UCF Senior Design

The AutonoMouse

Keep Your Pet Company While You're Away

Group 14

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Introduction

Many people own pets, and many of those pets are cats. These feline friends can be quite lovely companions, but they are also a hassle at times. With an innate instinct to hunt and test its abilities, a cat will get antsy if unable to perform. Usually, owners will get toys to play with and amuse the cat such as: string, feather on a stick, fake fish and mice. While these are all nice, each one still requires some level of human interaction, movement is required to attract the animal's attention. Without someone being home, the cat has nothing to do.

The AutonoMouse is a system that entertains a cat without the need for human interaction. It activates periodically throughout the day and travels on a path about the room to entice the cat into interaction while the owner is away. Should the customer choose, it can also be controlled via web app.

The AutonoMouse has two parts:

Mouse:

The Mouse is a simple device with two wheels, a façade of a rodent to attract the cat. A tension sensor is attached to the base of the tail, a communication system to interact with the Box section or WiFi, and a hidden camera. It is small, compact, and quick. The device will operate in three distinct modes:

1. Mode 1: The default mode. In this setting, the Mouse will go along a pre-determined loop starting and ending inside the Box. There will be two preprogrammed loops with the option for the customer to add additional routes. The coordinates of the loop are measured by distance from the Box.
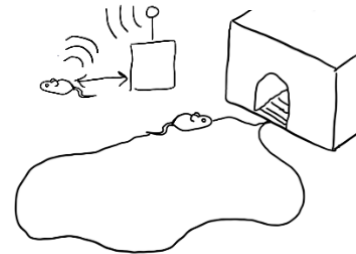
2. Mode 2: Activated Mode will occur when the cat tries to catch the Mouse. The Mouse will then take the fastest path back to the Box when capable. It will calculate this using signal communication with the Box. In this mode, the Mouse will be able to navigate around objects.
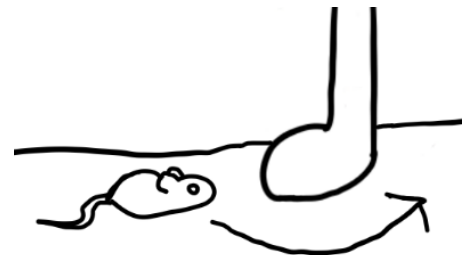
3. Mode 3: User Control Mode allows the customer to control the Mouse via a web app even when not at home. This allows them to play with the cat should they choose to use either a computer or phone. They can see what is going on by using the camera with a live feed.

The mode is determined by the tail. If the tail is pulled, it will activate the tension sensor and the Mouse will switch from Mode 1 to Mode 2, once the Mouse returns to the Box, it will reset back to Mode 1. Mode 3 is special and nullifies this effect, it can be selected through the app.

Box:

The Box is a stationary section of the system. Its purpose is to charge and house the Mouse. It is plugged into a wall outlet for power so the device can run autonomously. While not activated, the Mouse component will remain inside the Box charging station, entering through a hole on the side. The Box will also act as an anchor or reference point for the Mouse to determine its position and navigate the surroundings.
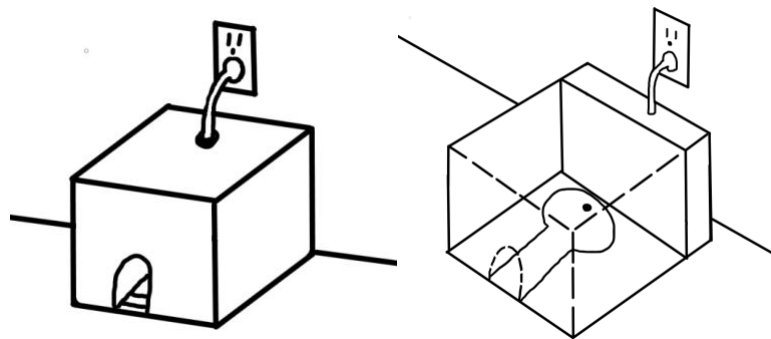

Specifications

- 3 different modes (Default, Active, User control)

- Box will recharge and give instructions to the Mouse

- Mouse can rotate about its center axis.

- Box and Mouse must wirelessly communicate within a radius of 20ft

- Box must be able to contain the Mouse unit.

- HD camera on Mouse to allow user to see where they are going.

- System programmed with 2 preset paths and the ability to add additional paths.

