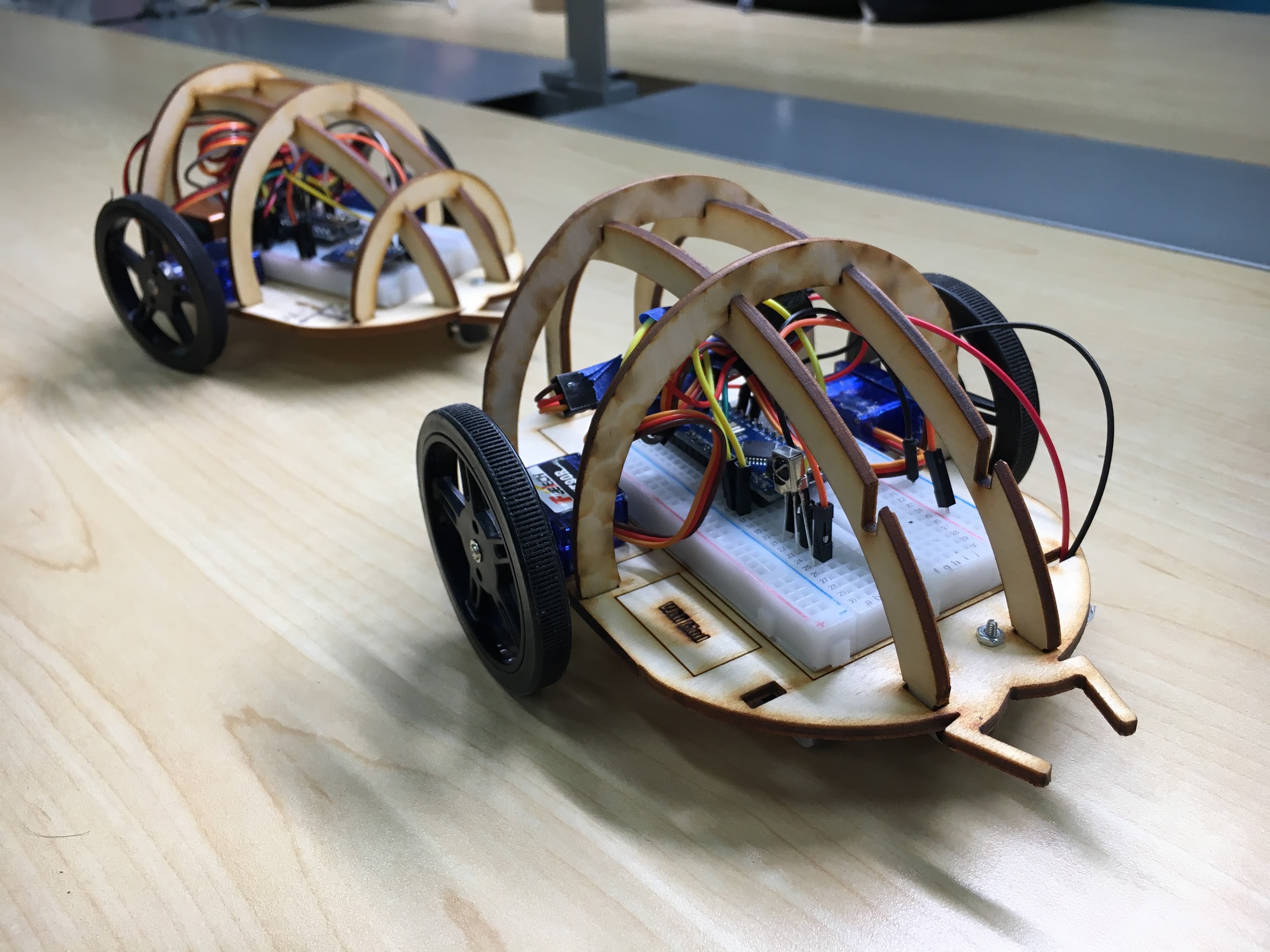
**Developer Guide: SwarmBot**

**A project by**

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# **Introduction**

The idea of this project is to build two robots that can follow each other. Scheme is simple:

1. Leader robot can be controlled via IR remote.
2. Follower robot will follow the leader robot.

# 

# **Hardware**

* Arduino Nano
* Servo + Wheels → allow robots to move around
* Caster Ball ½” → support the robot
* IR Remote
* IR Receiver
* MPU-9250 3-Axis Accelerometer, Gyro, & Magnetometer → location tracking
  + We only use the magnetometer. At least for now.
  + Magnetometer measures magnetic field (intensity, direction)
  + This sensor is installed on **follower robot**. It tracks the location of leader robot
* Breadboard
* Magnet → This is only installed on **leader robot**. It allows follower robot

to track leader robot’s location using magnetometer.

