Smart Automatic Cat Feeding Machine (SACFM) (sack-ff-mm)

Group Members

Tim Forkenbrock, Austin Scruggs, Kristin Soriano

Sponsors

IST, potential for others

Motivation

The common household cat can come in a variety of "flavors". There are currently over 80 different breeds of household cats, and within that every cat has a different personality. Cat owners have been faced with the problem of how to properly feed them when there are multiple cats in the same house. One cat may eat only twice a day, three times a day, or even small bits throughout the day. There are even cats that will eat EVERYTHING that is given to them, which can lead to cat obesity. The main motivation for the project stems from the following scenario. The owner of two Siamese cats, Lea is a female age 9, Cappy is a male and is less than a year old. Lea is the type of cat that picks at her food all day, so food must be left out for her or she gets angry, or won't eat. Cappy will eat all day, thus eating any food left out for Lea. To allow this owner (and many others) to make each cat happy a solution would be a machine that will allow an owner with multiple cats to feed each pet differently, based on the personality, weight, and breed.

Project description

The Smart Automatic Cat Feeding Machine (SACFM) is a mechanical version of a cat feeder. It essentially will hold a large amount of food and disperse it appropriately to the cats. There will be a scale at the very bottom of the feeder to weigh the cat as it eats. The “food dish” is going to be a circular design with pie like pieces where the food will go. This device will be able to rotate to feed the appropriate cat. On top of that is where the food dispenser will be, this will measure the correct amount of food into the dish. There are a few pictures below.

Goals and objectives

- Easy to keep clean
- Measures out food accurately
- Low power consumption (possibly runs on batteries)
- Low cost
- Ease of use
- Convenience (requires little maintenance or attention)

Functions

- Weighing the cat
  There will be a scale placed underneath the cat feeder that will weigh the cat every time it eats. The purpose of this is to constantly monitor the weight of the animal to make sure it is getting the correct amount of food. This will be done with a touch screen scale so that the program can know when the entire cat is on the scale by detecting the four paws.

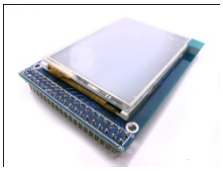
- Weighing the food
  There will also be a scale at the bottom of the food dish that will weigh the food when it is placed in the dish. This will not only allow the proper amount of food to be weighed out, but the remainder (uneaten by the cat) to be tracked as well. The placement will be done by a well researched and designed method yet to be determined.

- Dispersing the food
  Since the purpose of the device is to keep each cat on a specific diet, food should only be dispersed when the appropriate cat approaches. This will be done by placing RFID tags on the collars and using an RFID reader when the animal approaches. Once it is identified the feeding machine will rotate to the appropriate food section to allow the cat to eat. When the cat is done, known by the RFID being detected away from the machine, it will rotate to a closed position.

- The software functions
  The brains behind this machine will be a circuit board with a touch screen accessible on the top. When a new cat is added, the RFID tag number will be set to that cat, the breed, gender, age and weight. There will be a main program that will keep track of the food intake, and when appropriate put the cat on a diet. This circuit will have to also send and receive information from the scales and food dispensers. The possible add-on of allowing internet connection would make it possible for the owner to get updates sent to their phone or email to always know how their pet is doing, add more food, clean the machine, or change the battery.

Specifications and Requirements

Parts:

- Stepper motor
- Circuit Board MSP-EXP430G2
- RF ID tags
- WIFI card
- Scale for cat
- Scale for food
- RF Transceiver
- 2.4" TFT LCD Screen Module: ITDB02-2.4D 
- White plastic tray housing
- Cat food dispenser

