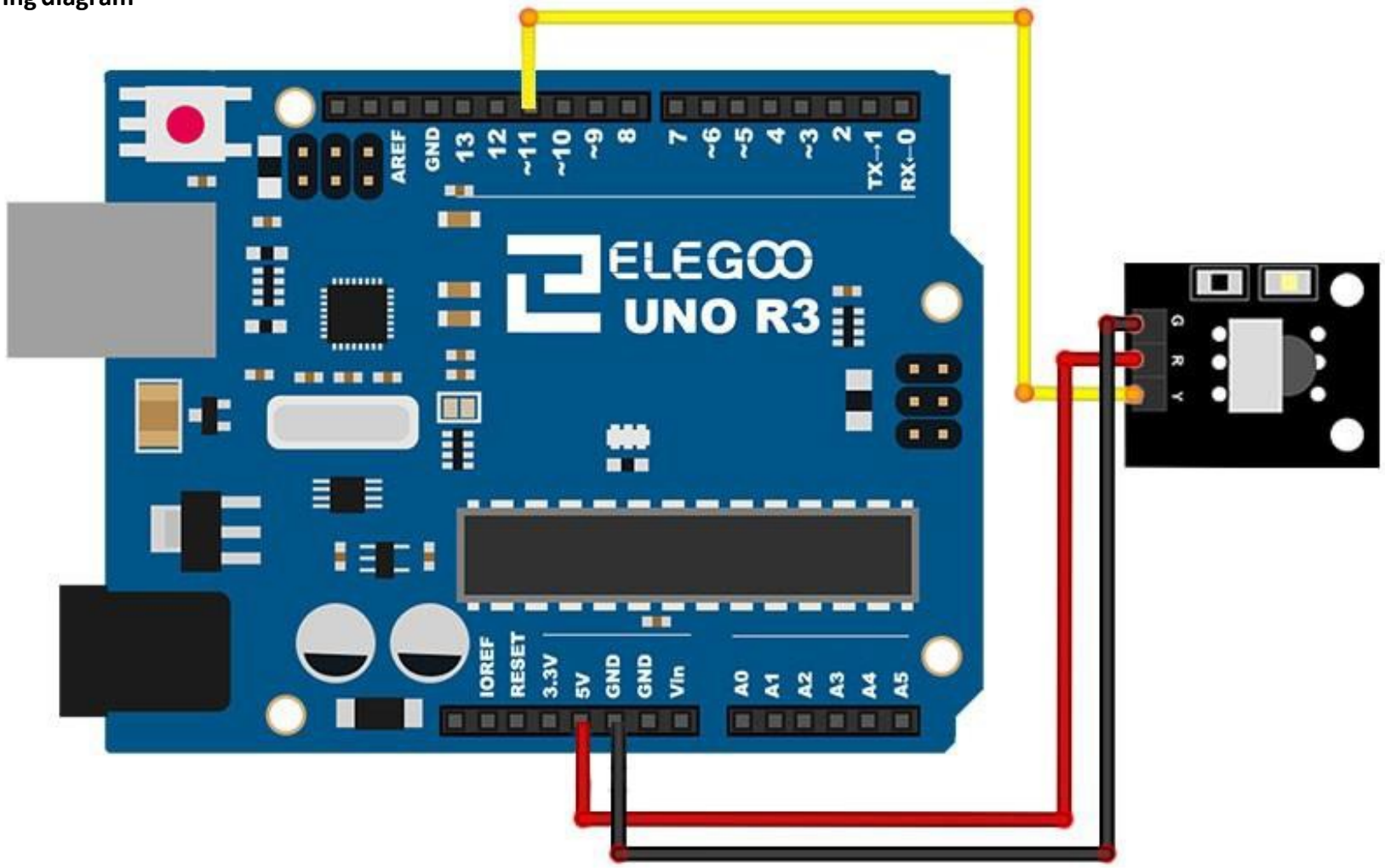
Try to get a 940nm - remember that 940nm is not visible light!

Connection

Schematic



Wiring diagram



There are 3 connections to the IR Receiver.

The connections are: Signal, Voltage and Ground.

The “-” is the Ground, “S” is signal, and middle pin is Voltage 5V.

Code

After wiring, please open the program in the code folder- Lesson 13 IR Receiver Module and click UPLOAD to upload the program. See Lesson 2 for details about program uploading if there are any errors.

