EE / CPRE / SE 491 Week 1 Status Report
Feb 4, 2019 - Feb 8, 2019
Group: sddec19-20
Project: Ultra-thin electronic skin for real-time health Monitoring
Stakeholder/Client: Liang Dong

Team Members:
Sovann Chak
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Justin Gordon
Sung Min Kang
Sangwon Lee

Passing Week's Accomplishments

Due to cancellation of courses during the previous week, the team was not able to meet with our stakeholder and this passing week the stakeholder has been out of town for a convention. So, the majority of this passing week has been spent brainstorming initial designs and becoming familiar with potential technology for our first conversation with our stakeholder.

The project abstract leaves a lot of questions to be answered, a lot of room on part of the student engineers for design and which technology to implement. The project that has been designated to the team will be quite research heavy because it is on the forefront of latest technology.

Software Engineers

(Justin)
The software engineers have been preparing for the process of trawling - which is essentially attempting to figure out the requirements for the project. In order to complete this task, the software engineers have researched similar technologies and applications which assist users with viewing medical themed statistics. Also, by taking note of design choices and specific technologies used to implement clean and UX friendly applications will help the products initial design.

Some applications which will assist us with requirements trawling are

- *Health* application (IOS app)
- *Fitbit* application (IOS, Web, Android app)

These applications are extremely popular, highly used, clean, UX friendly and prove to be a good jumping point for inspiration.

(Sovann)
Another aspect of preparation for the software team has been to research signal processing and how existing lightweight technology communicates with mobile devices either through bluetooth and or WiFi.

The following paper has been a useful in our understanding of basic signal processing

https://www.analog.com/en/design-center/landing-pages/001/beginners-guide-to-dsp.html

However, the team will have to communicate with the stakeholder on some of the finer grained details of this project so application design can begin as well as beginning to choose the correct technologies which will fit the need of the product.

Electrical Engineers

(Omar)
The electrical engineers have begun their respective research into similar technology which exists in order to find a good starting point as well as improve upon potential existing designs such as

https://www.eurekalert.org/pub_releases/2018-02/uot-jrd021218.php

The main questions which the electrical engineers are attempting to find answers for are

- What material should be used (or what material is in use)?
- How to power a device which simply sticks to ones skin?
- Will the device support bluetooth or WiFi (or something completely different)? (**questions**)

(Sung)
Through studying smartwatch devices which monitor health the team has begun to figure some insights towards these questions. However, the current development of the solutions and designs

are rudimentary (or best guesses), so that the team can be well prepared to discuss with the stakeholder.

http://www.ti.com/solution/smart-watch

(Sangwon)
First of all we have to know what kind of signals we can analyse such as measuring heart rate, blood pressure, oxygen saturation levels, blood glucose, nerve donfuciton, brain activity, and so on. These biomedical signal processing is one of the most important factors of the project. We have to choose which signal we are going to use and how to analyse it, moreover, how we collect and how we make decision with those specific signals.

Patient › Signals › Processing › Decision

https://www.embs.org/about-biomedical-engineering/our-areas-of-research/biomedical-signal-processing/

Through initial research it has been shown that the product requires enhanced research in the following areas

- Minimally sized energy resources
- Building a circuit using minimal energy
- Materials for biomedical devices (thin, durable, with good conductivity)
- How to detect signals from biomedical devices (journals about analysing signals)

Individual Contributions

Team Member	Contribution	Weekly Hrs	Total Hrs
Sovann	Basic research on signal processing	7	7
Justin	Gathered requirements by reviewing similar technologies	6	6
Omar	Researched similar products (ultra-thin wearables)	6	6

Sung	Researched smartwatch technical documents	6	6
Sangwon	Researched biomedical engineering related signals which come from various body-internal activities	7	7

Plans for Next Week

The plan for the next week is to trawl for requirements and have discussions with the stakeholder regarding the technology we have researched. From there we can develop initial designs and link communications with the stakeholders staff (of which will be assisting us since this project is heavily research based). The following is a more specific list for easier reading

- (Sovann and Justin) Trawl for requirements from stakeholder
- (Entire Team) Discuss with stakeholder the technologies they had in mind
- (Sovann and Justin) Create initial designs and look for the Application
- (Omar, Sung, Sangwon) Speak with stakeholders staff (biomedical scientists) about the technologies being used
- (Omar) Answer the questions specified above tagged by (**questions**)
- (Justin) Research the necessary technologies and how to implement (such as bluetooth, WiFi, …)
- (Sovann) Learn basic IOS development
- (Sangwon) Research biosignals and how those signal analyzed (ex. At what BPM or blood pressure represent injured statues.)
- (Sangwon, Sung, Omar) What kind of materials(easy to bent and durable, since we are applying on human skin) are used in technology for biomedical devices.
- (Sangwon, Sung, Omar) How and what kind of power source we have to use. Also how to use minimum energy to make device(skin) smaller.