

EE/CprE/SE 4910 WEEKLY REPORT 02

Sept. 24 - Oct 7th

Group number: 006

Project title: CyVital

Client &/Advisor: Dr. Meng Lu

Team Members/Role:

Kate Endersby, Claire Haas, Reza Choudhury, Maximilian Tanruther

○ **Weekly Summary**

The software team bootstrapped the new repository, audited last year's code and documentation, and set up a hardware-less "loopback" demo, allowing iterations on the software without hardware for now. Some early-sprint deliverables were identified:

1. restore wiring and continuity to the CyVital unit
2. live ECG pipeline to the GUI,
3. uniform module interface for PulseOx/EMG/Reaction-time

The hardware team created a Bill of Materials, a PCB project on KiCad, and resources on next steps for PCB implementation. The team researched existing projects similar to the CyVital such as the CyDAQ to see what aspects of safety and usability are necessary when creating a student-facing project. Some next-week deliverables include:

1. Initialize repository for version control and collaboration
2. Create a first draft schematic and PCB layout
3. Update Bill of Materials to reflect component selection in power protection circuits and signal indicators (LEDs)

Both the software and hardware team have made progress which builds directly on prior CyVital goals: low-cost DAQ, modular sensors, and a real-time GUI for BME labs.

○ **Past week accomplishments**

- Kate Endersby:
 - Created a Git repository for our code at <https://git.ece.iastate.edu/sd/sdmay26-06>
 - Reviewed the previous group's code to begin modifying it to fit expanded purposes

- Hooked up the oscilloscope to the box and ran the previous group's code to make sure it worked
- Claire Haas:
 - Created a schematic and layout on KiCad. Created a document with necessary tools to create a repository for version control
 - Watched Youtube videos on version control with KiCad and integration with Git repositories
 - Created a document with links to footprints and schematic symbols to import into our PCB project
 - Documented existing breadboard setup to implement existing connections upon the first layout revision
 - Debate between a GitLab repository or GitHub repository based on existing documentation and integration with KiCad. Consult with Dr. Lu based on his preferences
 - Created Bill of Materials for materials purchasing
- Max Tanruther:
 - Tested the sensors to ensure that they were functioning correctly.
 - Reviewed the schematic and the components used to filter the signals coming from the sensors.
 - Reviewed KiCad PCB modeling
 - Researched the datasheets for the current sensors
 - Reviewed the previous groups filtering of the sensor signals
- Reza Choudhury:
 - Worked on code and got the hardware demo up and running, but without results (the hardware hasn't been hooked up yet). This is where the group left off last year.
 - Made a hardwareless demo to test the software without using the hardware. This demo does not currently use graphs, but will in the following week. It currently displays test data outputs in rapid succession to ensure the demo works and is integrated in a way that makes it easy to switch between tests. This mirrors the approach of prior teams (CSV/open datasets while hardware stabilizes) and allows us to iterate on the GUI/analysis now.
- **Pending issues**
 - A few wires on the Cy-Vital unit were disconnected need to be carefully reconnected in the right places
 - Need to learn how to wire the specific sensors to the CyVital unit properly so we can read real-time outputs - authoritative pinouts/schematics

- Need to run a working demo of each sensor (ECG, PulseOx, EMG, Reaction time)
- Massive GUI updates: dockable views, stable FPS, graph panes, and a modular “sensor app” shell so labs are teachable and responsive
- Need access to the new BioPac sensors to figure out how they are wired before adding it to the Cy-Vital schematic.

○ **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week (9/23-10/7)</u>	<u>Total Hours</u>
Kate Endersby	Created Git, reviewed code, ran previous group's code	12	18
Claire Haas	Created schematic and layout on KiCad. Took photos of the existing system, BOM, and Git research for KiCad.	12	18
Max Tanruther	Researched sensor data sheets, previous teams design and KiCad. Tested existing sensors.	12	18
Reza Choudhury	Hardware-less demo, app integration, graph work	12	18

○ **Comments and extended discussion**

- Excited to get our testing along the way
- Ready to start GUI renovation next week
- Promising results from a hardwareless demo show software is ready to test upon reconnection to sensors

○ **Plans for the upcoming week**

- Kate Endersby:
 - Add functionality to export signal data to a file
 - Look into graphing data analysis, starting with the heart rate sensor
- Claire Haas:
 - Create Git repository for the hardware design
 - Create schematic with existing sensors wired up
 - Create layout with existing sensors: EMG, reaction time, ECG.
 - Theorize the best way to connect the Biopac sensors to the existing PCB design

- Max Tanruther:
 - Get access to a BioPac to cross test the sensors to ensure accuracy of the sensors.
 - Help theorize and create the pcb design with only existing sensors
- Reza Choudhury:
 - Live Demos - ECG first - working sensors, live outputs
 - Readable graph outputs - add axis/units, timebase controls, and start/pause/export - design and construct GUI graph outputs
 - GUI updates (UI/UX) for better student experience
- Group: Software team will get live demos going. The hardware team will have a basic PCB done with all of the existing components on it. Each person will ask ETG for Coover 1045 computer access. The team will meet to decide how to update the senior design website and assign roles based on what aspects of the website will be changed.
 - **Summary of weekly advisor meeting**

The team was granted access to Coover 1045 and set up a group workspace to allow each member to productively work on CyVital without disruption. Dr. Lu is working on sending the team current BME lab manuals based on his vision for the course. This will help determine other features that the CyVital system may implement either this semester or in the future.