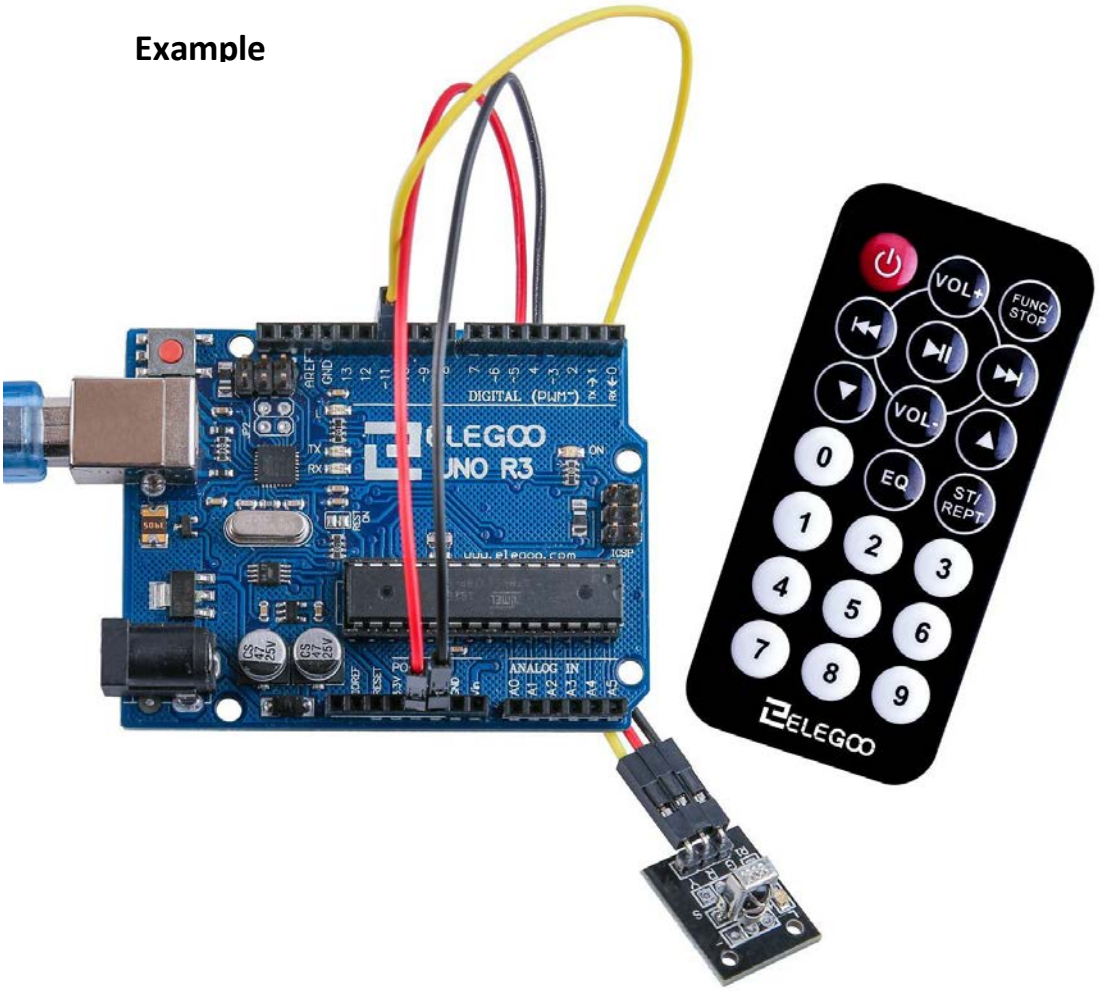
Before you can run this, make sure that you have installed the < IRremote > library or re-install it, if necessary. Otherwise, your code won't work.

For details about loading the library file, see Lesson 1.

Next we will move the <RobotIRremote> out of the Library folder, we do this because that library conflicts with the one we will be using. You can just drag it back inside the library folder once you are done programming your microcontroller.

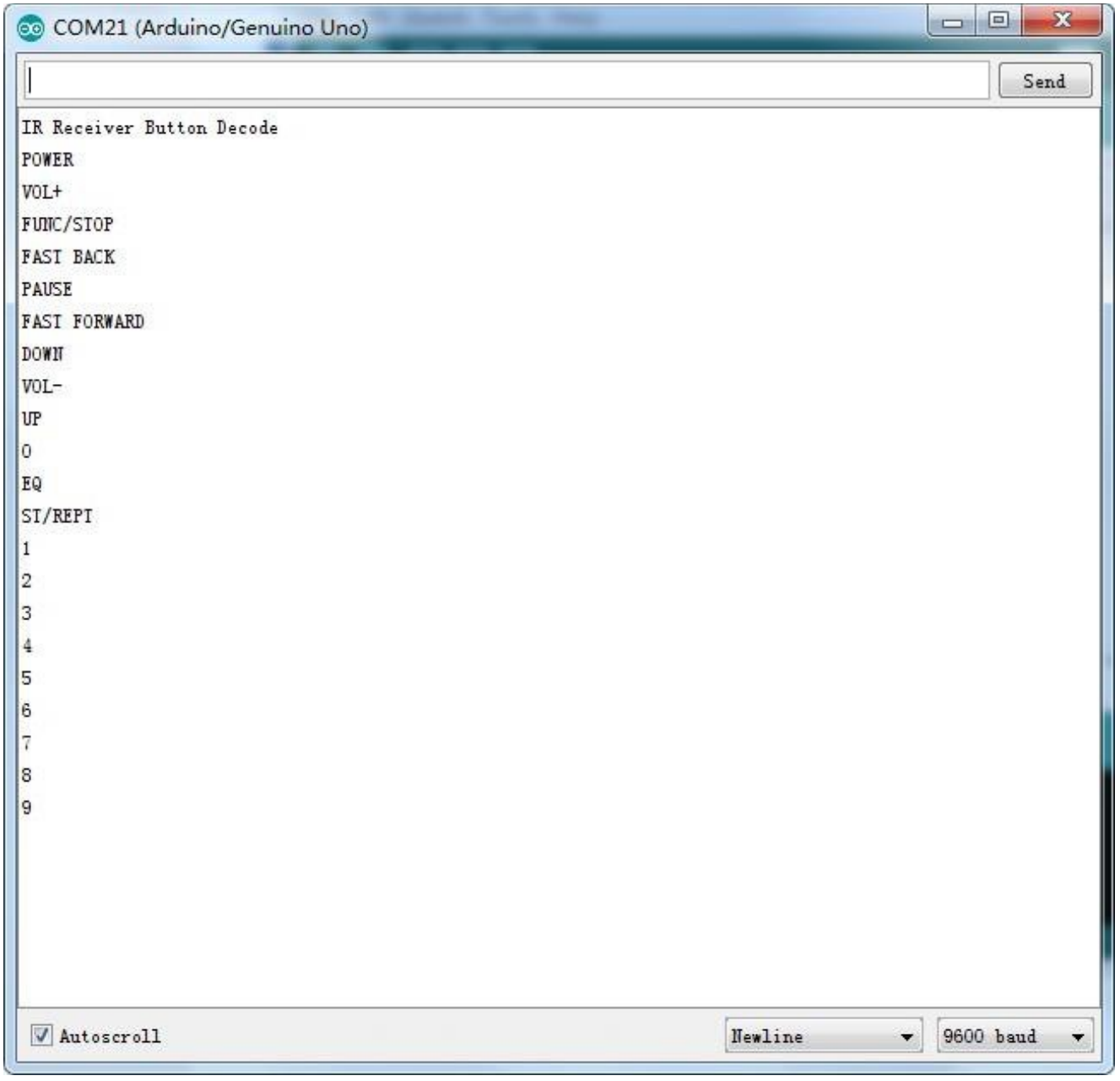
Once you have installed the Library, just go ahead and restart your

