



# - Sound Robot -

TEAM 1

Prepared for *Weavly*

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# | Enclosure |

## Steps

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1. Cut ten rectangular shaped pieces from the foam core/cardboard, according to the following dimensions:

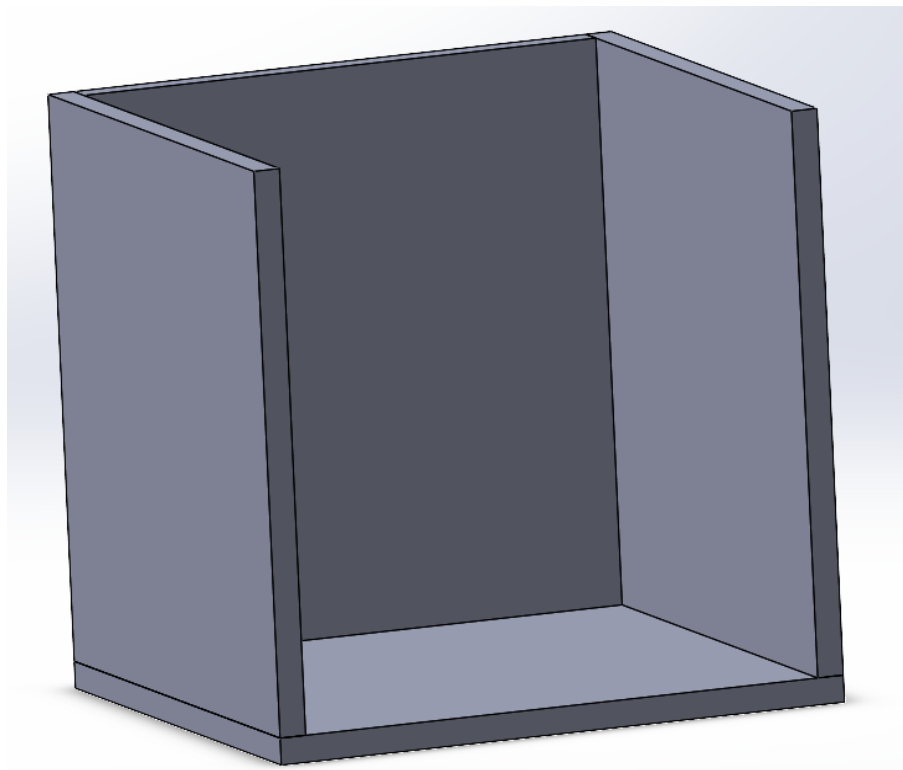
Front/back pieces: **2 cutouts of 21cm x 20cm**

Sides: **2 cutouts of 21cm x 20cm**

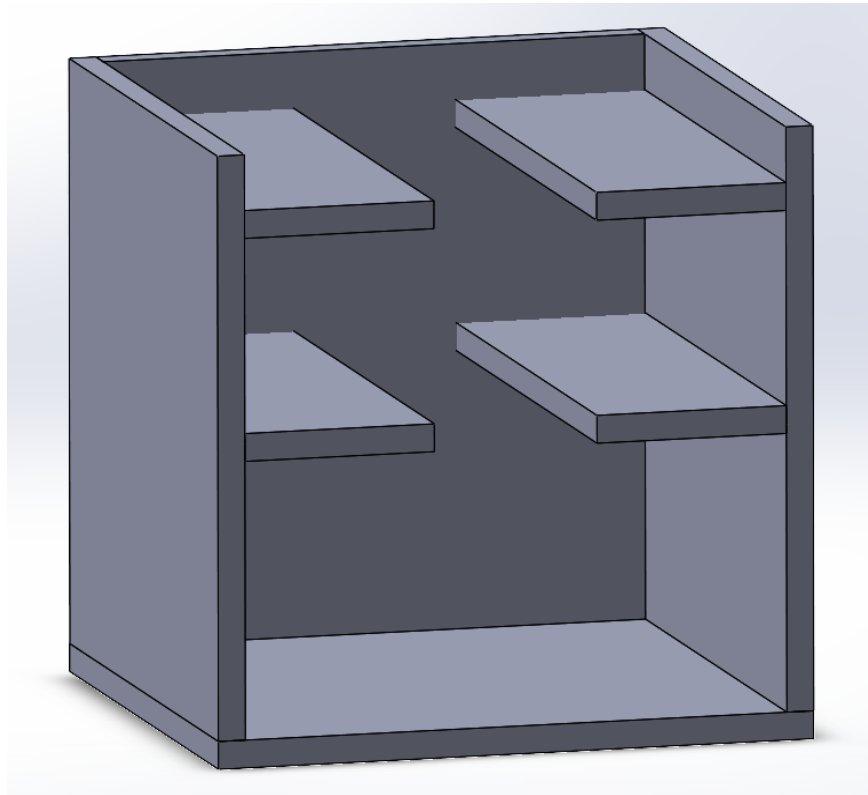
Top/bottom pieces: **2 cutouts of 22cm x 20cm**

