EE / SE 491 Week 9 Status Report

Apr. 22, 2019 - Apr. 26, 2019

Group: sddec19-20

Project: Ultra-thin electronic skin for real-time health Monitoring

Advisor/Client: Liang Dong

Team Members:

Sovann Chak: Software Architect, iOS Developer

Omar El-Sherbiny: Circuit design and analysis of Sweat sensor

Justin Gordon: Software Developer, Communication research

Sungmin Kang: Circuit design and analysis of Mobility sensor

Sangwon Lee: Circuit design and analysis of ECG, DMD 3D printer

Passing Week's Accomplishments

Software Engineers

(Sovann)
- Retrieved solder from the ETG
- Began implementing both Bluetooth and RFID libraries in iOS
    - Omar has been researching the possibility of using RFID over bluetooth due to power constraints
- Worked on the iOS development course and learned more important design skills
    - Researched heavily into GrandCentralDispatch framework (concurrency and parallel framework)
    - https://developer.apple.com/documentation/dispatch

(Justin)
- Watched many tutorials on soldering
- Soldered necessary pieces to the accelerometer
- Retrieved necessary breadboard pieces from the ETG
- Researched communication protocol alternatives to bluetooth for Android devices

Electrical Engineers

(Omar)

- One of the challenges we have been facing is communication between the sensors and the sensors.
- Bluetooth presents the challenge of powering the device, so an alternative is using a near field communication device (NFC) or radio frequency identification (RFID)
- RFID is more common in commercial products, but there are several ways to implement and RFID device.
- NFC would eliminate the power challenge, but seems to be more challenging to implement compared to RFID.
- Very small integrated chips are commercially available and that would ease the design of the device and would also fit on a small sensor. However, designing an antenna is still a challenge that needs to be overcome.

(Sungmin)
- Check the conductivity of graphene
- Conductivity of graphene is too low, so replace graphene with carbon nanotube
- Change the way to make substrate
- For stretchable substrate, use eco-flex

(https://www.amazon.com/Ecoflex-00-30-Super-Platinum-Silicone/dp/B00CA5VY3U)

(Sangwon)
- Power consumption for communicating device(Bluetooth or WI-FI)
- Wi-Fi requires approximately 80 milliwatts of electrical power. Sending data at the same rate over Bluetooth consumes only 2 milliwatts.
- Since ultra thin skin is portable device so it is better to select bluetooth to make longer battery life
- Bluetooth has better power efficiency since we are not communicating huge data.
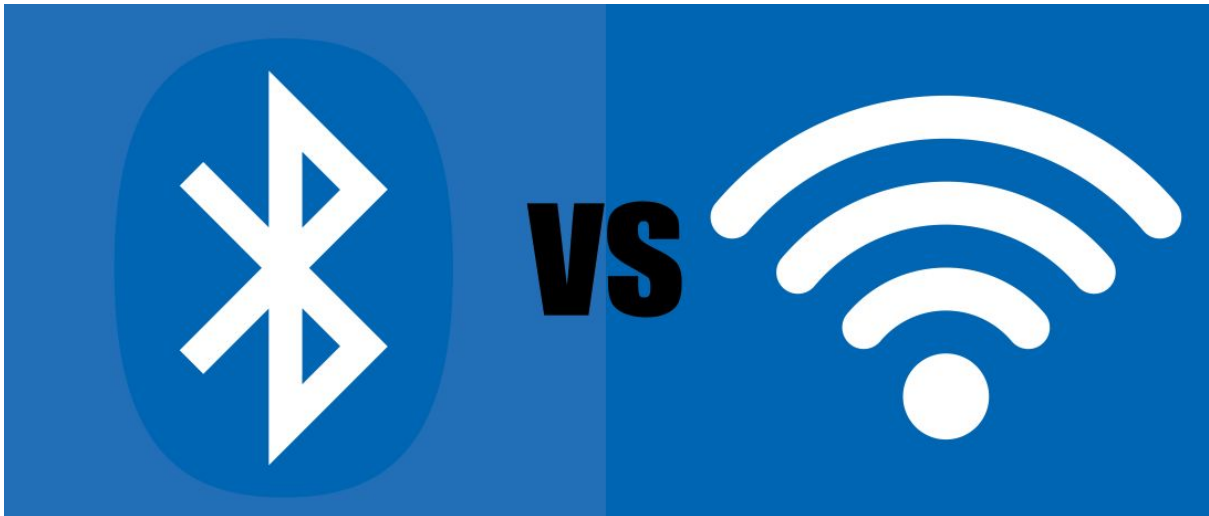
Individual Contributions

Team Member	Contribution	Weekly Hrs	Total Hrs
Sovann	Retrieved solder, began reading into iOS bluetooth and RFID frameworks.	6	57
Justin	Began to solder the prototype and working closely along Sovann. Researched communication protocol alternatives to bluetooth for Android devices.	6	56
Omar	Research NFC and RFID and how each could be implemented in our 3 sensors.	6	50
Sungmin	After checking conductivity of graphene, replace it with carbon nanotube. Also change the substrate to eco-flex	7	59
Sangwon	Research about communicating devices bluetooth and WIFI.	6	57

Plans for Next Week

(Sovann) Test the prototype
(Sovann) Write some basic test applications to test the bluetooth libraries of iOS
(Sovann) Prepare group presentation for next week
(Sovann) Continue iOS development course (http://CS193p.stanford.edu)
(Sungmin) Measuring conductivity of carbon nanotube, and make sure conductivity
(Sungmin) Making stretchable substrate like eco-flex, and test it
(Sungmin) Prepare group presentation for next week
(Sangwon) Research more about communication devices.
(Justin) Create heartbeat sensor for testing
(Justin) Continue work on bluetooth communication
(Justin) Keep studying android mobile development
(Omar) Build and test RFID and/or NFC communication.