Cover Page

ECE 493 Seamless Physiological Monitoring Progress Report

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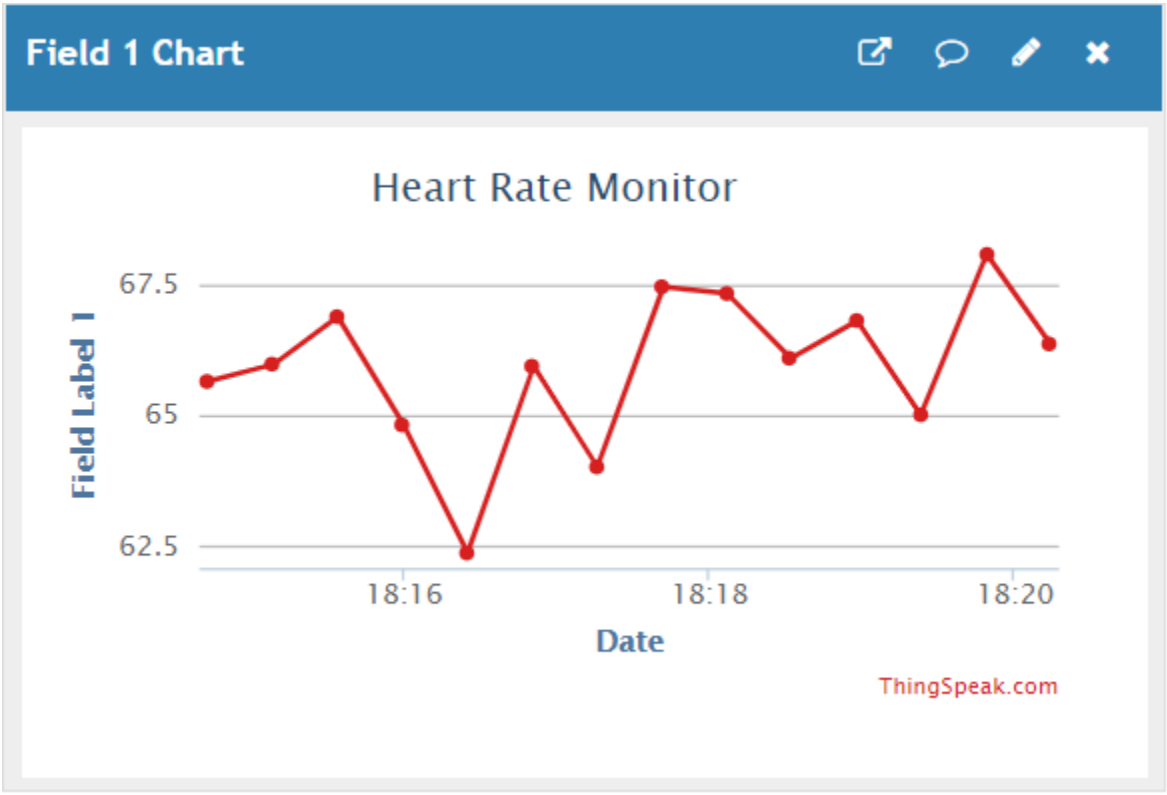
2. Technical Section

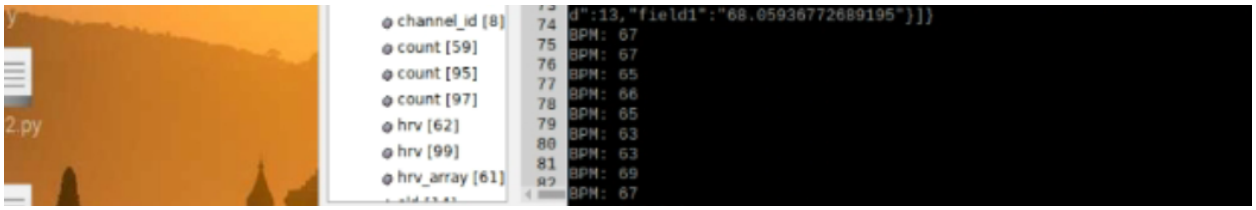
Finalizing the Cloud-Based Storage System: (Completed by Saad and Priyam)

Part of the requirement for our health monitoring device is to ensure that a user's health information is properly stored in a cloud-based system. Our initial design was to have the Raspberry Pi Zero offload the user's data into an AWS S3 bucket. However, after multiple failed attempts, we realized that offloading the data into AWS was requiring too much overhead from the Raspberry Pi. We then switched over to using ThinkSpeak in order to store our user's health data. We used this cloud-based system because it works more efficiently with the Raspberry Pi and doesn't require too much overhead. In order to further decrease overhead on the Raspberry Pi, we designed our code to average out 10 heart rate readings and have that data be uploaded to the cloud.