Example



Open the monitor then you can see the data asblow:

Click the Serial Monitor button to turn on the serial monitor. The basics about the serial monitor are introduced in details in Lesson 1.



Lesson 23 Stepper Motor

Overview

In this lesson, you will learn a fun and easy way to drive a stepper motor.
The stepper we are using comes with its own driver board making it easy to connect to our UNO.

Component Required:

(1) x Elegoo Uno R3

(1) x 830 tie-points breadboard

(1) x ULN2003 stepper motor driver module

(1) x Stepper motor

(1) x 9V1A Adapter

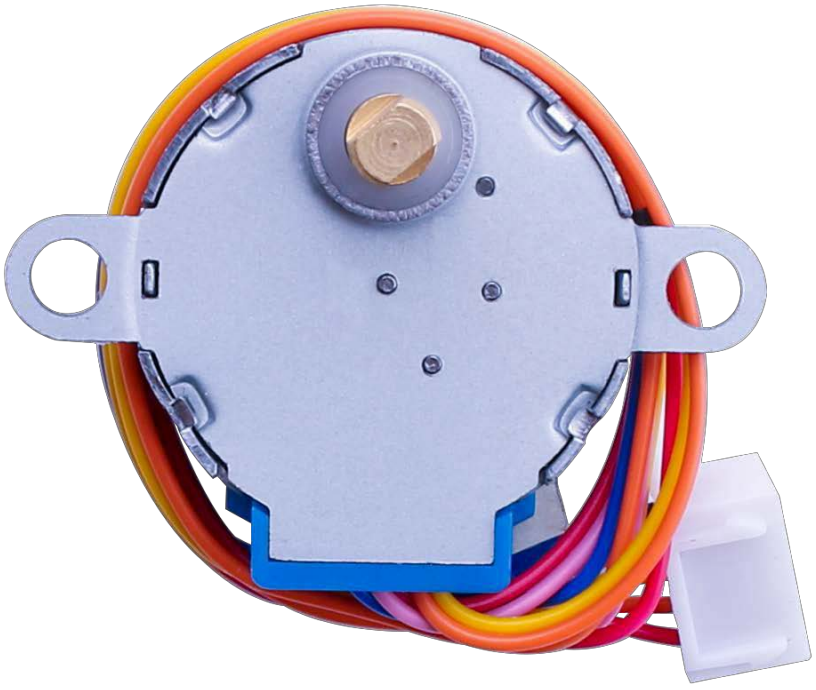
(1) x Power supply module

(6) x F-M wires (Female to Male DuPont wires)

(1) x M-M wire (Male to Male jumper wire)

Component Introduction

Stepper Motor

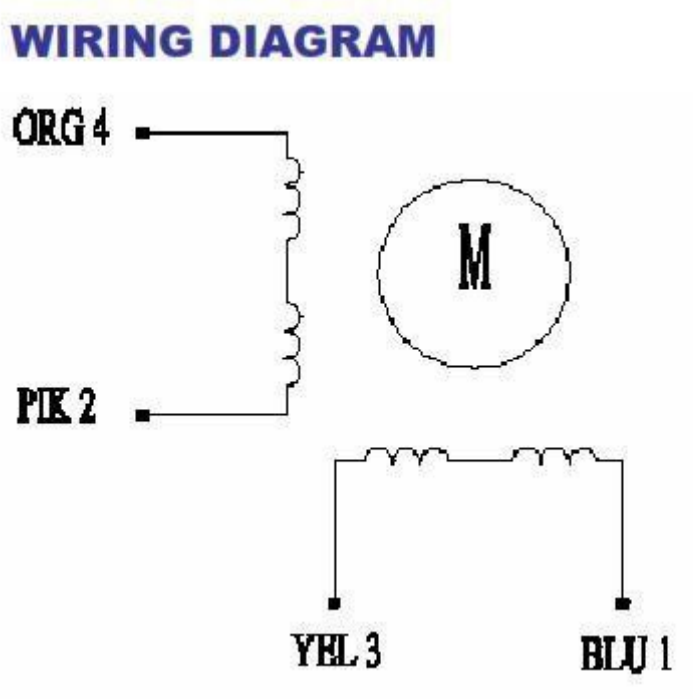


A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates in discrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied. One of the most significant advantages of a stepper motor is its ability to be accurately controlled in an open loop system. Open loop control means no feedback information about position is needed. This type of control eliminates the need for expensive sensing and feedback devices such as optical encoders. Your position is known simply by keeping track of the input step pulses.