Shelf stands: **4 pieces of 20cm x 7cm**

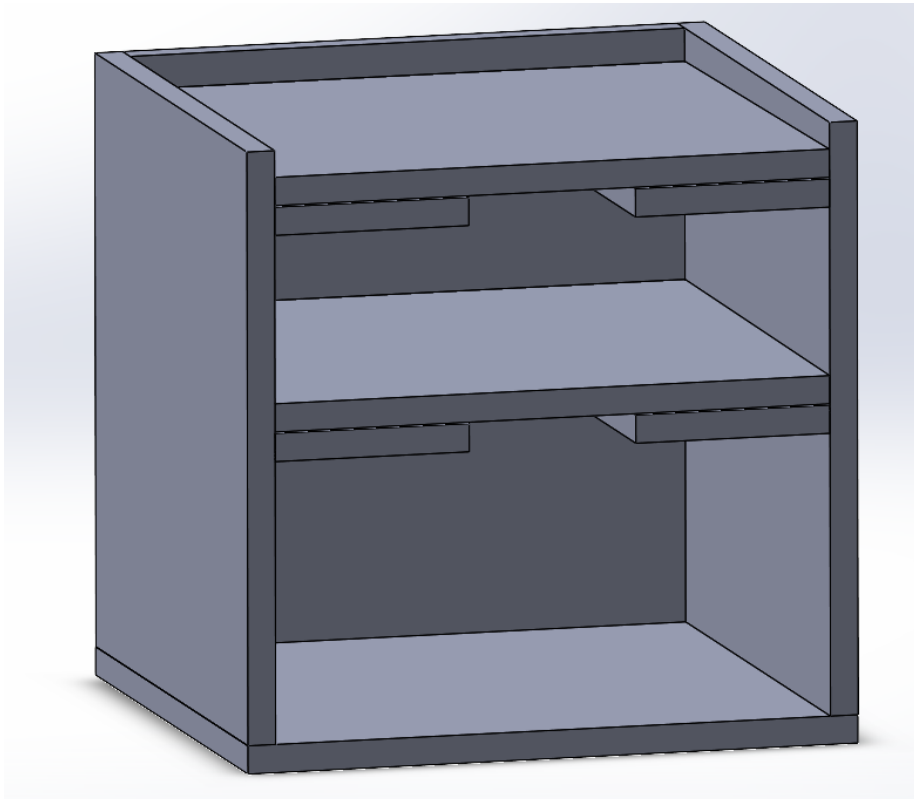
2. Glue four of the pieces (back, sides, bottom) together to create the following shape:



**3.** Next, glue the shelf stands to the sides of the enclosure walls:



**4.** Lastly, place the shelves on the stands, allowing them to slide in and out.

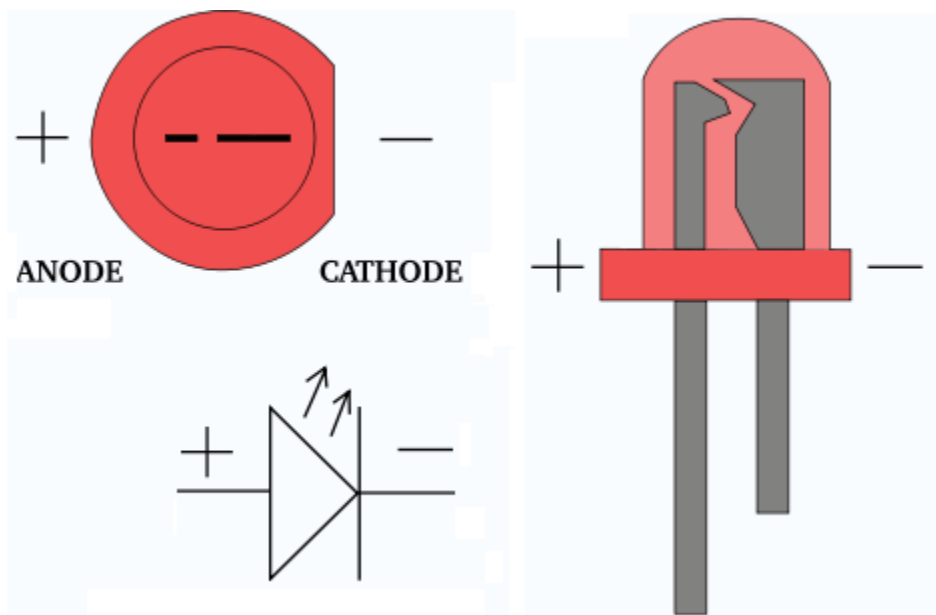


# | Sound System |

This project uses a step sequencer as well as some LEDs to program auditory patterns.

Start by taking eight buttons, and wiring them straddling across the ravine (the central pit) of the breadboard. Line them up as close as possible. On one side of the breadboard, wire the buttons together with several small wires. Make sure that every button is connected to this 'line' of wires. On the other side of the breadboard, wire the 220  $\Omega$  resistors in the exact same fashion. On the leftmost button, connect a wire from the A0 port of the arduino to make contact with the resistor of the breadboard. On this same lane, wire a resistor to ground.

Place all LEDs in such a way that the flat part of the led faces away from you. The flat part of the LED is represented by 'CATHODE' in the following image.



Leave approximately two spaces between the leds, and ensure that the leds straddle the ravine.

On the side facing furthest away from you, wire 1k resistors from the leds to the ground row of the breadboard. On the side facing closest to you, wire the leds from left to right using the digital pins as follows: 13 (left-most), 12, 8, 7, 5, 4, 3, and 2 (right-most).

At this point, wire a simple wire from digital pin 11 of the arduino to your speaker. Ensure that the other connector on the speaker is wired to ground. Ensure that the '-' and '+' lanes on the breadboard are laned to ground and 5V, respectively.

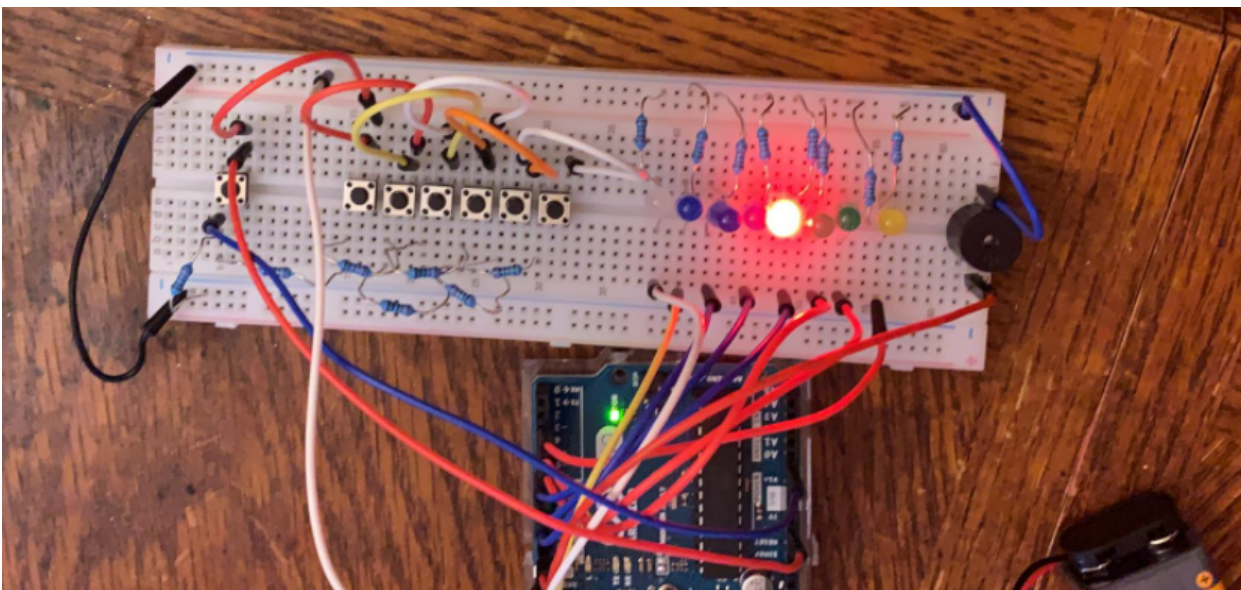
Caution: DO NOT EVER CONNECT GROUND DIRECTLY TO 5V. This may damage your arduino!

