Background

The FeedRite Feeding Tube is the next generation in naso-duodenal/naso-jejunal (ND/NJ) feeding. Currently, ND/NJ feeding tubes are placed with one of two main methods. The first method, fluoroscopy, accurately places tubes in the duodenum and jejunum. However, it is a notoriously slow process and often requires repeated fluoroscopic procedures, exposing the patient to unnecessary amounts of radiation. The second method relies on RF communication between the tube and a receiver placed on the xiphoid process. This method is relatively safe, but often results in improper tube placement.

Instead of using external indicators like those previously mentioned, the FeedRite Feeding Tube utilizes the body's natural physiology to determine tube location in the gastrointestinal tract. By relying on known pH and pressure differences between the stomach, duodenum, and jejunum, FeedRite plans to accurately, safely, and efficiently place ND/NJ tubes.

Achievements since last report

Since the most recent report, we have received several of the parts we have ordered. This includes our pH probe and pressure sensor for proof-of-concept. Thus, we have begun constructing our proof-of-concept prototype. In addition, we have also reached out to several companies regarding pressure and pH sensors on the micrometer scale. Current quotes for these microsensors suggests each probe will cost at least $100, possibly more.

In addition to prototyping, we have been in contact with the Center for Experiential Learning and Assessment (CELA) regarding testing of our device. CELA has expressed their desire to aid us in this endeavor once we reach the testing stage. Collaboration with CELA will be necessary to create a functioning testing system.

We have also began to think about our presentation for design day. We intend to show our device's ability to detect differences in pH and pressure using a cylindrical chamber. We have begun to design this chamber to be a simple but effective way of varying pH and pressure.

Problems that have arisen

The most notable problems since last reporting have been pricing for microsensors, part delivery, and a testing modality. Pricing for the microsensors has been discussed with Dr. Walker. At this time, it is uncertain if buying these parts is within the scope of the project. Should we acquire enough funding, pursuing a functional, microscale prototype will be possible. Should funding be unavailable, we will be limited to a proof-of-concept, larger scale prototype.

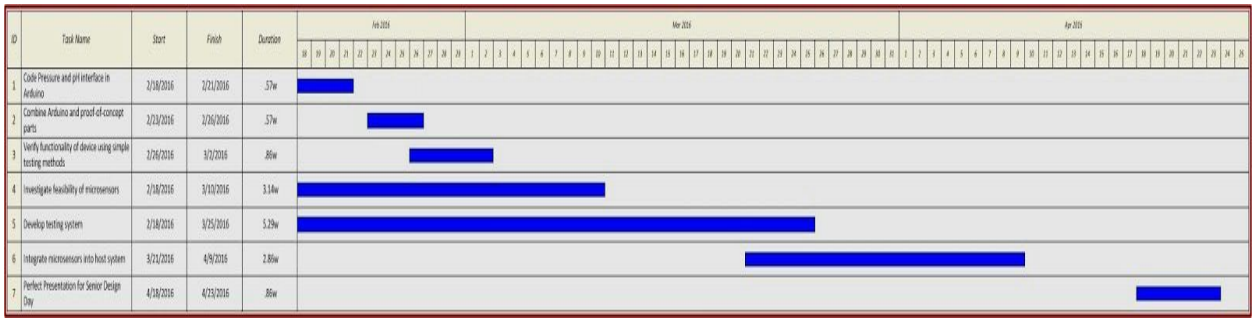
Part delivery for the proof-of-concept prototype has been excruciatingly slow. We received parts for our pH probe and pressure sensor on 2/18. Ms. Denise Anthony has been instrumental in ensuring these parts (which have been ordered since the beginning of February) arrive as quickly as possible.

Testing this device is likely the biggest hurdle to overcome right now. This device shouldn't just measure pH and pressure, but should distinguish the sharp changes present between different areas in the GI tract. We are uncertain of exactly how to test this, but we hope that collaboration with CELA and perhaps other partners at Vanderbilt will lead to a rudimentary, yet robust system.

Future Steps

With parts delivered, constructing the placement mechanism is top priority. Of course, immediately after the device is built, testing will occur, requiring a testing system. We have divided the team into two groups. One group will develop the code required for the prototype while the other will design and build the testing chamber. Thus, our major next steps are:

1. Build functioning proof-of-concept prototype
2. Create robust method for mimicking acidity and pressure seen in GI tract.
3. Determining the financial feasibility of microsensors in the prototype
4. Meet with sponsor Dr. Naji Abumrad to discuss thoughts of microsensors



ID	Task Name	Start	Finish	Duration
1	Code Pressure and pH interface in Arduino	2/18/2016	2/21/2016	.57w
2	Combine Arduino and proof-of-concept parts	2/23/2016	2/26/2016	.57w
3	Verify functionality of device using simple testing methods	2/26/2016	3/2/2016	.86w
4	Investigate feasibility of microsensors	2/18/2016	3/10/2016	3.14w
5	Develop testing system	2/18/2016	3/25/2016	5.29w
6	Integrate microsensors into host system	3/21/2016	4/9/2016	2.86w
7	Perfect Presentation for Senior Design Day	4/18/2016	4/23/2016	.86w

Assessment of Schedule, Budget, and Objectives

At this time, the objectives for this project have become blurred. Until we have full approval from Dr. Walker to move forward with a budget drastically larger than we first intended, this device is stuck in the proof-of-concept phase. With this objective in mind, we should expect to have a fully functioning proof-of-concept prototype by March 4th with environmental readings to gauge function. Should funding become available for the microsensors, extensive research will take place to integrate them into our host circuit. Thus, we would likely finish with this first prototype in mid-April.