Stepper motor 28BYJ-48 Parameters

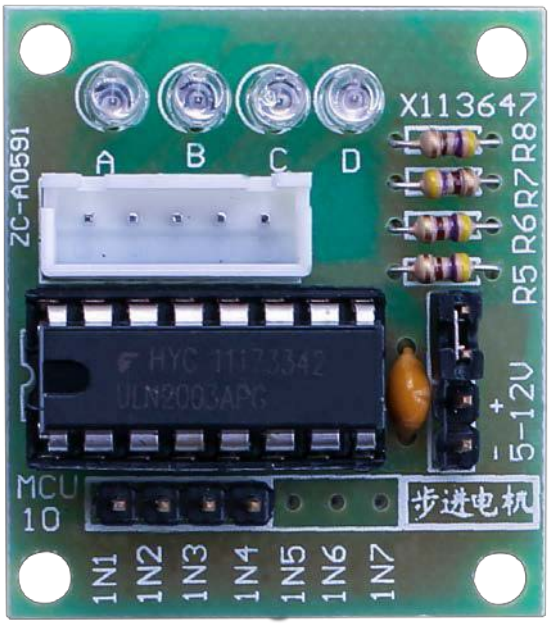
- Model: 28BYJ-48
- Rated voltage: 5VDC
- Number of Phase: 4
- Speed Variation Ratio: 1/64
- Stride Angle: 5.625° /64
- Frequency: 100Hz
- DC resistance: 50Ω±7%(25℃)
- Idle In-traction Frequency: > 600Hz
- Idle Out-traction Frequency: > 1000Hz
- In-traction Torque >34.3mN.m(120Hz)
- Self-positioning Torque >34.3mN.m
- Friction torque: 600-1200 gf.cm
- Pull in torque: 300 gf.cm
- Insulated resistance >10MΩ(500V)
- Insulated electricity power：600VAC/1mA/1s
- Insulation grade：A
- Rise in Temperature <40K(120Hz)
- Noise <35dB(120Hz,No load,10cm)

Interfacing circuits



The bipolar stepper motor usually has four wires coming out of it. Unlike unipolar steppers, bipolar steppers have no common center connection. They have two independent sets of coils instead. You can distinguish them from unipolar steppers by measuring the resistance between the wires. You should find two pairs of wires with equal resistance. If you've got the leads of your meter connected to two wires that are not connected (i.e. not attached to the same coil), you should see infinite resistance (or no continuity).

ULN2003 Driver Board



Product Description

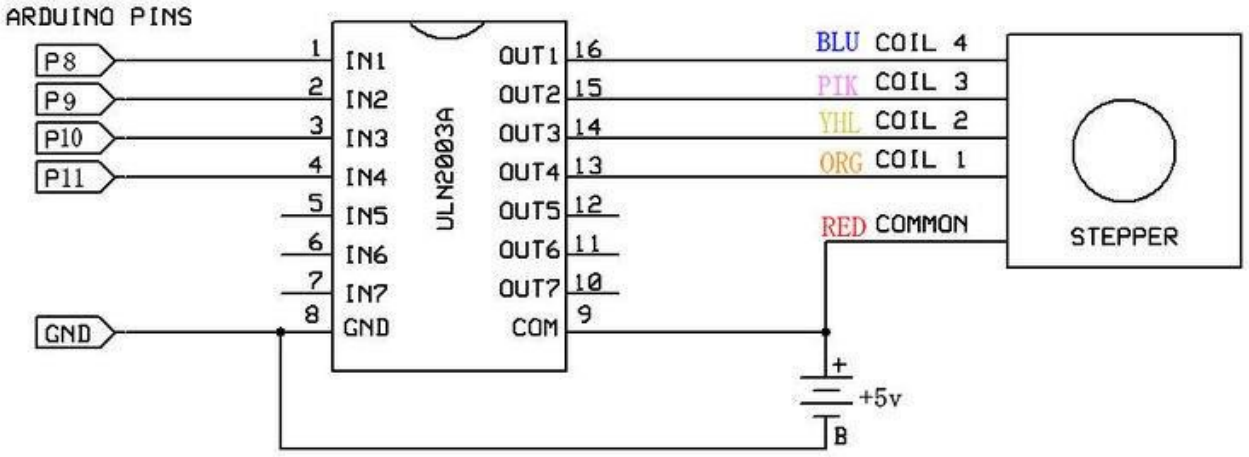
- Size: 42mmx30mm
- Use ULN2003 driver chip, 500mA
- A. B. C. D LED indicating the four phase stepper motor working condition.
- White jack is the four phase stepper motor standard jack.
- Power pins are separated
- We kept the rest pins of the ULN2003 chip for your further prototyping.