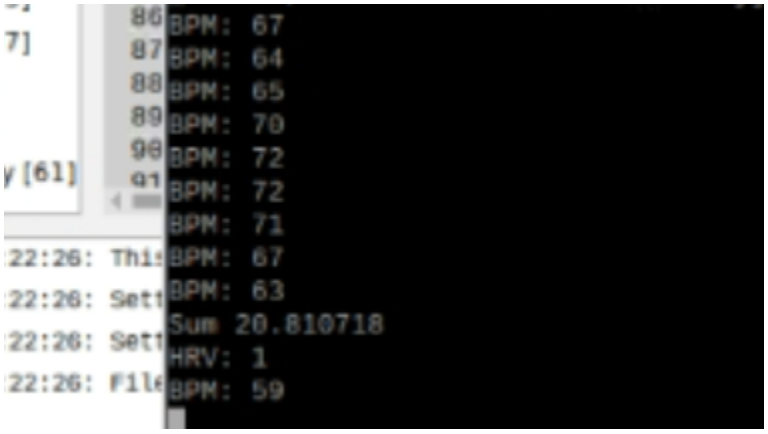
Finalizing the Heart Rate Sensor: (Completed by Saad)

The heart-rate sensor works fairly reliably right now, as it can give steady output. The issue with this heart-rate sensor is that there needs to be a layer of separation between the skin and the sensor. Something like a thin layer of plastic or glass helps the sensor read more reliably. We plan to incorporate a thin piece of glass in our 3d model which will separate the heart rate sensor from the user's skin.



Implementing Stress Level Feature: (Completed by Aayush and Moneeb)

The stress level feature was derived from the Heart-Rate sensor, by converting the BPM to a numeric stress level called HRV. We had to approximate the conversion function because we didn't have access to each individual heartbeat, and the time between each heartbeat. So we took a general approximation of the conversion function by using the deviation between each reported BPM value. We believe this gives us a reliable indication of a user's stress level.



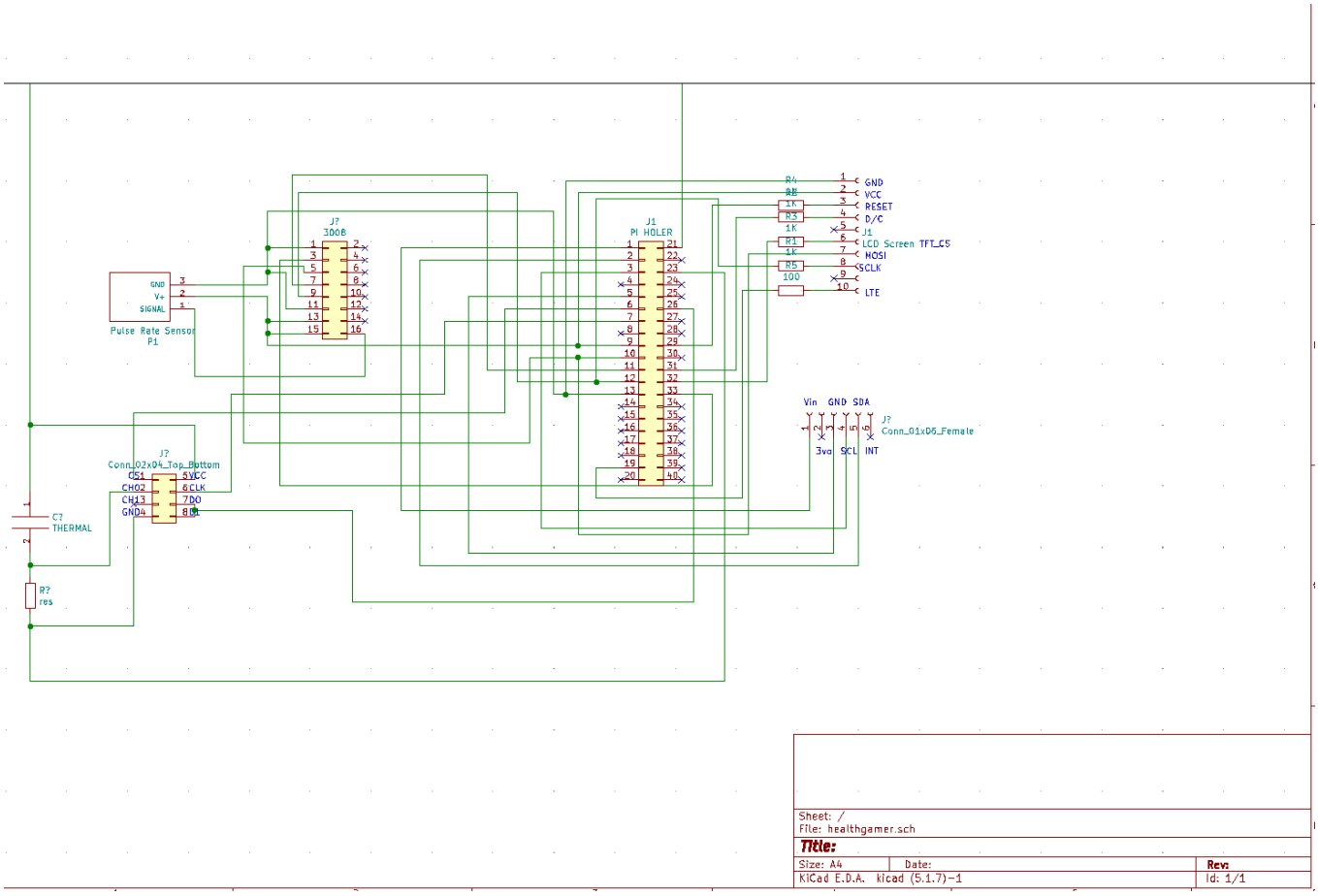
Ensuring Reliable LCD Screen: (Completed by Moneeb and Priyam)

