2/13/21 Kperez Journal

List of items working:

* Re-set up the pi and all the peripherals we had accomplished last semester.
* Talked with Andy about ways to implement the mechanical portion of our design
* Relayed this information to the team
* Gave team an idea of what I see the final product looking like through pictures as an example.
* Involves a large (approx. 10lb storage container on top to hold the food.
* A shaft connected to the bottom of the food container and a hole cut out of the bottom of the food container
* This feeds into the shaft where I plan to have our servo run an auger that will dispense out the far side.
* The servo will be connected to the back end of the shaft and the product; this will look sleek and be out of the way of our moving parts
* This shaft will feed a tube that goes directly to the bowl
* There will be IR sensors inside of the storage container that show approximate food levels, so the owner knows when its time to resupply the container
* There will be a force sensitive resistor that measures if food is in the bowl or not.
* Looked into possibly upgrades
* DC motor of 12 volts instead of the servo
* Figured perhaps using some kind of gearing ratio I could get high torque out of this and use that somehow to run the mechanical
* Rechargeable battery pack option that would run this. It would be 20 volts
* It would need a buck converter to step down the voltage from 20 to 12 V
* I found these upgrades to be problematic and about a $75 dollar increase in cost for these parts.
* Running the pi off of this battery would be painful. Would need to regulate the 12V down to 5V max
* Also, the issue of recharging the battery… meaning when the voltage sags through use the end user would need to charge the battery. Extra steps.
* Began thinking about the servo motor again and components we already have
* Parallax 360 servo motor (owned and operating with simple code)
* Peak stall torque @ 6 V: 2.2 kg-cm (30.5 oz-in) about 5 pounds
* Running at 5V it will hold less weight marginally I believe say about 3 & ½ lbs
* For cat food a serving would weigh approx. 100 grams.
* https://bestcatfoodforcats.com/blogs/readers-ask-how-many-grams-of-cat-food-in-1-3-cup.html
* The size of the tube as well as the weight of the auger and force from above will determine if the servo can push that much food through.
* Theres also a feedback I/O on the servo that allows us to see how far it turns.
* <https://www.parallax.com/product/parallax-feedback-360-high-speed-servo/>
* Weight sensor
* The FSR can only tell that something is putting pressure on it.
* Want to upgrade this to a smarter sensor that will tell that an approximate amount of food has been placed in the bowl. When the weight hits enough a feedback loop will tell the servo to stop turning and thereby stop dispensing.
* Takes the guessing out of the “how many turns do I need to rotate the auger in order to get the proper amount of food”
* <https://www.amazon.com/SparkFun-Mini-Load-Cell-Straight/dp/B07G5LTG5M> 500 g load cell. Measures up to 5x what we need to output
* <https://learn.sparkfun.com/tutorials/load-cell-amplifier-hx711-breakout-hookup-guide?_ga=2.127748493.162604040.1644614439-720504184.1644614439> this amplifier will take the readings and convert them to something our pi can read to us what the weight would be
* IR sensor to show when food is running low in the hopper container
* This is already a good idea and easy to implement.
* The cheap ones I have work well enough for the size of container we have. I have garage door ones that I could hookup… but honestly I think the ones we have are implementable enough.
* Back up battery
* Being a pet owner I’d really like to have a back up battery integrated into the design before the semester is over. I’m thinking a series of 6 volts in alkaline batteries. This should be able to power the pi and the feeding mechanism for an extra day if the power goes out. It could also be nice to maybe upgrade that idea to a 9v battery and step it down so that it will last longer in case of emergency. To me I think a 5v relay switch we already have will work for this. Basically if the pi can read that power is sagging at any point the relay will open up to the secondary battery. I need to work this out with someone who has a better idea of how to implement that than myself. I’d be worried about the switch not closing and the backup battery not coming online.

**Desirables for the next two weeks:**

This weekend I’ll be speaking to the team on the changes I’ve thought up in the mechanical design. Not a lot of changes just a better thought out process to implement. I’ll also be purchasing any remaining parts we need. I’m going out on a limb here in hoping that the servo motor we have is enough to power our design. I currently have a backup DC Motor that can run higher voltage. If my main idea somehow is untenable I’ll need to work VERY quickly in order to implement the new motor as well as figuring out the issues I showed above. That being buying all the new components I’ll need to implement the design and setting it all up.

What I need: 1. To make a 3D printed Auger sometime this coming week of 2-14 to 2-20. I have some tubing that I could play around with and see if attaching the servo to the auger and putting a load on it will work as I foresee it doing. I’ll be asking the team for that help. I need this ASAP.

2. When speaking to the team I’ll get their input and will purchase the weight sensor stuff on Sunday. Should have it around by the end of February at the absolute latest. Then I’ll be prototyping with it.

3. I have a container I can use for the hopper. I’ll need to cut out a bottom and fit something to it to act as a shaft that will contain the auger.

4. Give 3rd PI to Kenny so he can work on the camera some more. He gave his to Davin for programming purposes.

From our second semester work statement I am caught up on everything I intended to do by week 6 (2-14-20) With the items being worked above I should be able to reach my week 8 spring break goals easily as long as I finish all of the above.