The simplest way of interfacing a unipolar stepper to Arduino is to use a breakout for ULN2003A transistor array chip. The ULN2003A contains seven Darlington transistor drivers and is somewhat like having seven TIP120 transistors all in one package. The ULN2003A can pass up to 500 mA per channel and has an internal voltage drop of about 1V when on. It also contains internal clamp diodes to dissipate voltage spikes when driving inductive loads. To control the stepper, apply voltage to each of the coils in a specific sequence.

The sequence would go like this:

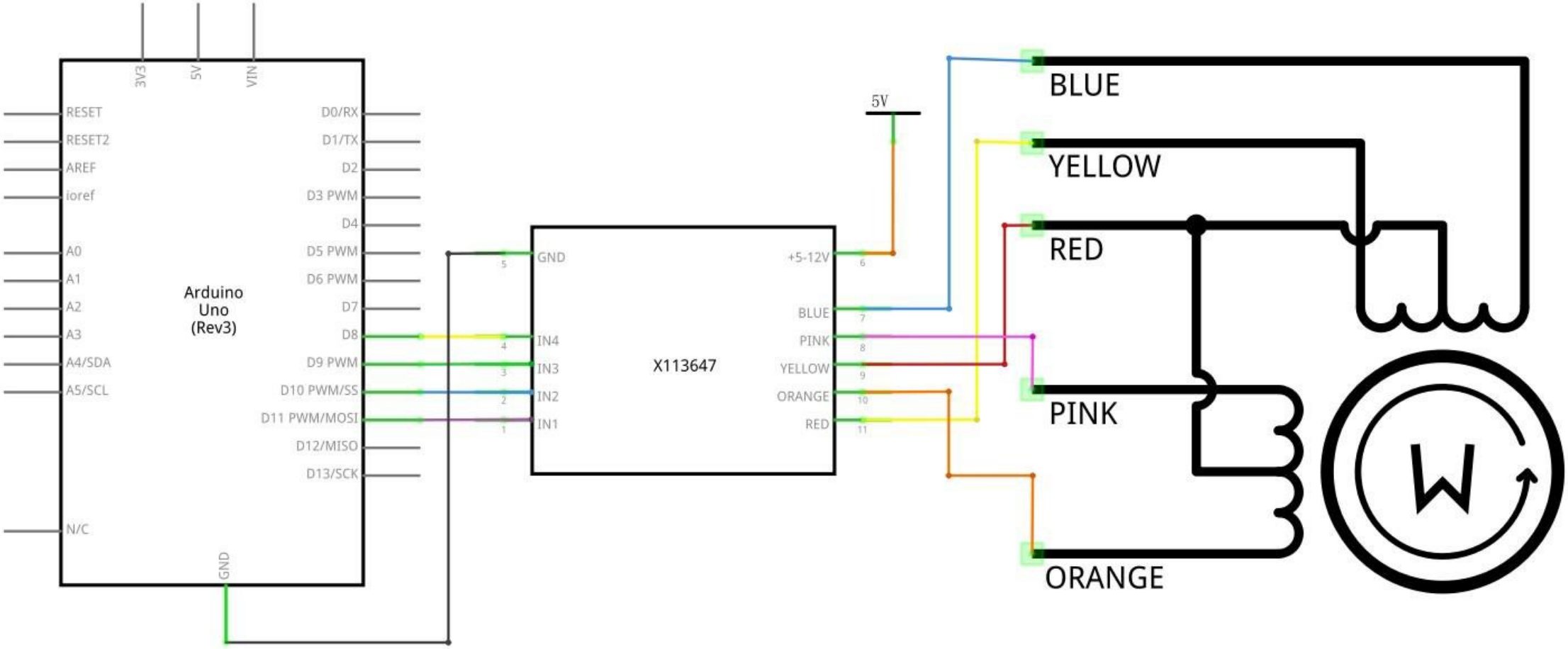
Lead Wire Color	---> CW Direction (1-2 Phase)							
	1	2	3	4	5	6	7	8
4 ORG	-	-						-
3 YEL		-	-	-				
2 PIK				-	-	-		
1 BLU						-	-	-

Here are schematics showing how to interface a unipolar stepper motor to four controller pins using a ULN2003A, and showing how to interface using four com