For this subtask, we wanted to ensure that the LCD would properly output when a signal was detected. We had a lot of trouble getting the LCD to output reliability since the LCD would often not turn on when the code was running. We determined that we were having hardware issues with the LCD not properly receiving the SPI signals, we believe this was a result of bad soldering. Here is a small video of the LCD updating with a test vector.

https://www.youtube.com/watch?v=NavqYXfhaq4&ab_channel=MoneebAhmad

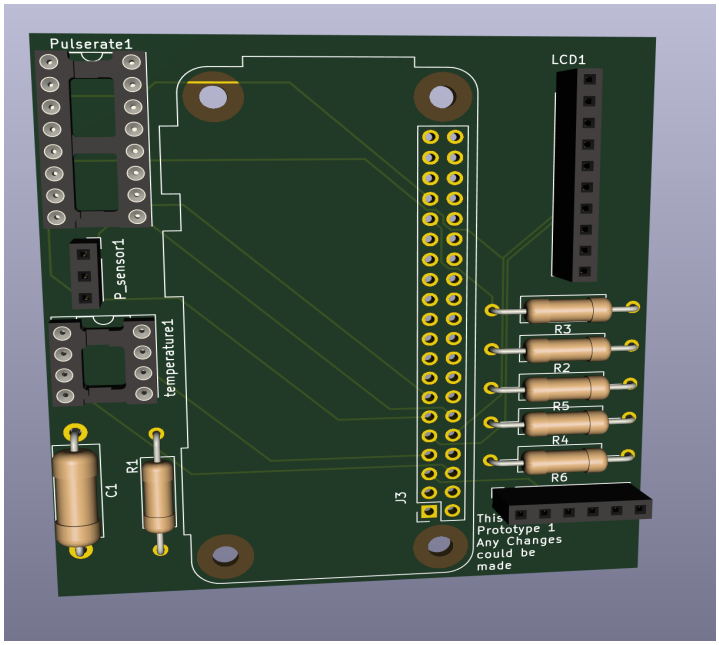
Finalizing the PCB Schematic: (Completed by Jamil and Ryan)

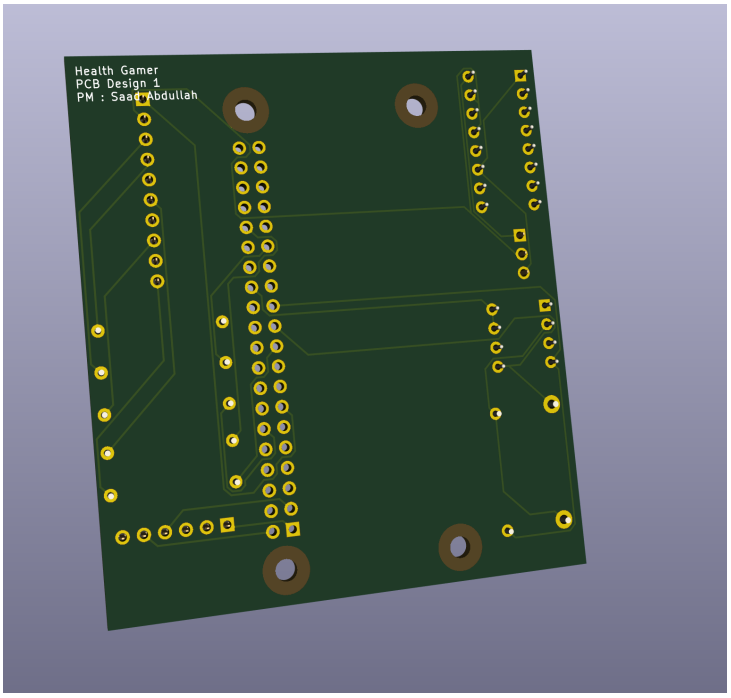
We plan on creating a PCB in order to connect the electrical comment of our health monitoring device together in a compact and neat manner. In order to design a PCB, a schematic for the PCB must first be initialized. In the schematic. We wired how each of the components will be connected to the Raspberry Pi.



