Wheel Chair Mounted Treat Dispenser

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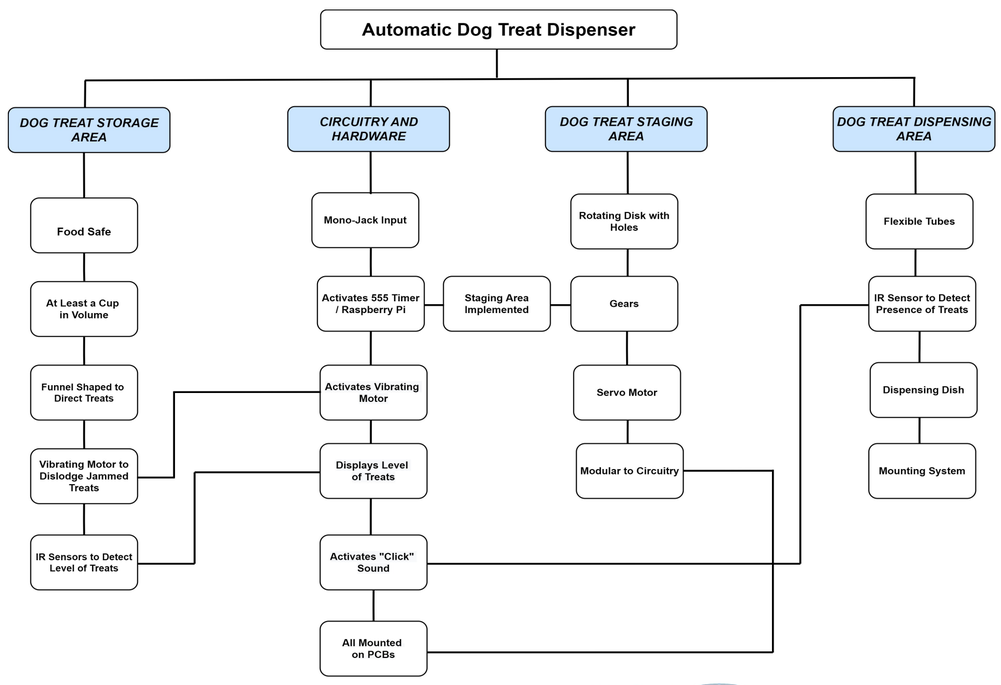
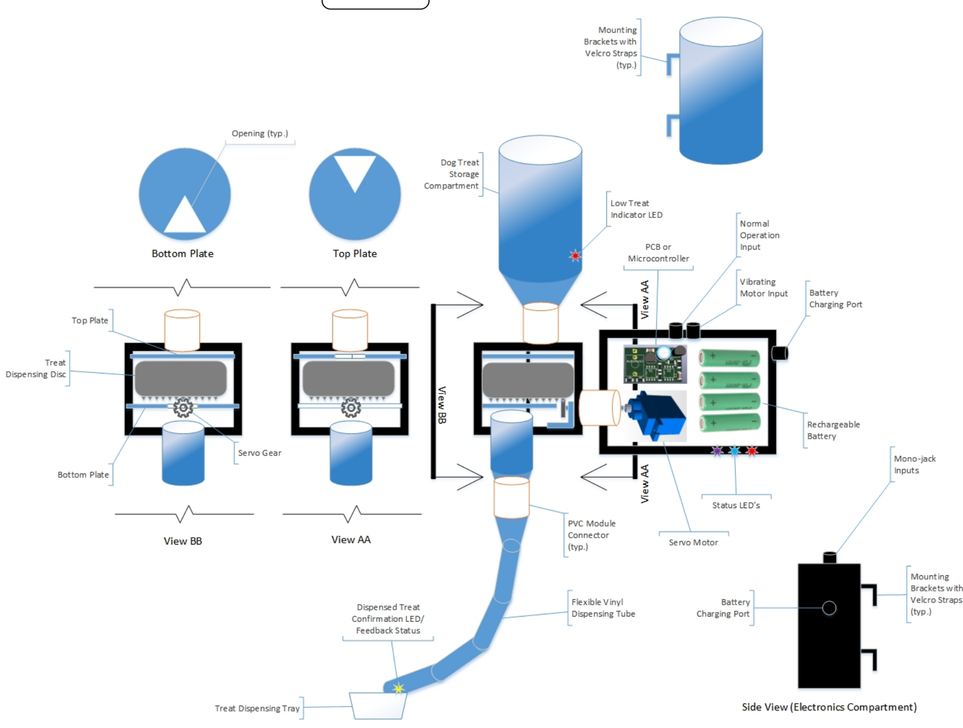
Purpose