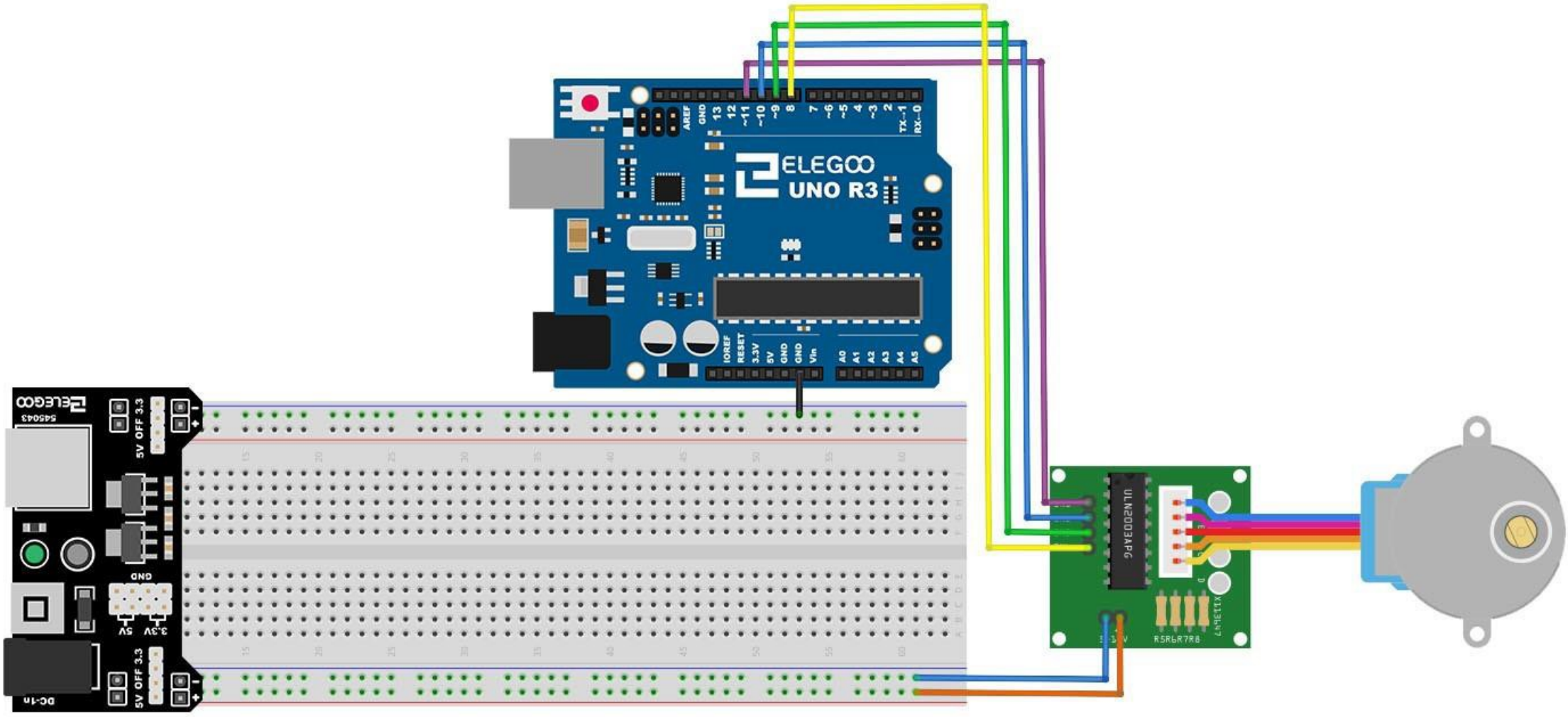


Connection

Schematic



Wiring diagram



We are using 4 pins to control the Stepper.

Pin 8-11 are controlling the Stepper motor.

We connect the Ground from to UNO to the Stepper motor.

