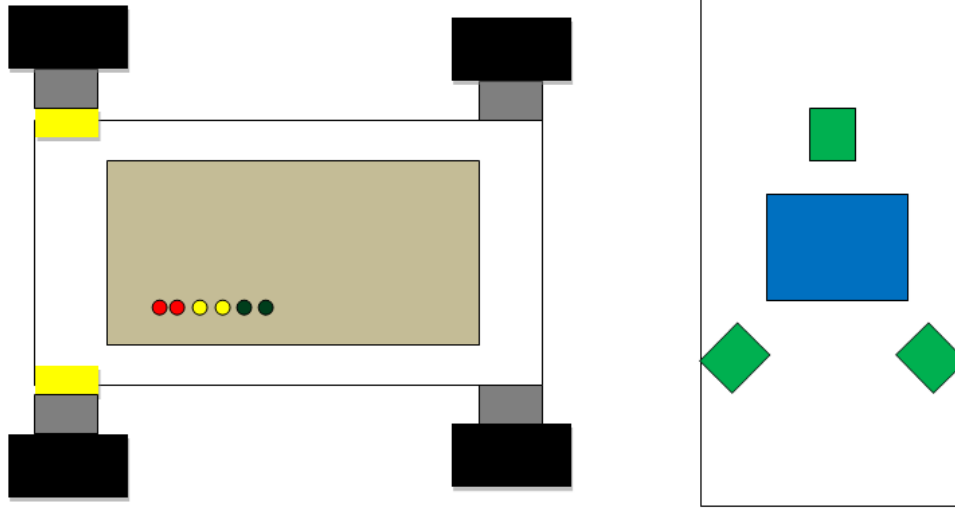


Tranquil

Hans Hu, John Hu, Injay Song

The original idea was to make a robot that finds the quietest spot in the room. There would be 3 sound sensors to direct the robot to the quietest place. The input from an ultrasonic sensor would override the sound sensors to prevent collisions. There was also going to be led lights to visually show how loud it was.



Original Work

Original Materials and Cost

One Raspberry Pi (\$40 each)
Three Electret Microphone Amplifiers
(\$7.95 each)
Two servo motors (\$11.95 each)
Four DC powered motors (\$2-5 each)
Four Wheels (\$5-15)
LEDs, wires, and resistors (\$10-20
each)
A metal frame (\$5-20)
Battery pack (\$15-25)
One to Two ultrasonic sensors (\$3.50
each)

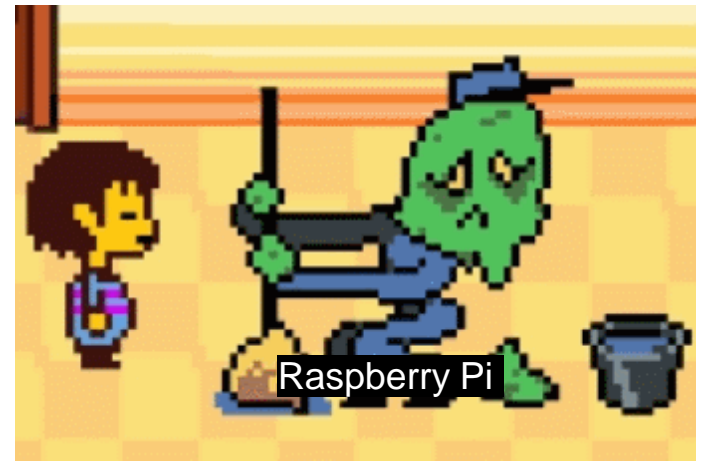
Total Cost: \$137.75 - \$194.75

Materials Used

Raspberry Pi
Arduino
Breadboards
3 Adafruit AGC Electret Microphone Amplifiers
Resistors
Wires
LEDs
4 DC Powered Motors
4 Wheels
Servo Motor
Ultrasonic Sensor
Metal Frame
Portable Battery Pack
4 AA Batteries

