Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 08: Marching Band LPS
Bi-Weekly Update 3

Alex Flores, Vlad Lebedev
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TA: Vishwam Raval

Problem Statement

- Problem: Marching bands require very precise positioning for their shows. Currently, the only method of review for marcher positions is a band tower, which is only accessible to the band directors.

Our Solution

- Solution Proposal: We are developing a system of wearable transmitters that send signals to stationary receivers for location calculation. This data is then sent to a web application that is accessible to both marchers and the director for a true bird's eye view.

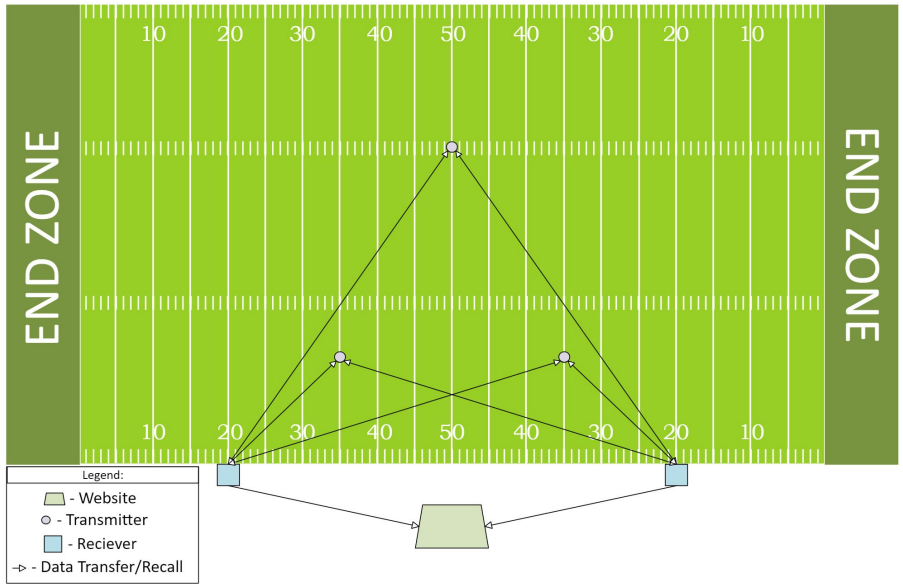
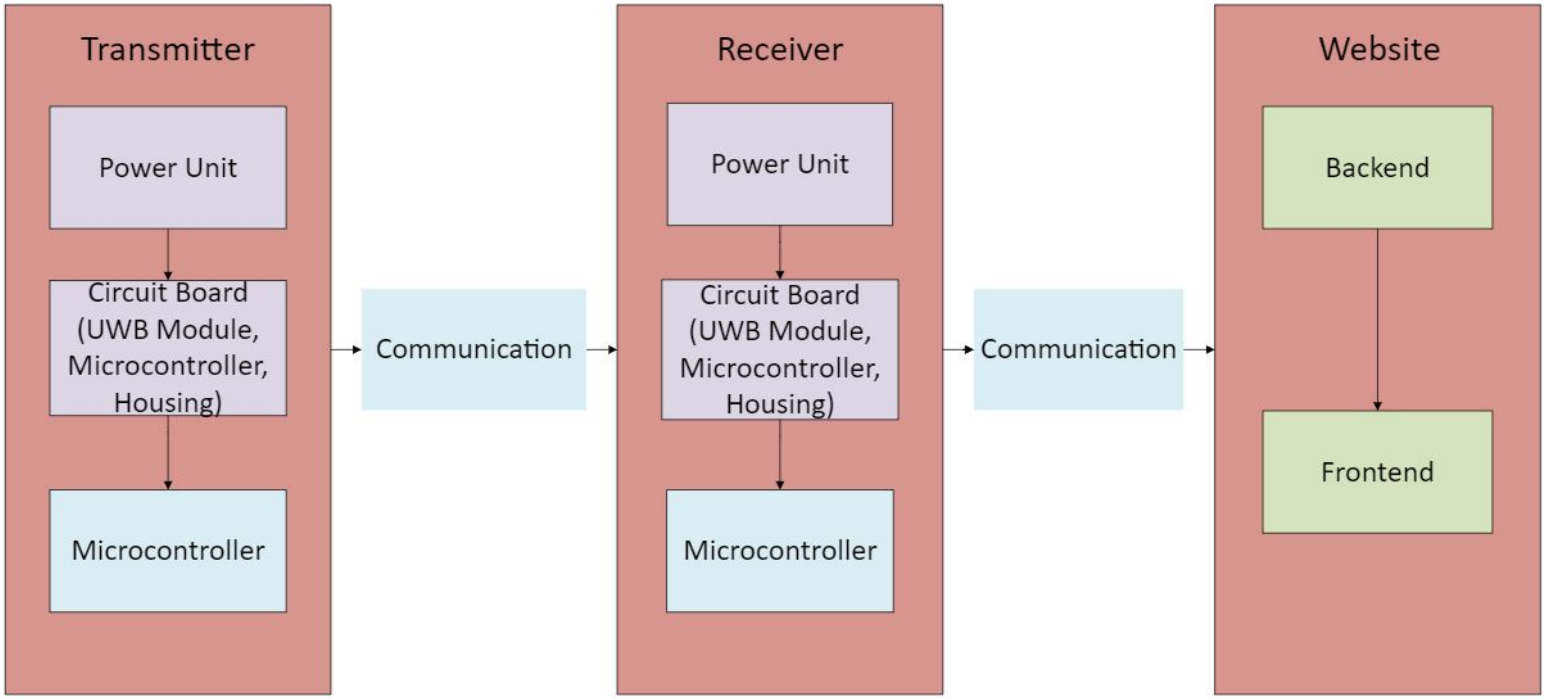
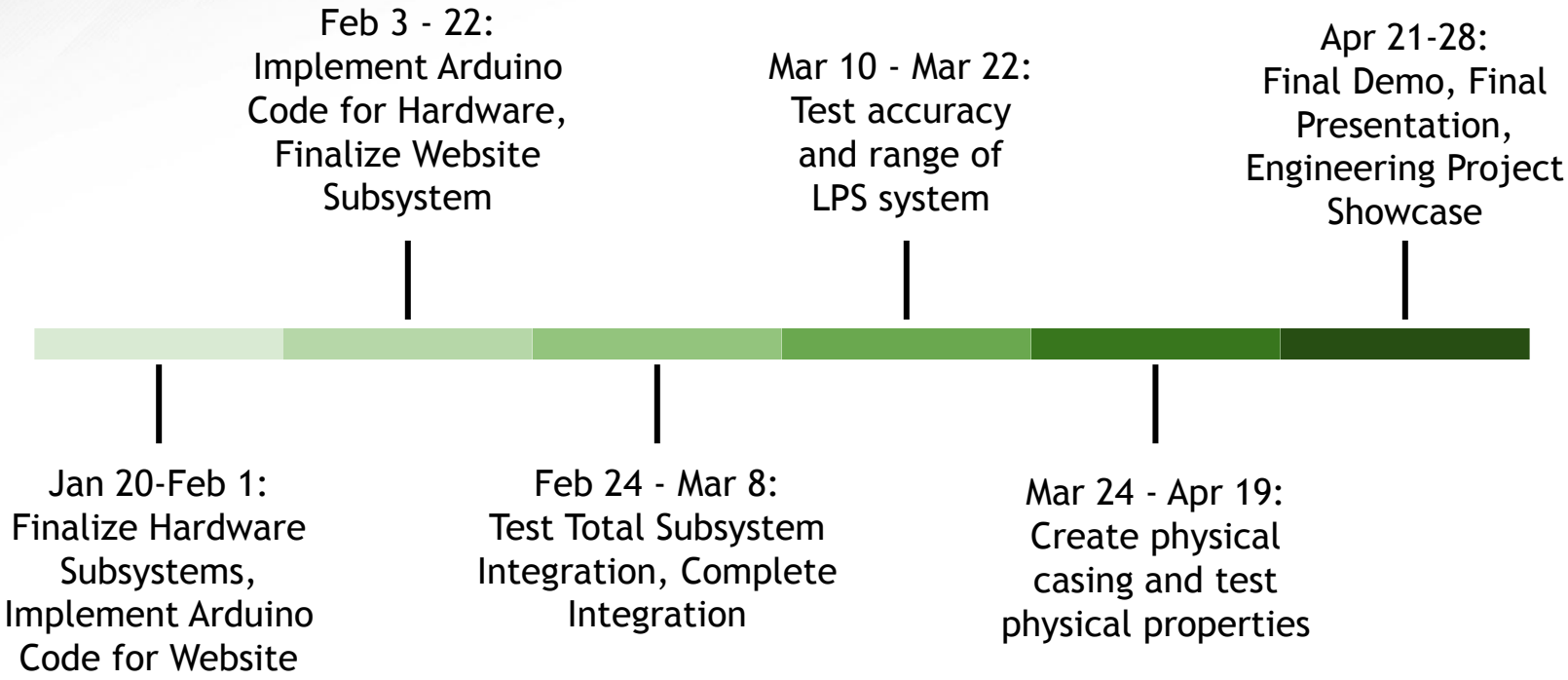


