Executive Summary:
Personal Data Acquisition Prototype

Team 16

ECE 443

Team: Preston Hang, Mingqian Xu, Qunyi Pan

Project Partner: Chris Patton

Design Problem (Ming)

Our project partner had tasked us with creating a device that fit into the middle area between industry-level data collectors and plug-and-play hobbyist devices. We set out to create a data collection system that We initially proposed eight engineering requirements for our project, which are as follows: Acceleration Precision，CAN Bus，Data Storage，Display Live Data，Read Sensor Data，Rugged Device，User Friendly Design，Wearable。the eight engineering requirements, we have completed six, including: Acceleration Precision, Data Storage, Display Live Data, Read Sensor Data, User Friendly Design, and Wearable. The two that were not completed are: CAN Bus and Rugged Device. The specific reasons for not completing them are: for CAN Bus, we temporarily cannot transfer data from STM32 blue pill through RS 485 Can Hat to Raspberry Pi. The cause is speculated to be the inability to communicate due to the lack of accurate editing of STM32 blue pill, but it cannot be fixed for now. For Rugged Device, we cannot ensure the device operates in a 150ml dead-zone-free water spray. The reason is that it involves certain risks, which may lead to the collapse of the entire system, so we cannot complete this part of the content for now.

Design Implementation (Pan)

At the beginning of the project, Mingqian Xu and Qunyi Pan worked on the setting of STM32 microcontroller, and Preston Hang worked on the building of the database and displaying the data from the database. Besides these, Mingqian designed a closure and Preston designed a custom PCB for the project. During this time, we usually had a virtual meeting with project partner Chris Patton every week. And at the last step, all of us worked together to make all blocks work together.

Proposed Timeline

TERM 1 TIMELINE

Smartsheet Tip → A Gantt chart's visual timeline allows you to see details about each task as well as project dependencies.

PROJECT TITLE	Personal Data Acquisition Prototype	TEAM MEMBERS	Preston Hang, Dakotah Rivers, Mingqian Xu, Qunyi Pan
PROJECT PARTNER	Chris Patton	DATE	10/27/22

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION	PCT OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Timeline Creation		10/27/22	11/1/22	4	30%
1.1	Priminary Research		10/27/22	11/25/22	28	70%
1.2	High Level Project Design Description				0	75%
1.3	Raspberry Pi Remote Setup		10/27/22	11/15/22	18	80%
1.4	Black Box Diagram		11/4/22	11/20/22	16	50%
1.5	Finalized Proof of Concept				0	20%
2	**Project Prototyping and Work**					
2.1	Discuss Group Design Roles		11/1/22	11/22/22	21	50%
2.2	Test Run Simple_log.c File		11/17/22	12/9/22	21	
2.3	Order Clickboard Sensor and attach to setup		11/18/22	12/9/22	21	
2.4	Potentially output sensor data to terminal		11/18/22	12/9/22	21	
3	**Preparation Before Winter Term**					
3.2.1	Next Step Discussion		12/2/22	1/1/23	0	0%

FALL TERM 2022 — WEEK 5 | WEEK 6 | WEEK 7 | WEEK 8 | WEEK 9 | WEEK 10

Figure 1: Term 1 Full Proposed Timeline

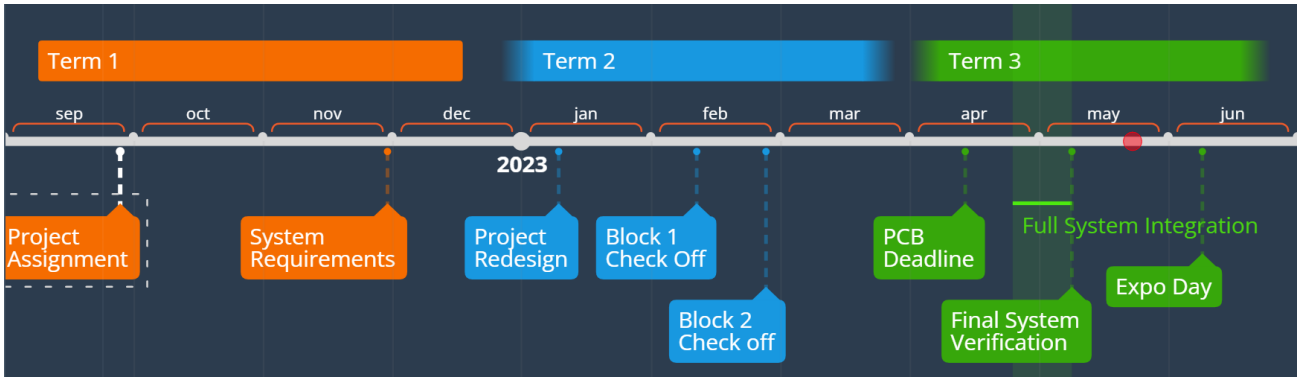

Figure 2: General Timeline

Key Takeaways (Preston)

One of the largest takeaways we had was all of the learning we had. This project was created entirely out of scratch, with only guidance from our mentor. Majority of the project design and implementation was up to us. Many concepts that we were introduced to here, such as CAN communication, STM32 microcontrollers and CubeIDE, 3D printing, PCB design, Flask, Python, JavaScript, SQL databases, Accelerometers, etc, are useful skills we can further develop in our careers. This experience was more than a school project; it was an entry into the life of an Electrical/Computer engineer, where you have to lead, plan, design, debug, report, and collaborate.

Our team learned many lessons from this project, such as how important communication is within a team. By the time the project was finished, we realized that we should have had more meetings to discuss confusion on work and integrate earlier to avoid issues and problems that we encountered early in the system integration process. Another lesson our team had learned too late was to involve each other in our individual progress. Without this, there was more difficulty integrating everyone's work together, as we had take the time to learn and understand each other's software and hardware with little background experience. This could have been avoided with more meetings and updates that involved the team more closely, such as code reviews and walkthroughs, since majority of the work was independent until term 3.

Though many obstacles came into our path, such as a teammate having to leave the team, numerous hardware and software issues, and many evolutions of the initial idea, we still managed to come together and work on something as engineers. Because of this project, we will be leaving the engineering program with more experience than we could have gotten from a regular course.