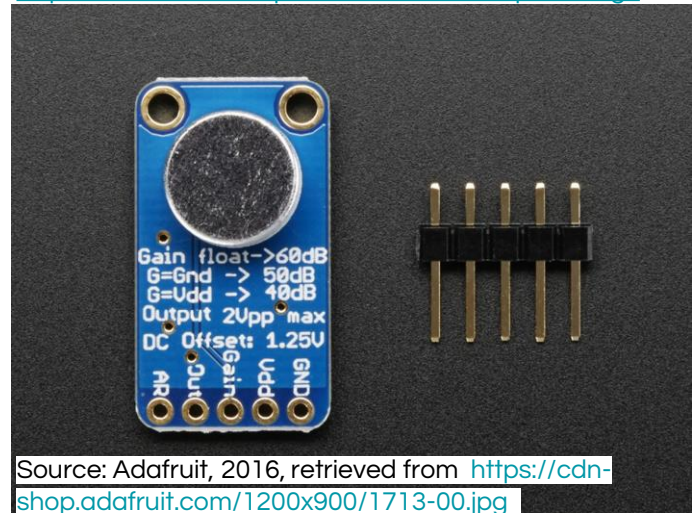
Troubleshooting

One issue we came across was that the electret microphone amplifiers returned either 0 or 1. This information was not useful since it would only detect places under a certain decibel. What we needed were values that could represent decibels. The problem existed because the default values that the electret microphone amplifiers returned to a raspberry pi was 0 or 1. However, we were able to get an arduino which was able to receive more detailed reading from the electret microphone amplifiers.



Source: n8r8.wordpress.com

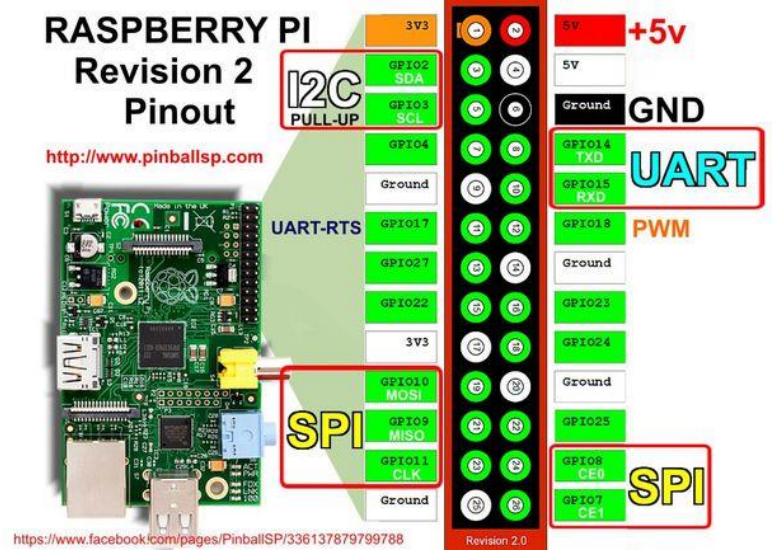
<https://n8r8.files.wordpress.com/2015/11/janitor2.gif>