- Can flip itself over if turned upside down

- Controllable via web app

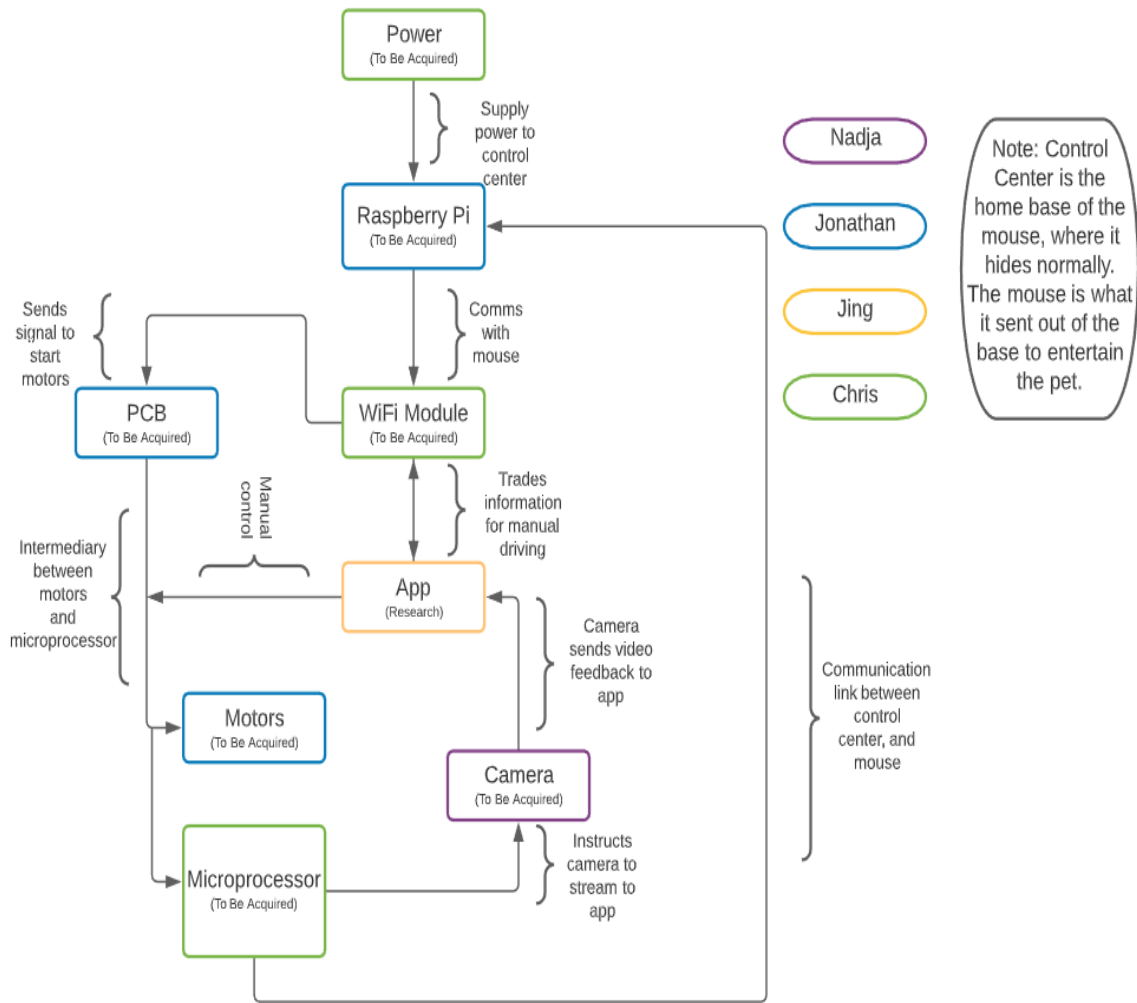- System can operate without human interaction

