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## **EE/CprE/SE 491 WEEKLY REPORT 02**

**Feb 19**

**March 3**

**Group number: 07**

**Project title: Temperature sensors for veterans**

**Client &/Advisor: BAE / Dr. Gaffar**

**Team Members/Role:**

- 1- Jared Cox / hardware**
- 2- Caleb Arnold / hardware**
- 3- Max Berthold/ hardware**
- 4- Michael McDonough / hardware**
- 5- George Makhali / software**
- 6- Bridget Schmitt / software**
- 7- Jamie Anderson / software**

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### **o Weekly Summary**

*As a group this last week, the software people have been working on making sure that the AWS works. We have had issues with authentication even after the login is confirmed by AWS. Our application was also not flowing to the correct places in the application. We worked to create the correct flow of the application. We found out that the authentication errors were because of certain local devices. We now have the task of figuring out how to make this not happen. We also realized that some of the visual aspects may not work well with the older audience that will be utilizing the application. For this reason, we have been working a lot on visual design.*

*On the hardware side, we were finally able to obtain the materials we ordered for our project. Since Max is currently living in Kalamazoo, MI, we had to ship his materials which arrived 2/26. The main focus of the first week was to convene early and discuss which areas of implementation each member plans to focus on, determine strategies for standardization of implementation and testing, and create a punch list of items assigned to members for completion. During the second week of this time period we were able to start configuring and testing individual pieces of our design with the thermosensing and RF communication. We are also reviewing our power design to make the device easier for users to charge in between uses and externally control power.*

- **Past week accomplishments** *(Please describe/summarize as to what was done, by whom, when and, collectively as a group. This should be about a paragraph or two in length. Bulleted points are acceptable as well. Please keep only your technical details related to your project. Figures, schematics, flow diagrams, pseudocode, and project related results are acceptable, but please ensure that they are legible (clear enough to read) and to provide an explanation. If researching a topic, please add a few details about what was learned and how it is relevant to the project. If two or more people worked on a single task, be sure to distinguish how each member contributed to the task. Specific details relating to the assistance provided to other members may be included here. **Do not include classwork, such as individual reflection assignments, and group meetings as part of your duties.**)*
  - 1: Michael: This week I worked with Caleb to find a software platform that would allow all members working on hardware to collaborate on code and circuit wiring in real-time. We found a few options, each with its own pros and cons, but we believe we have found one that will allow us to at least understand the changes each member is making to the circuit or program. In addition to this, I completed research on how to control power to the Arduino MCU using a 12V latching push button. I began designing a few possible options and have run into a couple of issues that can be worked out this coming week. However, the implementation of power control for our device will allow our users to minimize power consumption when the device is not being used, as well as have a clear indication as to when the device is powered on (LED lit) and ready for use.
  - 2: Caleb: I spent the initial part of this time period working with Michael on standardizing our code locations and wiring diagrams as we are working on multiple prototypes in parallel. I have spent the rest of my time working on the thermosensing circuit and code for our device. I was able to calibrate our thermistor using a temperature-controlled environment and create code to accurately measure temperature using the thermistor characteristics. The next step I have is refining the code and/or circuit to compensate for voltage fluctuations from the microcontroller. I have additionally been doing more research on PCB design in CAD software as I will be responsible for that step after we verify the prototype's functionality.
  - 3: Max: During this week, I received all the materials so I could finally begin testing hardware components and I created a Github for the hardware side of the team to have a central location for code. I focused on getting the LoRa RF module communication to work. As this was my first time, it took me troubleshooting issues and researching more to get the connection to work. I was able to send data from one Arduino Nano 33 BLE to the other using the LoRa RF module
  - 4: Jared: have communication via ble to arduino. At this time this is with a premade android app, team has been working on ble communication on the android app side. Consulted a source for hardware enclosure. No definite option at this time.
  - 5: George: I am a little bit behind testing Bluetooth on the android side because I've had surgery the last week, I am still modifying things on my side of things to meet our specifications and will test it as soon as I recover a little bit more.
  - 6: Bridget: These last two weeks I have been working on interface implementation. I had to begin by fixing the main temperature sensor page. This page was crashing. I was able to find the issue and made sure that it was working correctly. Now my biggest task has

been making the app user friendly. I have been working with the design we decided on and have been updating the design to make it more user friendly.