Initiating the PCB Design: (Completed by Jamil and Ryan)

We have initiated the PCB design for our Health Monitoring device. As of right we are working on making the PCB dimensions smaller that way we can make our Health Monitoring more portable and compact.





3. Administrative Section

a. Progress summary table

First Sample Project						
Finish Protoyping (All parts functioning)	1/25	2/5	0	11	++++++++++	100%
PCB Shecmatic	2/8	2/15	14	7	++++++++++	100%
PCB Design	2/15	2/23	21	8	+++++++	80%
In-Progress Report*	2/26	2/26	32	0	++++++++++	100%
3D Printed Case	2/26	3/5	32	7	++++	40%
System Integration	2/26	3/16	32	18	++	20%
Testing Case 1	3/16	3/19	50	3		0%
Testing Case 2	3/21	3/24	55	3		0%
Reporting	3/25	4/1	59	7		0%
In-Progress Presentation + Report 2*	4/2	4/2	67	0		0%
Draft Final Report *	4/23	4/23	88	0		0%
Final Presentation Prep	4/9	4/23	74	14		0%
Oral Presentation/Final Report/ Poster*	4/30	4/30	95	0		0%

*In-Progress Report** is the first progress report.
*In-Progress Presentation + Report 2** is the second progress report. This progress report will be formatted in a presentation format.
Final Report * will be the last task for the course. A poster detailing the Health-Gamer project and a presentation will need to be made.

b. Funds spent Since 8/24/2020

Item	Cost ($)	Vendor
Pi Zero x2	50.3	Amazon
Pulse Sensor	24.95	SparkFun
LCD	19.95	447 Kit
MCP3008 ADC	12.5	Amazon
ADC0832	$2	350 Kit
Thermistor	1	350 Kit
PCB x6	50	Oshpark
Accelerometer	10	447 Kit

Temp. Tester	20	Amazon
Accel. Tester	32	Amazon
Resistors	1	Previous Lab Kits
Fitbit pre-owned	0	-
Battery	10	Amazon
	Total	
	233.7	

c. Man/ Women Hours Spent Since 1/25/2021

Task	**Hours Spent**
Finalizing the Cloud-Based Storage System	15
Abstract, Title Form, WBS, Test Plan	5
Finalizing the Heart Rate Sensor	7
Implementing Stress Level Feature	5
Ensuring Reliable LCD Screen	8
Initiating the 3D model	5
Finalizing the PCB Schematic	5
Initiating the PCB Design	2
Total	52

4. Plans for the next period

For the next period, we are planning to get the Printed Circuit Board (PCB) design printed out, 3D Model which will house the electronic components, integration of all devices into the system, and then move on to perform two sets of testing. Among the two tests, the first one will check if the Healthy-Gamer uses data-gathering sensors in order to collect a user's health symptoms every 3 seconds. In the second test, we will check if the Healthy-Gamer alerts the user if their stress level, heart rate, body temperature, or wrist movement are at a high rate for an extended period of time or not. If yes, it will then send an alert in the form of an SMS message to

the user's cellphone. Upon the successful completion of those tasks, we will then start working on our final report and presentation.

5. Problems Encountered

a. Is the project on schedule?

We are 10 days behind on our schedule due to some minor setbacks which is causing this delay.

b. Any problems causing problems/delays?

A problem we experienced was the LCD screen not functioning as we would like it to. Trying to make the LCD screen work properly without random disconnections had hindered our progress by around a week.

There might be issues with shipping the PCB due to COVID, if this does happen on an off chance we will try to work around this potential issue by shortening the time we have given ourselves on the System Integration to stay on schedule.

c. Plan to deal with problems/delays

We will be working every day from now on to catch up with the issues we faced. We have scheduled to work a couple of hours every day in order to solve the issues that occurred and fix them in time so that we can proceed to exhaustive testing.