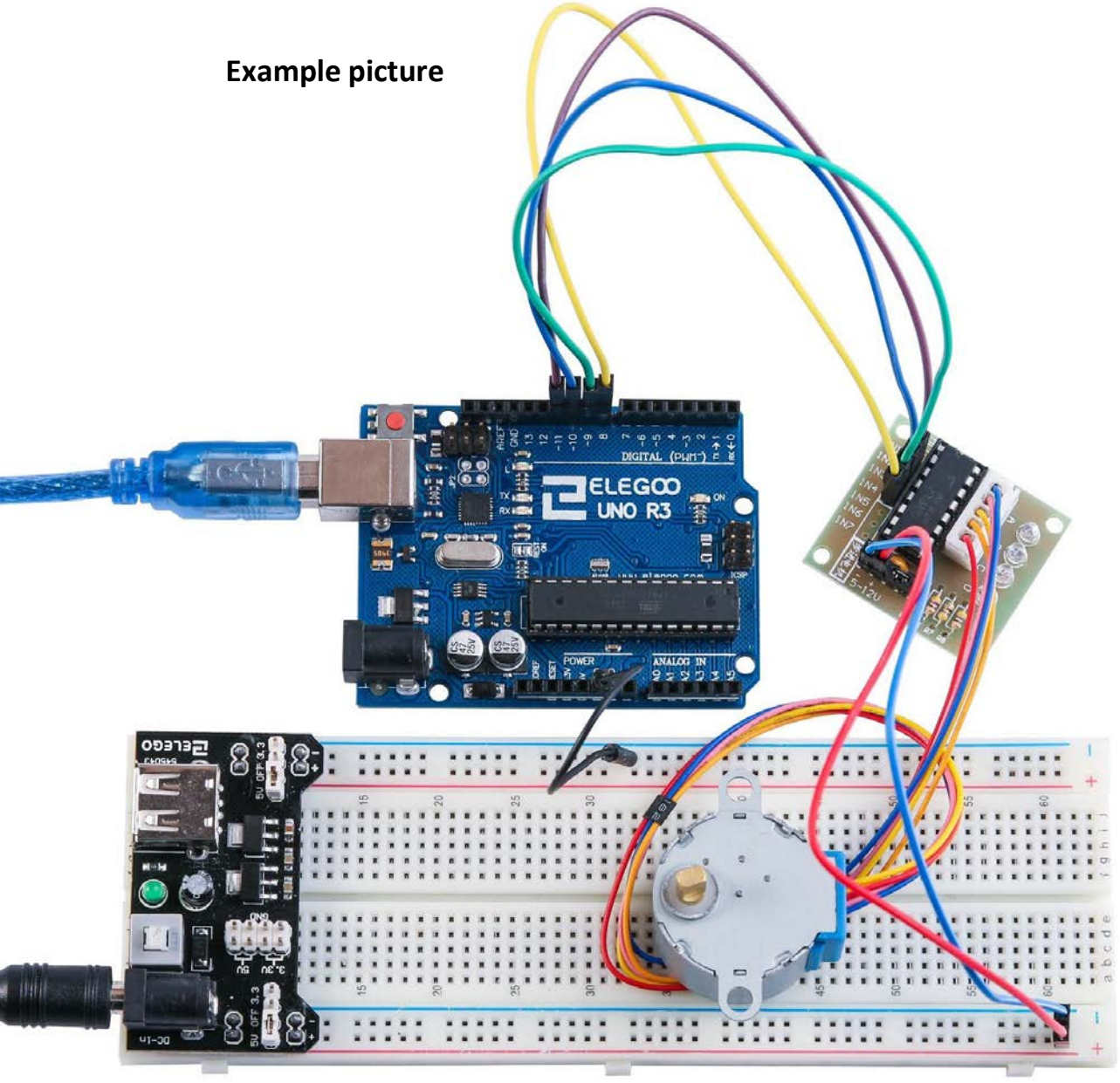
Code

After wiring, please open the program in the code folder- Lesson 23 Stepper Motor and click UPLOAD to upload the program. See Lesson 2 for details about program uploading if there are any errors.

Before you can run this, make sure that you have installed the < Stepper > library or re-install it, if necessary. Otherwise, your code won't work.

For details about loading the library file, see Lesson 1.

Example picture



Lesson 24 Controlling Stepper Motor With Remote

Overview

In this lesson, you will learn a fun and easy way to control a stepper motor from a distance using an IR remote control.

The stepper we are using comes with its own driver board making it easy to connect to our UNO.

Since we don't want to drive the motor directly from the UNO, we will be using an inexpensive little breadboard power supply that plugs right into our breadboard and power it with a 9V 1Amp power supply.

The IR sensor is connected to the UNO directly since it uses almost no power.

Component Required:

(1) x Elegoo Uno R3

(1) x 830 tie-points breadboard

(1) x IR receiver module

(1) x IR remote

(1) x ULN2003 stepper motor driver module

(1) x Stepper motor

(1) x Power supply module

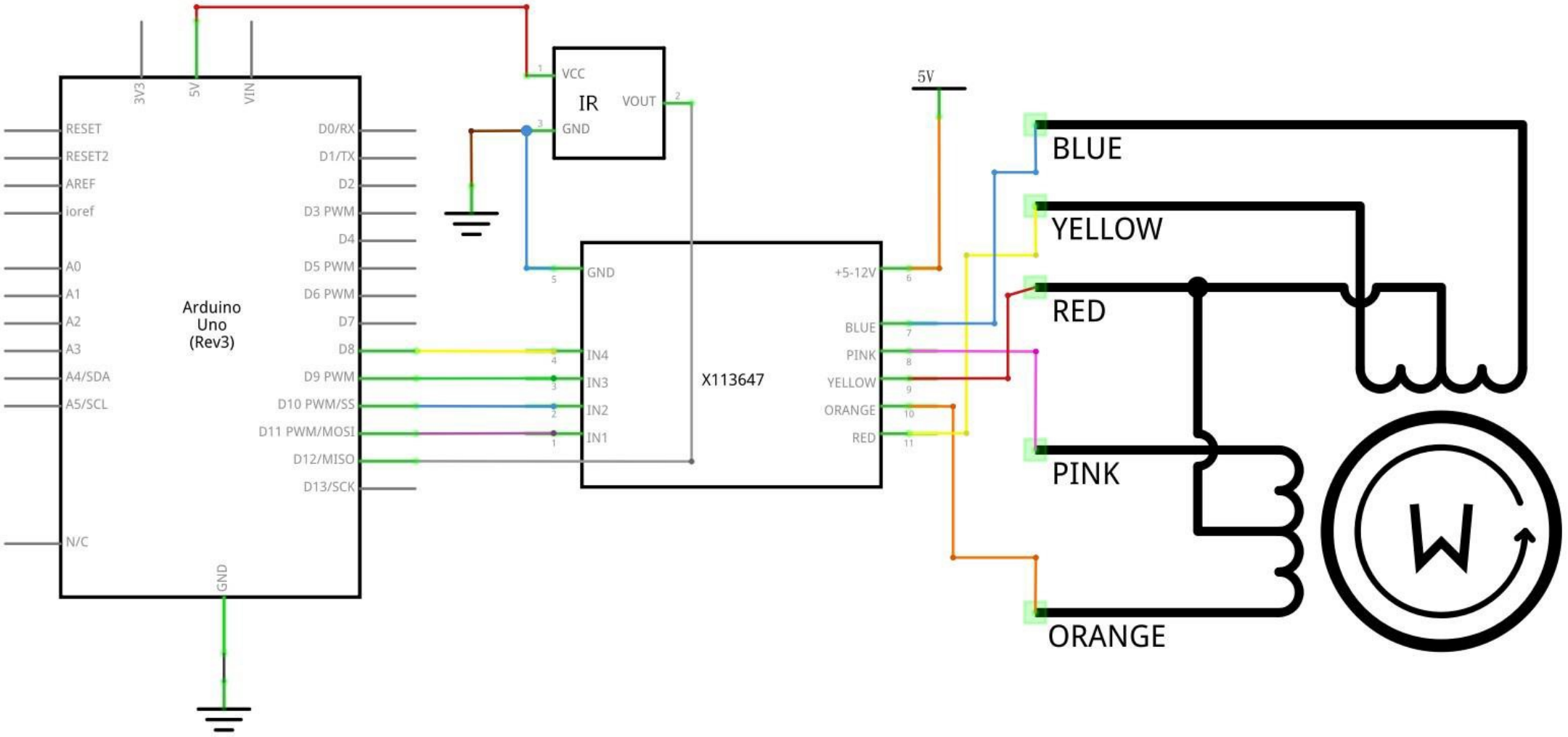
(1) x 9V1A Adapter

(9) x F-M wires (Female to Male DuPont wires)