Diagram of Subsystem Division



Project Timeline

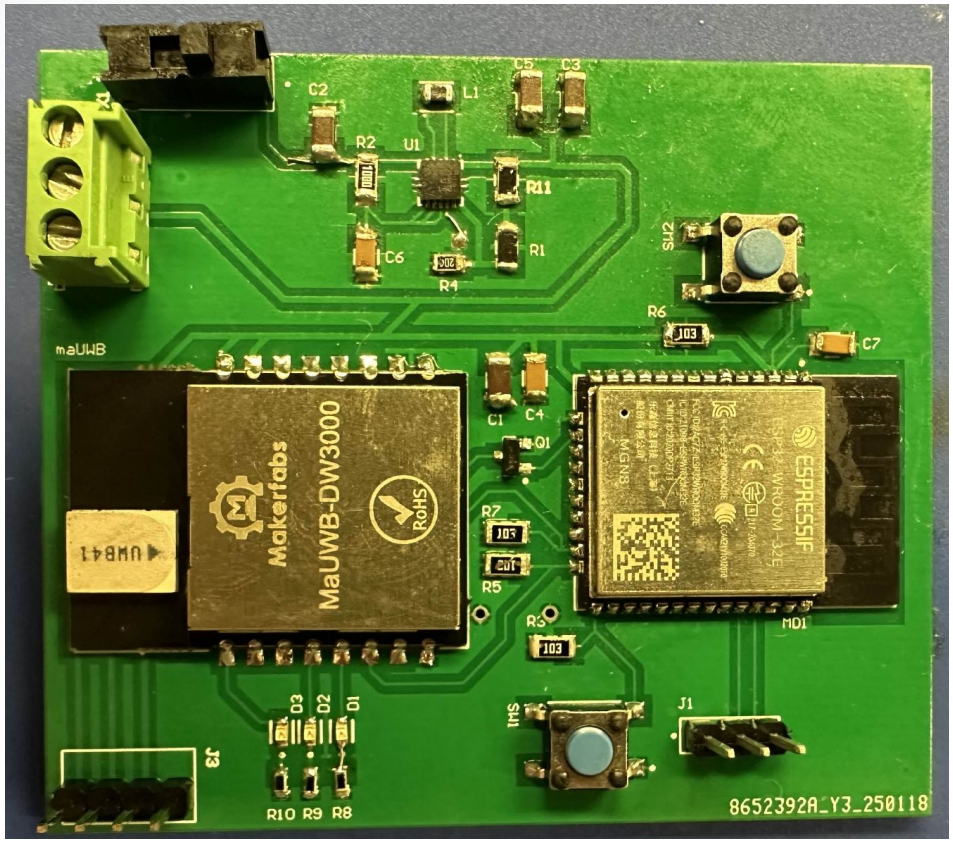


Hardware Subsystem

Alex Flores

Accomplishments since last presentation 18 hrs of effort	Ongoing progress/problems and plans until the next presentation
All boards are completely soldered Power testing and microcontroller functionality have been tested. Power works perfectly, issues with MCU	Hardware subsystem needs troubleshooting Work on finalizing integration with firmware and finish up my half of the firmware

Hardware Design Data and Photos



Hardware Design Data and Photos

Website Subsystem

Vlad Lebedev

Accomplishments since last presentation 13 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Debug code for compatibility with global hosting • Change live feed functionality from static data processing to dynamic data processing • Connect PostgreSQL database with a 3rd party program (pgAdmin) to visualize the database	• Adjust CSS code for styling • Connect the website to the receivers • Review data

SQLite to PostgreSQL Database

	id	x_coordinate	y_coordinate
1	2	3000	3000
2	3	100	3000
3	4	193.5	190
4	5	395	297
5	6	596	190
6	7	798	297
7	8	596	297
8	9	999	190
9	10	596	399
10	13	0	0