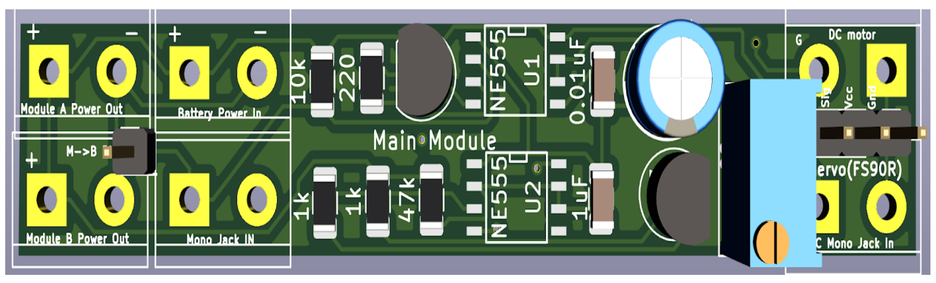
The goal of this project was to provide an easy to use treat dispenser for service dog owners who struggle to reward their partners. There have been several great ideas and attempts to create an adaptive treat dispenser that could be integrated seamlessly to a wheelchair, but there are none that are commercially available as of today nor patented for this use. The team has implemented a solution that can be operated by either a PCB or MCU.

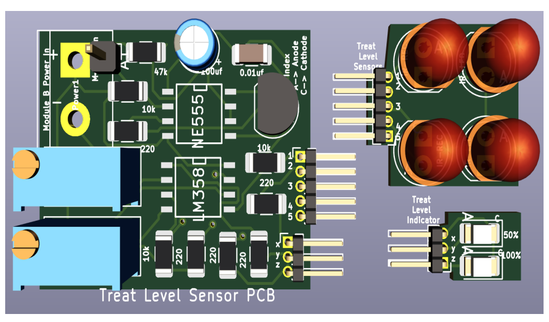
System Architecture & Diagram

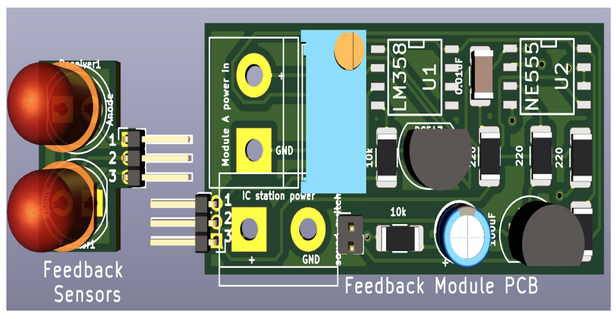




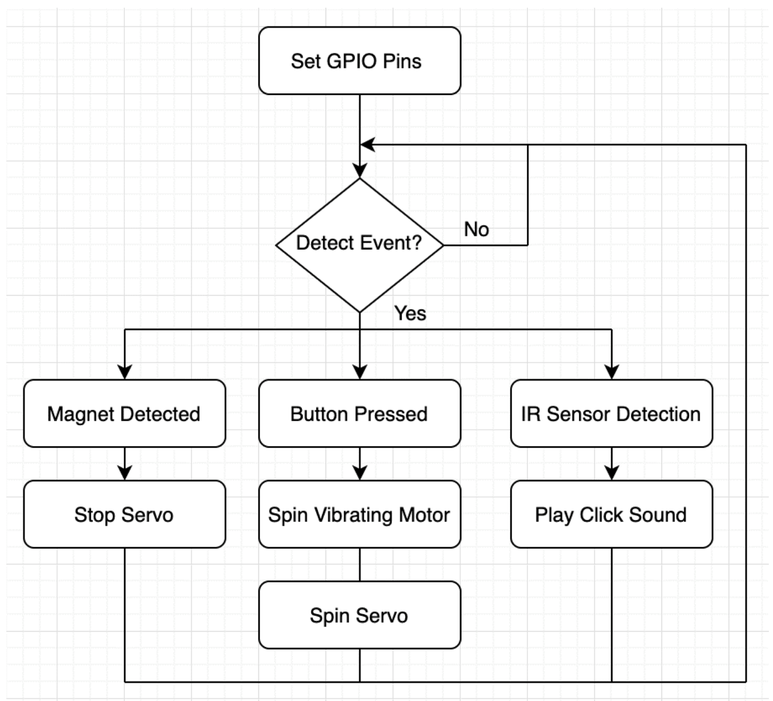
Hardware Design



