Real Time Activity and Weight of Desert Mice

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Introduction

Our sponsor Danielle Blumstein is working with a team to determine the effects of desert climate on Peromyscus Eremicus mice's metabolism. These mice are native to southwestern American deserts and have had to adapt to survive in harsh dry areas. Her team needs a reliable method to weigh the mice without handling the mice directly.

Methods

Main Objective
To find a way to measure the weight of mice in their cages without human interference.

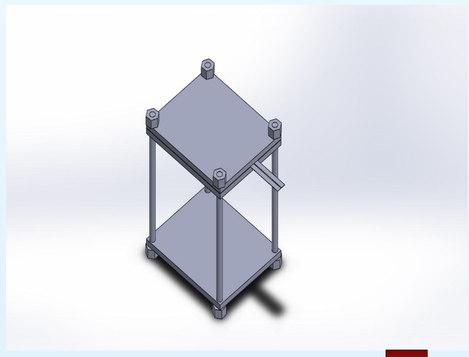
Design
To do this we assembled a system that would be inserted into the cage acting as a platform for the mice to stand on, while also using a force sensor to collect the force measurements from the mouse.

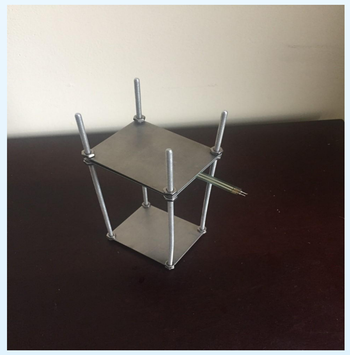
Our design was simply to sandwich the force sensor between a plate that would be in contact with the cage and a free moving plate that would transfer the force from a bottom plate inside the cage to the force sensor.

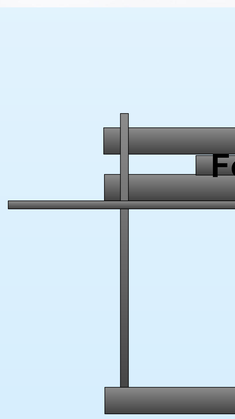
Testing Plan
To ensure the highest accuracy of data two different force sensors were tested with a known applied force of 22.1 grams, which is similar to the actual weight of the mice The raspberry pi is capable of producing a stable 5.21 volts through the circuit. By measuring the change in voltage associated with an applied force on the sensor, the weight of the mice can be determined.

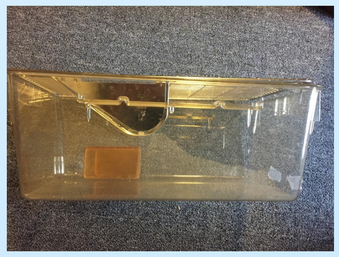
Assembly

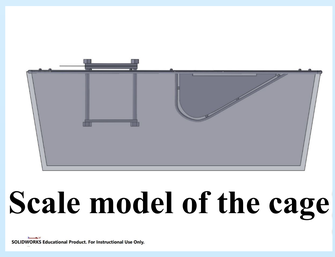
Initial design criteria was driven by the materials used and the method for weighing the mice in the cage.
Mice have an extraordinary ability to chew through most materials with hardness under 5.5 on the Mohs scale. While this is natural for mice any introduction of foreign materials may cause the mice to get sick, interfering with Danielle's metabolism research





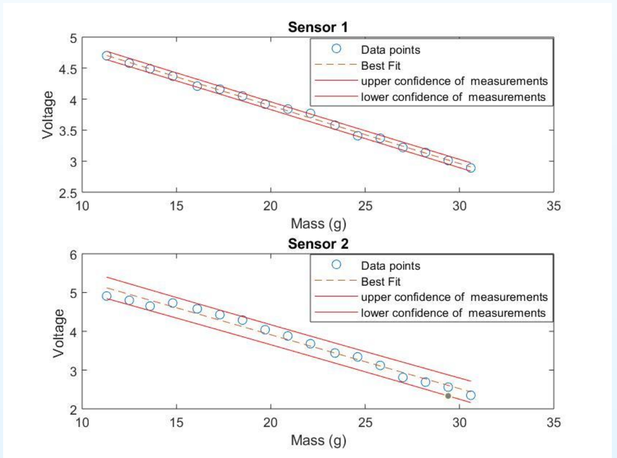






Scale model of the cage

Results



Sensor 1 (grams)	Sensor 2 (grams)
21.813	24.827
21.756	23.957
21.008	23.756
22.216	25.162
21.641	24.493
21.583	22.886
21.468	23.823
22.159	24.024
21.353	21.749
21.698	25.028

10 measurements pre sensor were taken with a know weight of 22.1 grams.

Standard Deviation of Sensor 1 = 0.3582
Standard Deviation of Sensor 2 = 1.0395
Percent Error of Sensor 1 = 1.9458%
Percent Error of Sensor 2 = 8.4665%
Force sensor 1 had better results overall