SQLite

	id [PK] bigint	x_coordinate double precision	y_coordinate double precision
1	2	3000	3000
2	3	100	3000
3	4	193.5	190
4	5	395	297
5	6	596	190
6	7	798	297
7	8	596	297
8	9	999	190
9	10	596	399
10	13	0	0

PostgreSQL

Firmware Subsystem

Vlad Lebedev

Accomplishments since last presentation 6 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Adjusted the code to send positional data to the website backend for real-time live feed • Reworked Tag functionality code to work for maUWB	• Reworking Anchor code to be compatible with hardware • Integration with hardware and software for testing

Execution Plan

Items	Owner	1/27/25	2/3/25	2/10/25	2/17/25	2/24/25	3/3/25	3/10/25	3/17/25	3/24/25	3/31/25	4/7/25	4/14/25	4/21/25	4/28/25
Redesign Board and Order New Parts and Board	Alex														
Bi-Weekly Update #1	Both														
Use Arduino to Create Firmware	Vlad														
Finalize Arduino Details	Both														
Solder New Boards and Test	Alex														
Test Arduino Code Implementation	Alex														
Bi-Weekly Update #2	Both														
Make Changes to Code for Hardware Implementation	Alex														
Finalize Website Subsystem	Vlad														
Bi-Weekly Update #3	Both														
Test Website Connectivity	Vlad														
Finalize Integration	Both														
Test Range of Detection	Both														
Test Precision of Detection	Both														
Spring Break (If needed, catch up if behind)	Both														
Bi-Weekly Update #4	Both														
Participate in Design Blitz	Both														
Implement Design Changes if Needed	Both														
Bi-Weekly Update #5	Both														
Work on Physical Casing	Alex														
Test Physical Properties (Thermal, Weight, etc)	Alex														
Final Presentation	Both														
Final Demo	Both														
Final Report	Both														

Not Started
In Progress
Completed
Behind Schedule

Validation Plan

Paragraph #	Test Name	Success Criteria	Methodology	Status	Owner(s)
3.2.1.1	Location Precision	The Marching Band LPS will be able to provide the location of each marcher with an accuracy of +/- 1 meter.	Establish reference points with known positions and compare LPS data to calculate the precision error.	UNTESTED	Full Team
3.2.1.2	Range of Detection	The Marching Band LPS will be able to detect marchers within a football field with the dimensions of 100 meters by 50 meters.	Move around a transmitter at the edges of the football field to ensure stable connection.	UNTESTED	Full Team
3.2.1.3	Website Data Process Time	Location data will be processed and displayed on the website associated with the Marching Band LPS in one second or less.	Add a timer on the display and count the time it takes to process 50 location coordinates.	UNTESTED	Full Team
3.2.1.4	Website Connection	The website will connect through WiFi to the receivers.	Be able to network through a local connection like a hotspot from one device on the python project.	UNTESTED	Vlad Lebedev
3.2.2.1	Mass	The total mass of the PCB and additional hardware will not exceed 1kg.	Measure mass of the hardware with a digital scale.	Partially Tested: Board is small, which leads me to assume casing will be compact enough to meet mass requirement	Alex Flores
3.2.2.2	Volume Envelope	The housing unit for the PCB will not exceed the dimensions of 80 x 80 x 160 mm.	Perform measurements on the hardware to ensure it fits into specified dimensions	Partially Tested: Board is small, which leads me to assume casing will be compact enough to meet volume requirement	Full Team
3.2.2.3	Receiver Mounting	The receiver can be mounted onto a pole similar in scale to that of a speaker stand. The transmitter can be mounted comfortable onto a person	The receiver will be mounted onto a stand and shaken lightly to ensure stability. The transmitter will be worn by and individual who will move to test comfortability	UNTESTED	Full Team
3.2.3.1.1	Power Consumption	The maximum peak power of the system shall not exceed 2 watt hours	Use mulitmeter to validate watt hours for the device	Tested: Success. Totally draw required is 0.78 Wh when adding up current draw from various parts	Alex Flores
3.2.3.1.2	Input Voltage Level	The input voltage level for the Marching Band LPS shall be within 3.0V-3.5V.	Use mulitmeter to validate input voltage levels	Tested: Success. Output is 3.25V	Alex Flores
3.2.4.2	Thermal	The system should be operational in environments that have temperatures within the range of 10°F and 120°F	System will be placed in a heating device and cooling device and be monitored to guarantee operation in the respective conditions.	Tested: Success. Heat was simulated by an oven. Cooling was simulated by being placed in a freezer	Alex Flores

Thank You!