Upon loading the arduino's code and running the program on it, you should see leds lighting up from left to right. If this works, your leds have been wired correctly! Now, press the fifth from the left. If the leds stop moving, and the led furthest to the left lights up, you've wired the buttons correctly.

### Hardware:

From left to right, the buttons classify as up, down, left right, pause, record. The final two buttons are currently unused, however they still must be wired to the arduino in order for it to function.

To record a pattern, press the pause button (button #5). Use the up and down buttons to select different sounds, and the left and right buttons to choose when those sounds get placed. Press the record button to confirm that this location is where you'd like to place that sound.



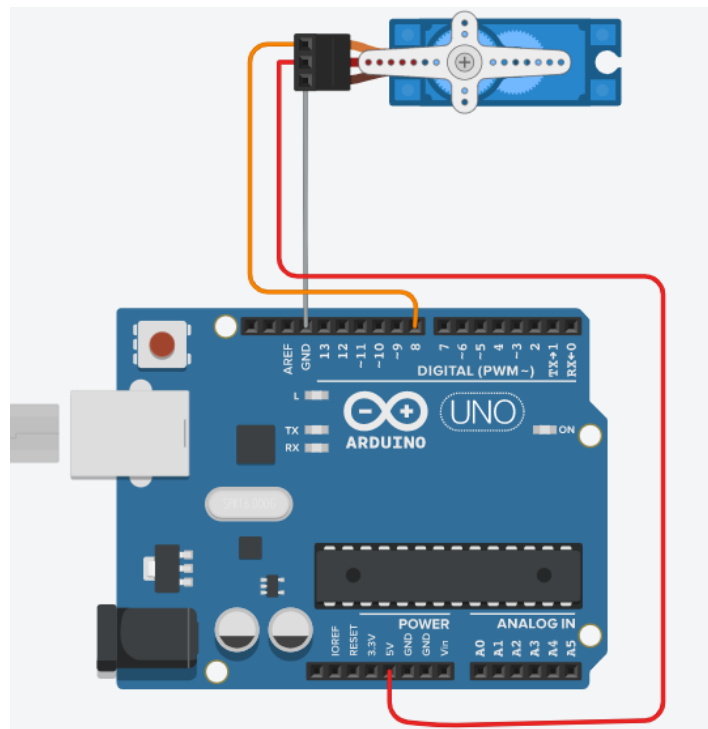
## | Movement |

The main goal of this system is to provide motion to the robot. This is achieved by using four servo motors. Note that only one servo motor is shown in this instruction manual. In order to implement four servo motors the outlined steps must be repeated four times.

### Parts required

- 4 continuous servo motors
- An Arduino with at least 4 available digital pins
- Several male-to-male connection cables (common jumper cable)