- 7. Jamie: This week I focused more on ensuring that the AWS utilities that we are using are configured properly and won't cost much (if anything) to our clients. AWS has a limit to the amount of space that can be used before paying, so ensuring that this stays under this limit is pivotal to keeping costs under budget. Also set up some basic screens differentiating students from instructors and made it easier for students to sign up.
- **Pending issues** *(If applicable: Were there any unexpected complications? Please elaborate.)*
  - 1: Michael: First, Caleb and I ran into a few issues when trying to find a software platform that would allow all members working on the hardware side of the device, to make changes to a collaborative circuit diagram and code program in real-time in order to help streamline and standardize our implementation from various areas (Ames, Fort Dodge, Kalamazoo). One platform seemed promising but did not have an Arduino Nano as an addable component, nor did it have code to simulate the circuit. Another platform had the Arduino Nano but lacked other components such as a battery and temperature sensor. However, the latter did have collaborative program code that we can at least update whenever we have an update, and we have created various strategies to add to the circuit diagram representable updates such as using various circuit components to represent others i.e. using an LED to help show how our temperature sensor is wired on the board. Additionally, when researching and designing options for how to control power to the Arduino using a 12V latching push-button, I ran into a couple of issues with implementation. The overall goal is to have the Arduino initially off, when the push button is latched, it will complete the circuit to add power to Arduino and turn it on. When the button is un-latched, the circuit will be broken, and the Arduino will then turn off. This may not be as simple to implement as the idea is to form because we need to create a way for the Arduino to initialize and run the program code when it is powered, and to safely turn off the Arduino when it loses power. Also, we want to add a safeguard so that if the wiring to the pushbutton is ever severed causing it to not work, we want the users to be alerted in some fashion to allow them to make corrective actions for their safety. These issues will be worked on in the coming weeks until resolved.
  - 2: Caleb: I am having an issue with the temperature readings from our microcontroller. The temperature readings are mostly accurate, but can fluctuate up to a couple degrees Fahrenheit each second. After some troubleshooting I was able to pin this down as a voltage fluctuation from the MCU's 3.3V pin. I am not positive if this is an issue for all power sources or just the USB power I was using.
  - 3: Max: Getting the LoRa RF modules working and communicating with the Arduino Nano properly took a lot of troubleshooting. After hooking up the RF modules for the first time, they seemingly did nothing. I tried changing the baud rate of the RF modules and many of the other settings on the RF modules, but none of this worked. Eventually, after scouring through forums related to LoRa modules and Arduino, I figured out what my issue was. I was using the wrong function to initialize the communication between the Arduino Nano and the RF modules. I changed this in my code, and then I was able to successfully send data between the two Arduinos using RF.
  - 4. Jared: ble testing is the next step on the hardware side, will need software to continue. Hardware enclosure dimensions can't be confirmed at this point due to the hardware design not being quite finalized.

- 5: George: Bluetooth interface on the android side still needs to be completed and tested.
- 6: Bridget: We need to make it so that AWS will connect every time we logon so that we can access the rest of the application every time. I have been working to make the interfaces user friendly, but the more user friendly, the more complex the code is so I have run into a few challenges in syntax.
- 7. Jamie: Currently login authentication will mysteriously not like a user on a single device, which is detrimental to the login process. (Further clarification: it is not an AWS Cognito issue (probably), app simply says user is not authorized when they are on one device but will login fine from another.)

- **Individual contributions** (*Creating this section is optional, but it is **Required to include the “Hours Worked for the Week” and their “Total Cumulative Hours” for the project for each member somewhere relevant in your report. Your individual weekly hours should be at a minimum of 6-8 hours for this course. So please manage your time well. Also, ensure that individual contributions support your claim to the weekly hours. Be honest with the reports.***)

<u>NAME</u>	<u>Individual Contributions</u> (Quick list of contributions. This should be short.)	<u>Hours this week</u>	<u>HOURS cumulative</u>
Max	RF module research	6	32
Caleb	Thermosensing calibration and testing	7	34
George	Bluetooth connection on the android side	4	34
Bridget	Application design	6	39
Jared	BLE connection, enclosure options	7	28
Jamie	Additional login features, debugging	6	32
Michael	Power optimization	8	32

- **Comments and extended discussion** (*Optional*)

*Feel free to discuss non-technical issues related to your project.*

*We have had a lot of miscommunication amongst the group. We have also had issues not getting hardware in a timely manner.*

- **Plans for the upcoming week** (*Please describe duties for the upcoming week for each member. What is(are) the task(s)?, Who will contribute to it? Be as concise as possible.*)

- 1: Michael: This upcoming week, my main focus is to continue implementing latching push button power control for the device.
- 2: Caleb: We have catching up to do on the hardware side. Myself, Max, Mike, and Jared will need to meet early on in the week in order to clarify individual responsibilities with testing.
- 3: Max: This week, I am going to continue testing the RF communication. I plan to do testing in different locations, and with the RF modules at varying distances away from each other. My goal is to successfully find an RF module that can reliably send data 300 meters when in a lightly wooded area.
- 4. Jared: hardware testing is the focus at this point. Will continue to work with the hardware team to accomplish testing goals.
- 5. George: I am planning to keep pushing the Bluetooth side since it is a big part of the project and I am planning to test it as soon as I feel a little bit recovered.
- 6. Bridget: I plan to continue working on the ease of use of the app. I need to make different popups and menus to make the app easy to navigate.
- 7. Jamie: Refining the app to a place that will be easier to pick up after spring break. Main focus will be on finalizing pivotal features in the app (such as instructor view with dynamic student tabs).

- **Summary of weekly advisor meeting** *(If applicable/optional)*  
*(Provide a concise summary on the contents and progress made during the advisor meeting.)*

### **Grading criteria**

Each weekly report is worth 10 points. Scores will be awarded as follows:

- **8 – 10:** Progress for your project seems to be suitable. Documentation and hours reported by team members are adequate.
- **6 – 8:** There is scope of improvement both in your report and your project progress. Can consult with instructor/TA after class for further inputs.
- **< 6:** Please talk to instructors/TA after class hours about any difficulties that you/your team is facing.

Each weekly report should be unique in that they have a unique set of supporting details for your contributions. So please do not just copy your reports from the previous week. In addition, please avoid any personal pronouns (he, she, I, you). Try to keep your reports as neat as possible.