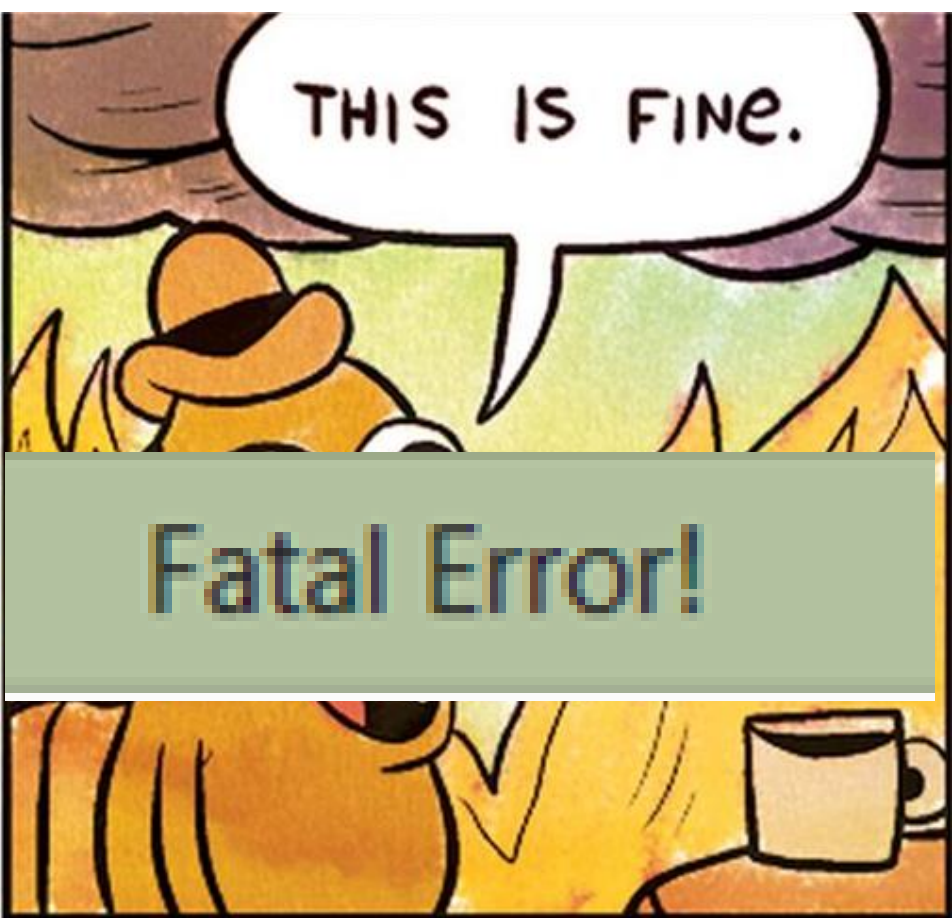
Source: Adafruit, 2016, retrieved from <https://cdn-shop.adafruit.com/1200x900/1713-00.jpg>

Troubleshooting (continued)

Another issue was that the raspberry pi only had one pwm. We wanted to use the pwm for the LEDs and the servo motor. To fix this, we tried to use software pwm, but it didn't work. So we decided that we would just use the pwm for the servo motor and control the LEDs another way.



Source: Instructables, 2016, retrieved from <http://www.instructables.com/file/FN1YEKZHN824U1E/>



<http://www.cs.bu.edu/courses/cs108/guides/debug.html>
<https://www.raspberrypi.org/documentation/usage/python/>
<http://getmetech.com/technology-tips/easy-fix-for-google-drive-fatal-error-python-dll-code-1114/>
<http://stackoverflow.com/questions/29725992/error-with-function-name-col-is-not-defined-python-3-turtle>

Comic made by KC Green, 2013
From: <http://gunshowcomic.com/648>

Troubleshooting (continued)

Another problem was the wiring was very confusing. Lots of wires had the same color and wires were also bunched together. At first, we ignored it but it started becoming a bigger problem. We couldn't find problems wrong with the wiring since it was hard to see which wire connected to which pin. We were able to remove some of the wires by extending resistors so they connected to the pins. We also replaced some long wires with shorter ones since the long wires were not really necessary in that place. On top of that, we used some pre-bent jumper wires to make it more neat.

We also had problems with the motor where one motor didn't do what it was supposed to do. We made a function to make it rotate forward, then backwards, but one motor only rotated forwards and stopped.

End Result

The end result was similar to what we had in mind, although it was a bit messier. The robot was less functional than what we had in mind. The sound sensors were not the most accurate so the place it moved in was a little off. There were also a lot of additions to the robot that were needed to make the robot work properly. The robot did follow most of the design though, like the placement of the sound sensors and the metal frame.

References

Limor Fried (2005). Electret Microphone Amplifier - MAX9814 with Auto Gain Control. Adafruit. Retrieved from <https://www.adafruit.com/products/1713?gclid=COLzyamygs4CFQckhgod-PsNSw>

TheFreeElectron (2013). RASPBERRY PI Revision 2 Pinout. Instructables. Retrieved from <http://www.instructables.com/file/FN1YEKZHN824U1E/>

Contact

Hans Hu - huc2@bxscience.edu

John Hu - huc3@bxscience.edu

Injay Song - songi@bxscience.edu