### Circuit diagram

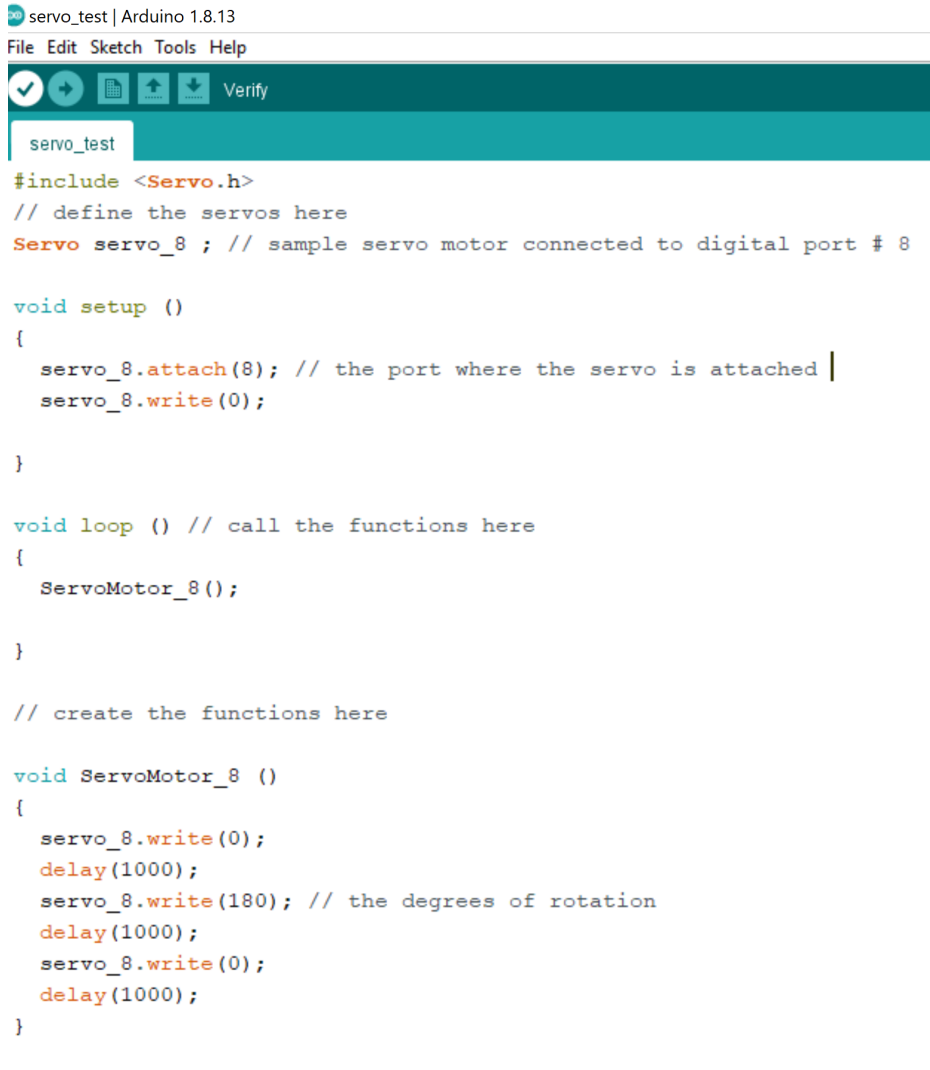


The circuit diagram shown above is a sample connection of a servo motor. The connection in the servo motor is as follows

- Orange wire (the signal wire) will be connected to a digital port (pick any unused port, just make sure to keep note what ports are used for each servo motor. The respective ports to servo motor connection will be inputted to the provided code)
- Red wire (the power wire) will be connected to 5v connection (we recommend attaching the 5v to a free column on the breadboard to that all the power connection from the four-servo motor can be attach on one column in the breadboard)
- Brown wire (the ground wire) will be connected to the GRD connection. (Same as the red wire, attach the ground wire to any free column on the breadboard for ease of connection)

Repeat the circuit connection four times with each servo motor.

## Code:



```
servo_test | Arduino 1.8.13
File Edit Sketch Tools Help
Verify
servo_test
#include <Servo.h>
// define the servos here
Servo servo_8 ; // sample servo motor connected to digital port # 8

void setup ()
{
  servo_8.attach(8); // the port where the servo is attached |
  servo_8.write(0);
}

void loop () // call the functions here
{
  ServoMotor_8();
}

// create the functions here

void ServoMotor_8 ()
{
  servo_8.write(0);
  delay(1000);
  servo_8.write(180); // the degrees of rotation
  delay(1000);
  servo_8.write(0);
  delay(1000);
}
```

The sample code above contains the function to actuate the servo motors. Each motor must have a function and can be called in the main loop. The codes above contain explanations for each significant part. In this case, only one function is shown.



## Appendix:

```
#include <Servo.h>

// define the servos here

Servo servo_8 ; // sample servo motor connected to digital port # 8

void setup ()

{

  servo_8.attach(8); // the port where the servo is attached

  servo_8.write(0);

}

void loop () // call the functions here

{

  ServoMotor_8();

}

// create the functions here

void ServoMotor_8 ()

{

  servo_8.write(0);

  delay(1000);

}
```

```
servo_8.write(180); // the degrees of rotation
delay(1000);
servo_8.write(0);
delay(1000);
}
```