For more details. Visit [**Parts List**](https://docs.google.com/spreadsheets/d/1NqEvrNKO_gMEPasWNwXx2zeLknJX9tPNbHTAOnMAJZo/edit?usp=sharing)**.**

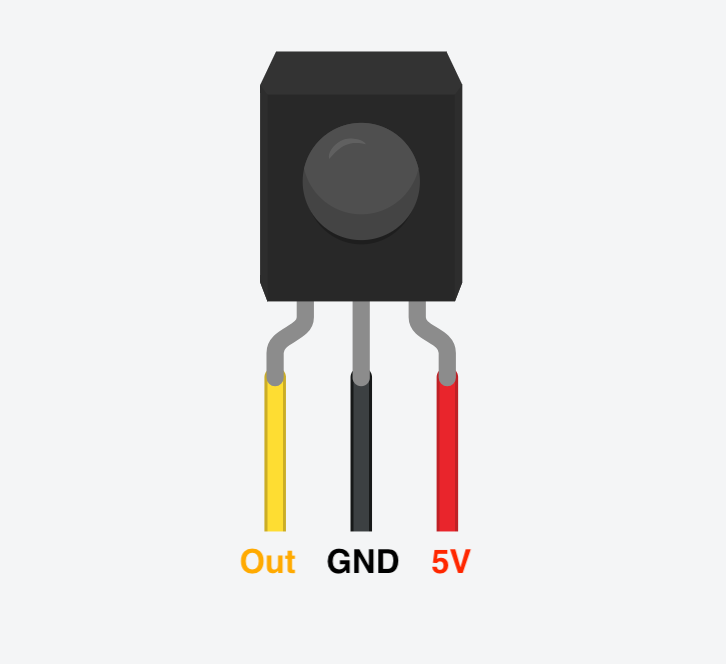
# **Assembly and Code**

## **Leader Robot**

### **1. Connect two servos**

Example code us pin 10 and 11.

### **2. Connect IR receiver**



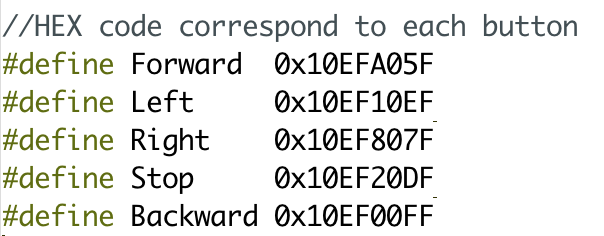
Out → Any digital pin. Example code use pin 12.

