Progress Report 11

Week of 11/26/18

Alex Goodman

Work/Research Accomplished:

- Team split into groups to develop testing protocol for ISFET sensor probe that just arrived yesterday

Materials

- Meat and cheese probe
- ISFET pH sensor
- Tea bags
- Thick steak able to withstand probe invasion
- pH buffer solution chemicals
- Glass containers

Protocol

- Create 5 pH solutions ranging between the boundaries of in vivo conditions
    - 6, 6.4, 6.8, 7.2, 7.6,
    - Make solutions in 100 mL beakers
- Slice identical cubic pieces of steak (2 in x 2 in x 2 in)
- Enclose steak in tea bags and submerge in pH buffers for 2 hours
- Place steak on a sterile surface and record measurements
    - One measurement with ISFET
    - Another measurement with "Meat and cheese"
- Record measurements and measured value of pH in journal
- Plot differences of probes across all 5 pHs

Problems:

- Problems may arise with testing the probe this week
- Also, calibrating it may be challenging

Will Bacon

Work/Research Accomplished:

- We received some of our testing materials from Dr. Doro
- Finished going over testing protocol
- Began work on outreach project, and will meet up later this week to finalize our idea for it. The following factors will be discussed:
    - Timeline for outreach project
    - Potential locations
    - Interactiveness of design
    - Potential rewards for good designs/winning teams -- candy?
    - Assigning roles
        - Maybe have each us be assigned to a group to serve as an advisor
            - Could potentially be a mini-competition among us group mates

Problems:

- We will need to find a company or method to miniaturize the ISFET technology

Mark Austin
Work/Research Accomplished:
Problems/Concerns:

- Picked up Sentron “meat and cheese” pH probe and ISFET probe from Dr. Doro’s office
- Plan to use these this week/weekend to go through our various testing protocols in order to ensure that the ISFET probe meets our previously specified requirements
- Plan to test on steak model initially to simulate an “in vivo” application to shed light on the possibility of use in dogs
- Protocols include signal drift, pH sensitivity, temperature dependance, ion selectivity, durability, etc.
- Also discussed outreach ideas prior to break and plan to have a few of us meet with Tracy to hash out the details

Kelsey Murphy
Work/Research Accomplished

- Continuing contact with DeltaTrak technical services. They verified the outer probe materials with me (PEEK, stainless steel, ABS), but I had to remind them about the sensor material - still waiting on that.
- Put together a research plan for once we’re done testing our proof-of-concept. This is partially for me, but I also think it will be useful for the entire team to use it.
- Found some papers on the kinetics/site-binding model of ISFET pH measurements that will be very helpful in understanding testing results and designing a miniaturized probe.
- Began outlining our poster
- Wrote testing protocols for the drift and pH/temperature tests
- Ran outreach idea by Tracy Puccinelli, who likes the idea. We will meet with her next semester to iron out details. I’ve been in contact with the girl scout committee of the Society of Women Engineers to host the event during one of their patch days.

Problems/ To Do

- ABS is one of the body-contacting materials. This is a cytotoxic material, so in our own design we will have to replace it with a biocompatible material of similar strength.
- We’re crunched for time on testing, so we will pick three to do well with full stats before the poster session. The rest we will do after the poster session.