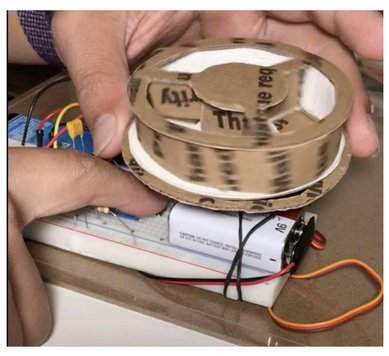


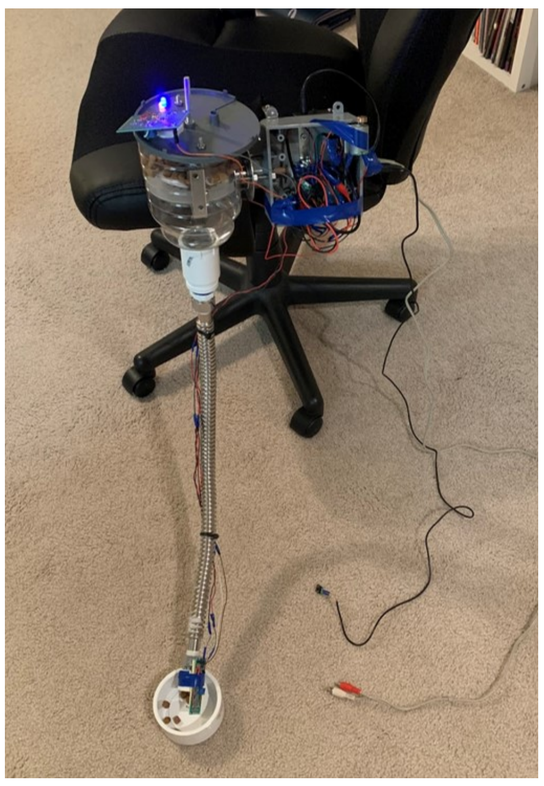


Software Flow Chart



Early Prototype & Final Design





Test Results

Power Analysis : 555 Timer Circuit

Circuit Load	Min. (Watts)	Max. (Watts)
Treat Level Sensor (Yellow LED On, Blue LED On)	0.39	0.41
Treat Level Sensor (Yellow LED On, Blue LED Off)	0.375	0.395
Treat Level Sensor (Yellow LED Off, Blue LED On)	0.37	0.38
Treat Level Sensor Off (Idle Circuit)	0.3	0.325
Servomotor Activation (LEDs On)	1.125	2.445
Clicker Sound Module with Sensor (LEDs On)	0.79	1.29
Clicker Sound Module (LEDs On)	0.89	0.935
Clicker Sound Module Sensor (LEDs On)	0.625	0.645
Vibrating Motor (LEDs On)	0.65	0.695