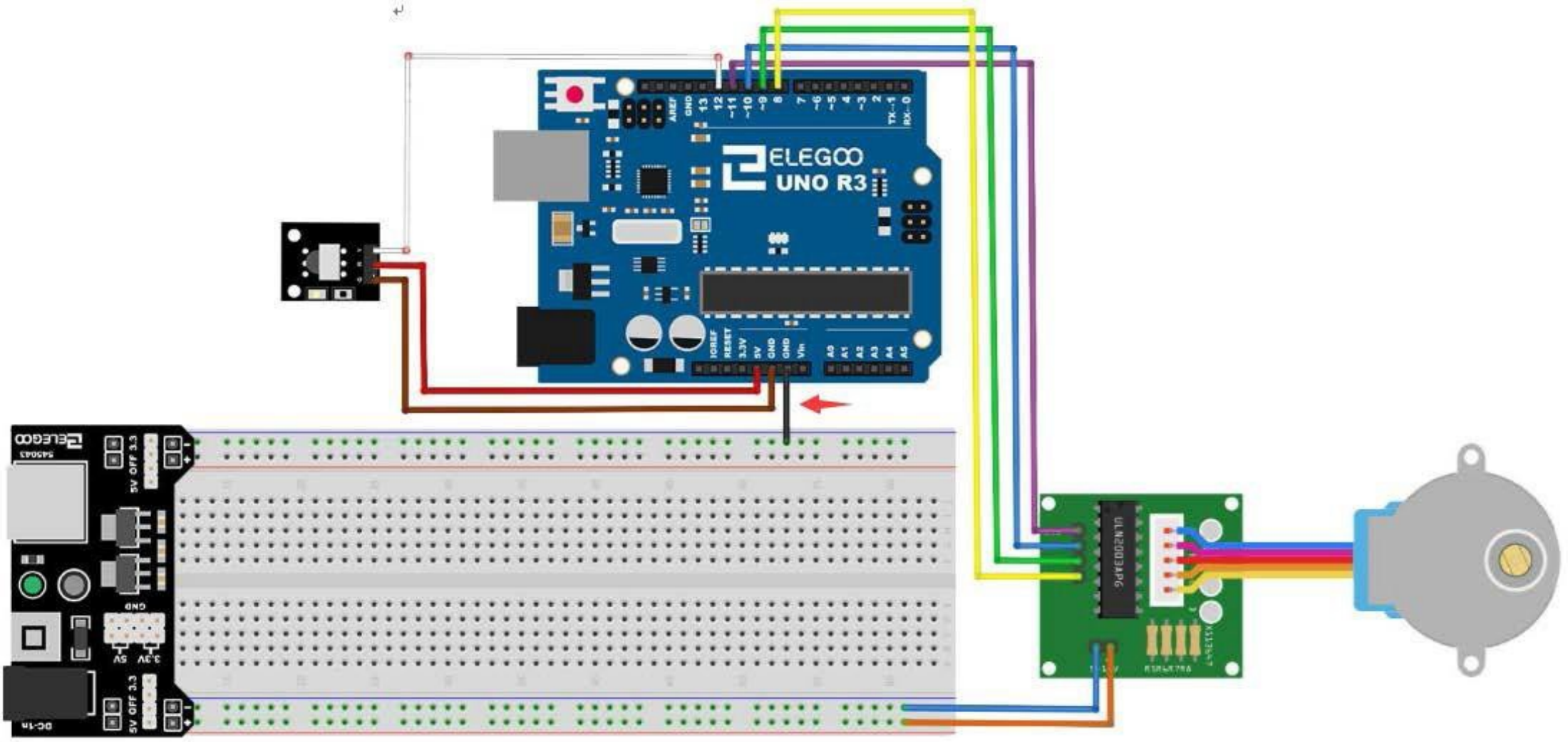
(1) x M-M wire (Male to Male jumper wire)

Connection

Schematic



Wiring diagram



We are using 4 pins to control the Stepper and 1 pin for the IR sensor.
Pins 8-11 are controlling the Stepper motor and pin 12 is receiving the IR information.
We connect the 5V and Ground from the UNO to the sensor. As a precaution, use a breadboard power supply to power the stepper motor since it can use more power and we don’t want to damage the power supply of the UNO.

Code

After wiring, please open program in the code folder- Lesson 24 Controlling Stepper Motor With Remote and click UPLOAD to upload the program. See Lesson 2 for details about program uploading if there are any errors.
Before you can run this, make sure that you have installed the < IRremote >
< Stepper >library or re-install it, if necessary. Otherwise, your code won't work.
For details about loading the library file, see Lesson 1.
The code only recognize 2 values from the IR Remote control: VOL+ and VOL-.
When VOL+ is pressed on the remote the motor will make a full rotation clockwise.
VOL- will make a full rotation counter-clockwise.

Example picture