

Step-by-Step Instructions for Building and Programming an Arduino-Controlled Robot

Scientist in Residence Grant Project

Supplies Needed Per Robot:

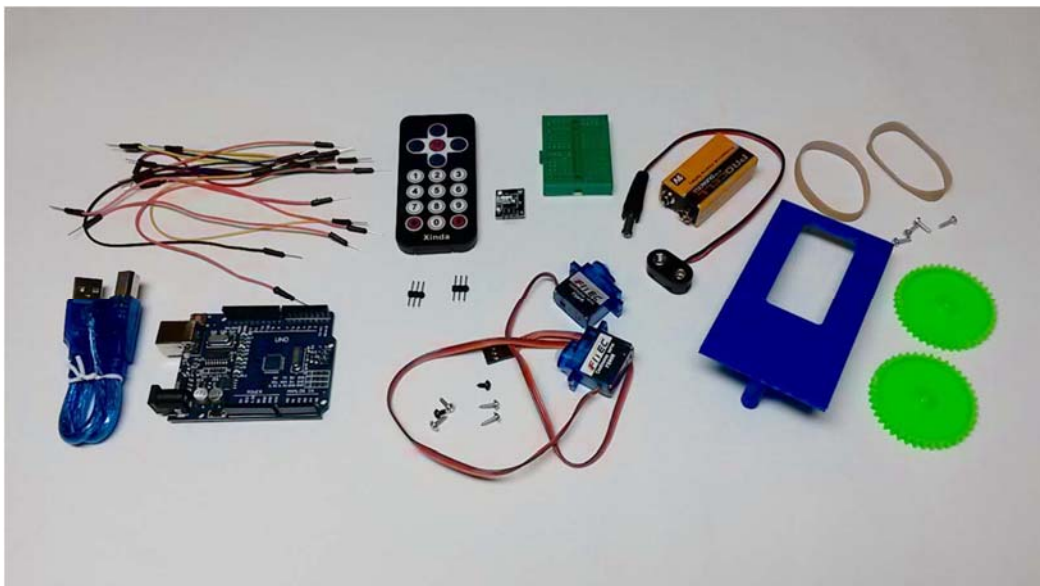
- 1 - Arduino Uno microcontroller board
- 1 - USB Cable to connect Arduino to computer
- 1 - Mini breadboard
- 1 - Remote control with infrared receiver
- 2 - Continuous Rotation Servo Motors
- 9 - Conductors (jumper wires)
- 1 - 9V battery
- 1 - 9V battery clip
- 1 - 3D printed chassis
- 2 - 3D printed wheels
- 4 - 5/16" screws to attach Arduino to chassis
- 2 - Screws to attach wheels to servo motors (one screw is included with each servo motor package)
- 2 - 3 Pin Extended Length Headers (same length on each side)
- 2 - ¼" rubber bands to provide traction for your wheels (optional)

You will also need:

Small Phillips head screwdriver

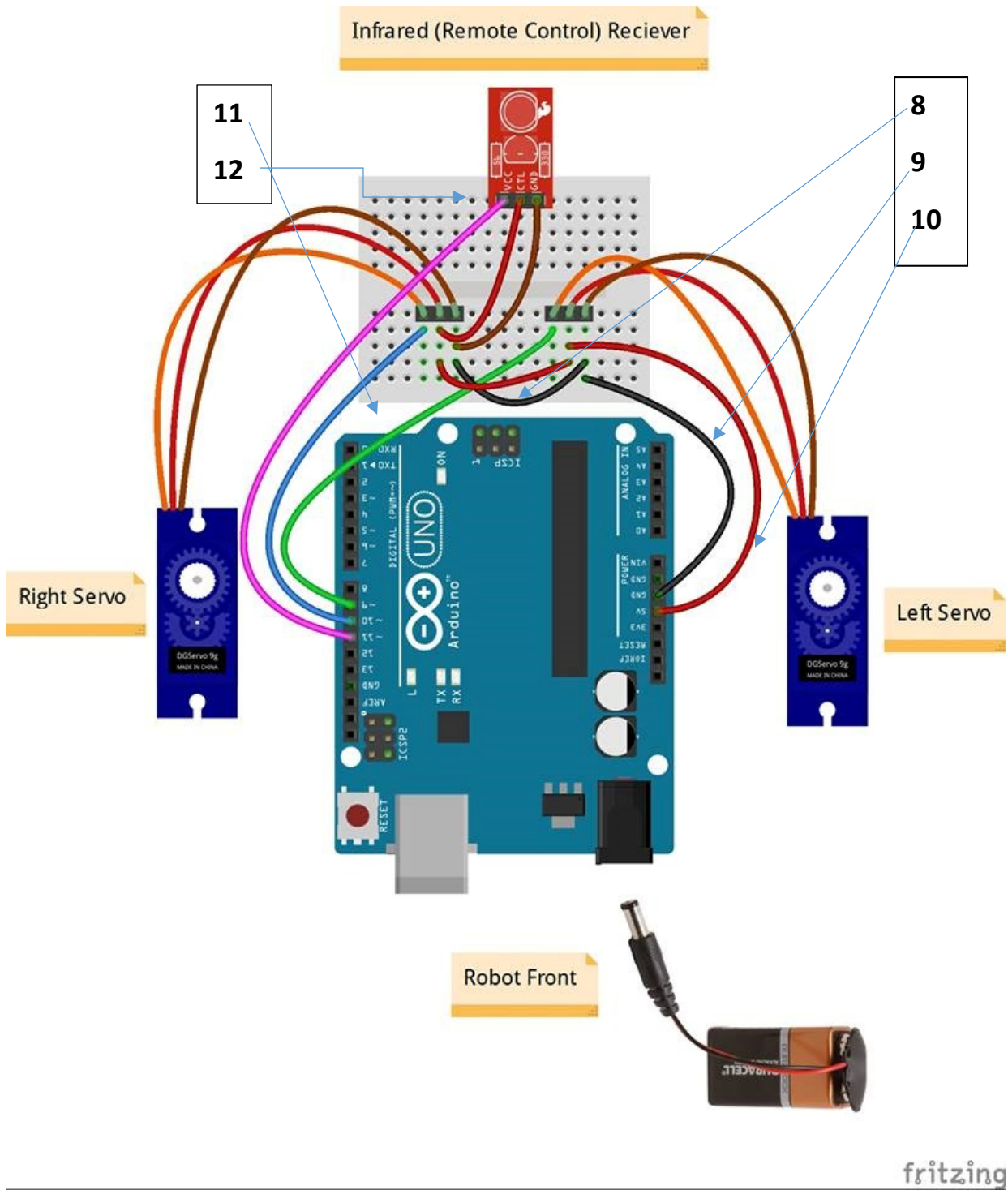
Scissors to open component bags

Computer with Arduino Genuino IDE software (Windows needs CH340 Win driver installed)



Robot Assembly (The wiring diagram is shown on page 3)

- 1- Attach the Arduino to the chassis by lining up the screw holes. You will need 4 – 5/16” screws. Be careful not to overtighten the screws!
- 2- Attach the breadboard: Be sure board is turned so that the peg is pointing off the back of the chassis. Peel and stick.
- 3- Slide/snap the battery into place with connections facing the outside of the chassis.
- 4- Attach the servos using the two longer screws included in the servo package. The white gear shaft goes to the outside. (There are three screws in the bag, the small screw attaches the wheel to the servo.) Turn the bot over. One servo will be label up, the other will be label down. They will be mirror images.
- 5- Use the round white disc from the servo package to snap into the center of each wheel. Then, screw on the wheels using the smaller screw that came with each servo. The rubber bands go around the wheels to provide better traction.
- 6- Now we want to connect the servos to the Arduino. The servo conductor and the breadboard are “female” only, so we need to use pins that came with the Arduino to convert the “female” end of each servo so there are “male” ends. In other words, we need to turn sockets into plugs. We need 3 pins for each servo. Using the wiring diagram for placement, plug the servos into the breadboard.
- 7- Open the remote control bag and find the receiver (looks like a tiny circuit board with 3 pins sticking out). Plug it into the breadboard in the middle rear so that it is facing out (to the rear). Bend down the receiver to it is at a 45 degree angle, but not touching the pins (the breadboard).
Servos = Output Servos do what the Arduino tells them to do.
Receiver = Input Input is received when you press a button on the remote and that input is communicated as output through the Arduino to the servos.
- 8- Take a conductor (jumper wire) and plug it into the negative (brown) servo wire. Take the other end of the conductor (wire) and plug it into the brown slot on the other servo. Do the same with the red wires on the servos. **DO NOT CONNECT ORANGE TOGETHER.**
- 9- Connect ground on the servo (brown) to ground (GND) on the Arduino.
- 10- Red wires on the servos need to be connected to 5V on Arduino.
- 11- Servos: The orange conductor (wire) for the left servo plugs into PIN 9 on the Arduino. PIN 9 was selected in the code to “talk” to the left servo. The right servo plus into PIN 10.
- 12- Infrared Receiver: Connect negative (-) to common ground (GND) on the Arduino. Connect positive (middle) to 5V on the Arduino. Connect the signal wire (s) to PIN 11.



READY?

Hold the robot by the USB connector because the wheels might spin. Plug the battery into the Arduino. You might need to lower or increase the servo center position in the code if your wheels are spinning. If so, look in your code, find:

int leftservocenterposition=94

int rightservocenterposition=87

If the wheels are spinning, lower the center position a little at a time until it stops, then upload the adjusted code. This is called "finding a neutral position" for your servo.

Using the remote:

1-4 are speeds- press #4 (the highest speed) and then one of the arrow keys. It is important that your remote is pointing at the receiver on the robot.

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