Circuit Load	Device Usage Profile Times
Idle Current (Yellow LED On, Blue LED On)	18 hours
Servo Motor Activation	100 seconds
Clicker Sound Module with Sensor	100 seconds
Vibrating Motor	60 seconds

$$Average\ Power\ Draw = \frac{[(0.41 * 18 * 60 * 60) + (2.445 * 100) + (1.29 * 100) + (0.695 * 60)]}{18 * 60 * 60}$$

$$= 0.416\ Watts = 0.0347(Amps)\ at\ 12\ VDC \quad , Estimated\ Run\ Time = \frac{2.8\ Amp{-}Hours}{0.1\ Amps} = \mathbf{28\ Hours}$$

Power Analysis : Raspberry Pi Zero W

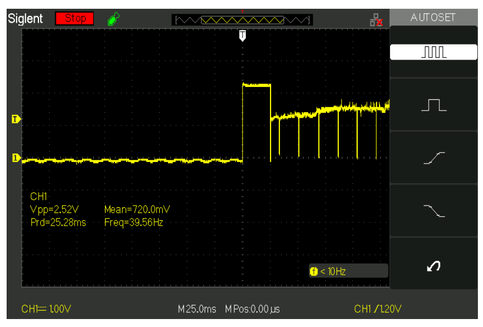
Circuit Load	Min. (Watts)	Max. (Watts)
Idle Load (No activation)	0.25	0.25
Servo Motor Activation (Includes Vibrating Motor)	0.75	0.90
Feedback and Clicker Module Activation	0.25	0.35

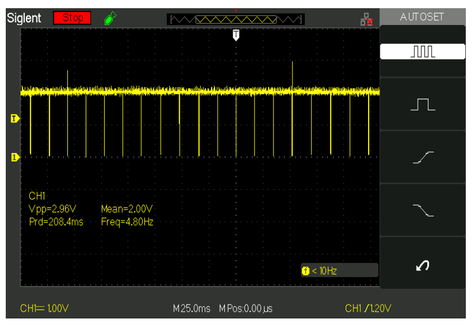
Circuit Load	Device Usage Profile Times
Idle Load (No activation)	18 hours
Servo Motor Activation (Includes Vibrating Motor)	100 seconds
Feedback and Clicker Module Activation	100 seconds

$$Average\ Power\ Draw = \frac{[(0.25 * 18 * 60 * 60) + (0.9 * 100) + (0.35 * 100)]}{18 * 60 * 60}$$

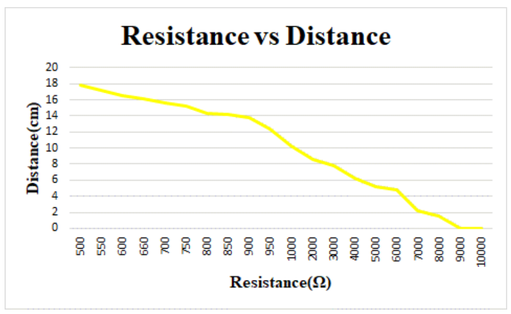
$$= 0.252\ Watts = 0.0210(Amps)\ at\ 12\ VDC \quad , Estimated\ Run\ Time = \frac{2.8\ Amp{-}Hours}{0.05\ Amps} = \mathbf{56\ Hours}$$

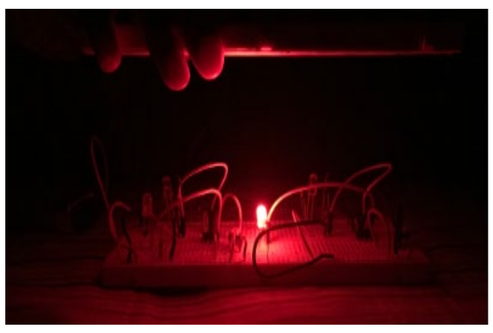
Treat Dispensing System : Servo Motor





Treat Detection System : Infrared Sensors





Visit Our Website

http://treatdispenser.onmason.com/

Acknowledgements

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