Constraints

- Cost/Budget

- Construction Time

- Range that the mouse can travel

- Charging Time/Battery duration

- Motor power

- Size

- Weight

Software Block Diagram
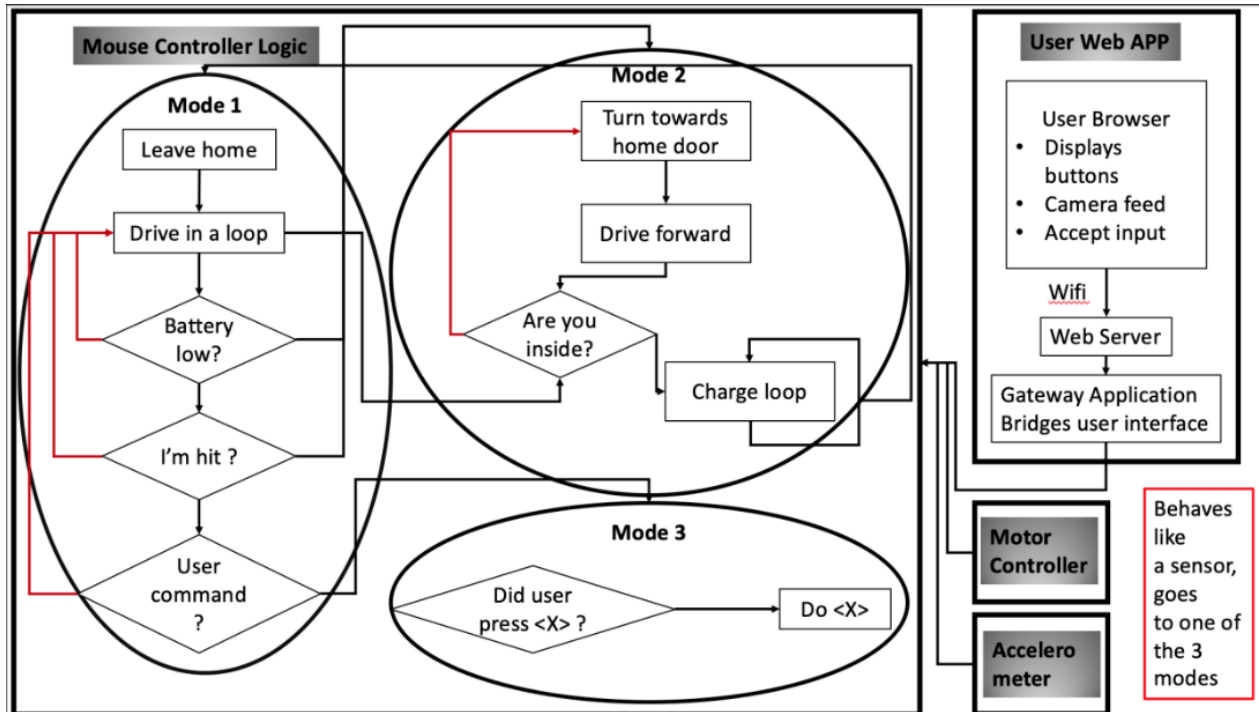
Hardware Block Diagram

Marketing and Engineering Requirements

↑ = Positive Correlation
↓ = Negative Correlation

		Marketing Requirements					
		Size	Weight	Cost	Range	Charging time/ Battery duration	Motor power
		-	-	-	+	+	+
Engineering Requirements	Cost	-				↑	↑	↑
	Range	+			↑			
	Charging time/ Battery duration	+	↑	↑	↑			
	Motor power	+	↑	↑	↑		↓	

Finance, Budgeting, and Milestone

The following prices are a rough estimate of the average cost of these components on the market. Many calculations were rounded up in order to have some leeway with the budget. In an ideal situation, the total cost would be $20 - $40 lower than the amount shown. The prices are subject to change as the project continues, and innovations arise.

Autonomouse Finance & Budgeting				
Description	Vendor	Price per Unit	Amount Required	Total Estimated Price
Wireless Camera	Amazon	$50	1	$50
Raspberry Pi	Adafruit	$35	1	$35
PCB		$50	2	$100
Circuit Components		$20	1	$20
WiFi Module	Adafruit	$7	1	$7
Structural Materials		$20	1	$20
Aesthetic Materials		$20	1	$20
Motors	Amazon	$3	4	$12
Wall Plug	Amazon	$5	1	$5
Battery Holder	Amazon	$5	1	$5
			Total Cost:	$274

Number of Team Members:	4
Amount to Be Funded:	$274
Average Cost per Member:	$68.50

Week	Description	Due Date
	Senior Design 1 – Research, Design, and Documentation	
1-2	Project Selection	N/A
3	Initial Divide & Conquer Document	9/18/20
4	Meeting with Professors (Approval of project)	9/23/20
5	Update Divide & Conquer Document	10/2/20
6-11	60-Page Draft of Senior Design 1 Documentation • Table of Contents • Individual Responsibility Assignments	11/3/20
12-13	100-Page Draft of Senior Design 1 Documentation	11/27/20
14-15	Final Report of Senior Design 1 Documentation	12/8/20
	Senior Design 2 – Test, Modify, and Finalize	
1-2	Build Prototype	
3-10	Testing and Modifying	
11-12	Finalize Prototype	
13	Final Report	
14-15	Final Presentation	