### 

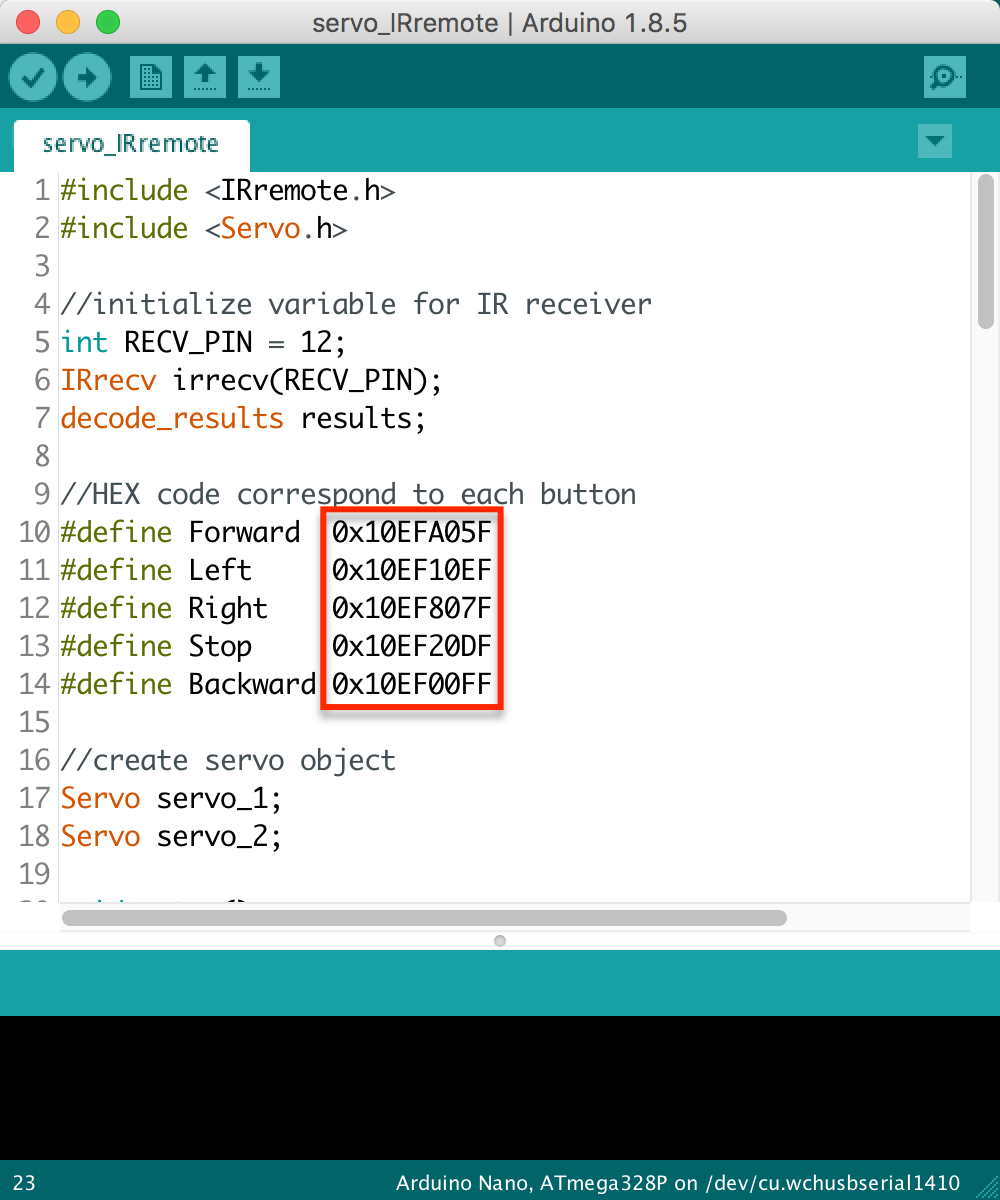
### **3. Decode signal from IR remote**

You need to decode signal from IR remote because arduino needs to know what command (in the form of he1x code) it will receive if a particular button is pressed. Upload [**this**](https://drive.google.com/open?id=1AXYjp2VjIomgsrT9obVaNcW725ZbAg6O) code to arduino and press up (forward), down (backward), left, right, and ok button (stop). Record the hex code for above five buttons.

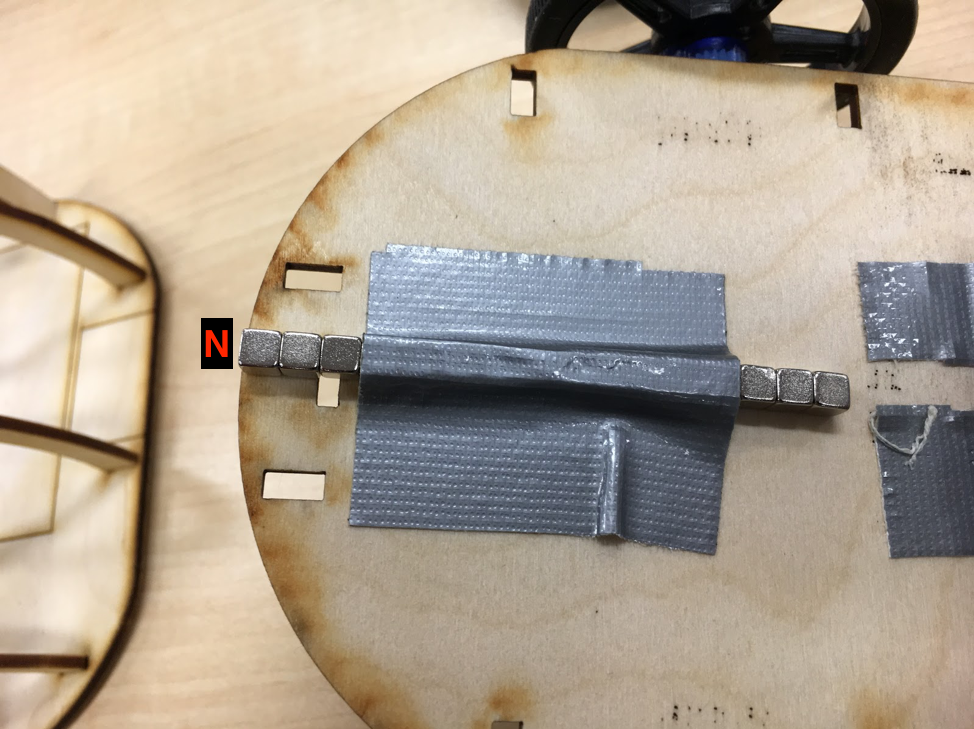
You will get something like this. **Note** hex code might vary depending on model and manufacturer of the IR remote.



### **4. Example code**

[**This**](https://drive.google.com/open?id=1gZRHQ2_GfLfcMuxNQJJNoBGQa_A_u39-) code allows you to control the leader robot with IR remote. You might need to update the hex code for each button if yours are different. 

### **5. Attach magnet**

Make sure the **north** pole of magnet is pointing away from the robot itself. Sensor will have different readings if polarity of magnet is reversed. 

### **6. Connect battery**

Positive (**red**) → VIN

Negative (**black**) → GND

## **Follower Robot**

### **1. Connect two servos**

Same as the[**leader robot**](#_4ea0z3unevw4)**.**

### **2. Connect magnetometer**

See instructions[**here**](https://docs.google.com/document/d/1IYGILpsgvbroK8GGHBjo8NjsGsv3-QTXstASRPQ_MX0/edit?usp=sharing)**.**

### **3. How it works?**

Check out [**this**](https://drive.google.com/file/d/15Zu0gopNMs2UIob8NH0R6qpCf3xnDXz-/view?usp=sharing)demo video. As the leader robot moves, you can see the change of reading on follower robot.

* Absolute value of reading tells distance
  + Leader robot is further → absolute value of reading gets **smaller**
  + Leader robot is cloer → absolute value of reading gets **larger**
* Sign of Y reading tells direction
  + Leader robot moving left → Y is **negative**
  + Leader robot moving right → Y is **positive**