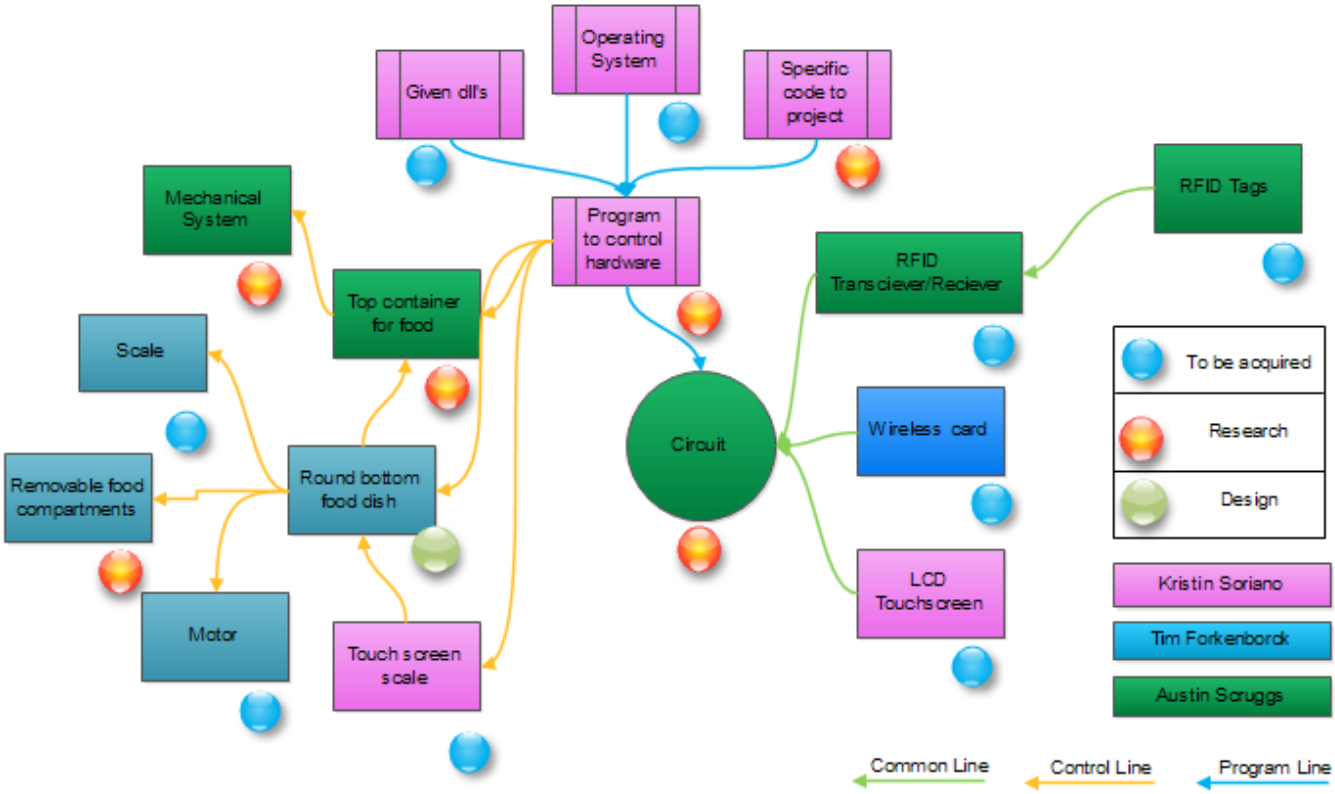
The S.A.C.F.M. will have a RF Transceiver to receive the RF ID tag signal on the cats collar to have the ability to feed up to three different cats at once; at two to three servings a day depending on the cat's age (younger cats typically get fed three times a day while older cats only get fed twice a day). The SACFM will contain enough food to feed one cat for six days, two cats for three days, or three cats for a day. The SACFM will consist of six trays which contain the correct amount of food for the specified cat depending on the inputs for that cat. Based on our research and the inputs for the designated cat, we are able to determine how much food the cat should receive per feeding. The RF ID tags on the cat's collar will be assigned to certain trays to maintain accuracy of your cat getting the correct amount of food. One scale will be mounted

inside the machine to accurately weigh out the amount of food for the specified cat. Another scale will be used to measure and record the cat's weight daily.

It consists of three simple steps for proper installation. First, simply scan in each RF ID tag (depending on the number of cats the person has) and using the touch screen mounted on the top of the machine, follow the steps on screen for the inputs of the cat's: Age (two is old, three is young), Weight(for determination of amount of food to be served i.e. 8lb cat = 240 calories/day; as well as to keep track of cats weight daily which will be determined by the scale).

The Circuit board will consist of the RF Transceiver, the WIFI card, and the LCD touch screen device. It will be mounted to the top of the machine for easy access of the user.

Block Diagram



Project Budget

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	ITEM						COST$		Financing				
2	2.4" TFT LCD Screen Module: ITDB02-2.4D						20						
3	Premiertek PT-H9DN USB 2.0 Max Distance Wirel						25						
4	RF ID tag						5						
5	RF Transceiver						10						
6	Stepper Motor						15						
7	Circuit Board MSP-EXP430G2						5		Split between group members and/or sponsor				
8	Scale for cat						20		some items may be donated				
9	Scale for food						20						
10	White plastic tray housing						10						
11	Cat Food						5						
12	Cat food dispenser						40						
13													
14							175						
15													

Project Milestone

Senior Design 1	Task
Week 4	Begin research • RFID tags • Stepper motor • Scale • Food dispenser
Week 9	½ writing done
Week 11	Begin experimenting with individual parts • Determine open/close dispense • Design plastic piece in AutoCAD • Learn MSP430 circuit board
Week13	Assemble final paper
Week 15	Turn in

Senior Design 2	Task
Week 1	Purchase all parts
Week 2	Begin assembling project
Week 10	Complete project assembly
Week 11	Test project and improve
Week 14	Practice presentation
Week 15	Present Project
Week 15	Graduate?