Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 36: Voice-Controlled Wheelchair
Bi-Weekly Update 3

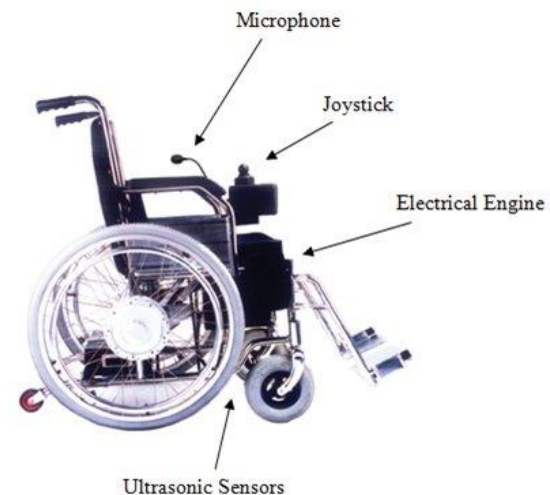**Nathan Philipello, Juan Alcala, Saleem Joubran, Nishant Murali**
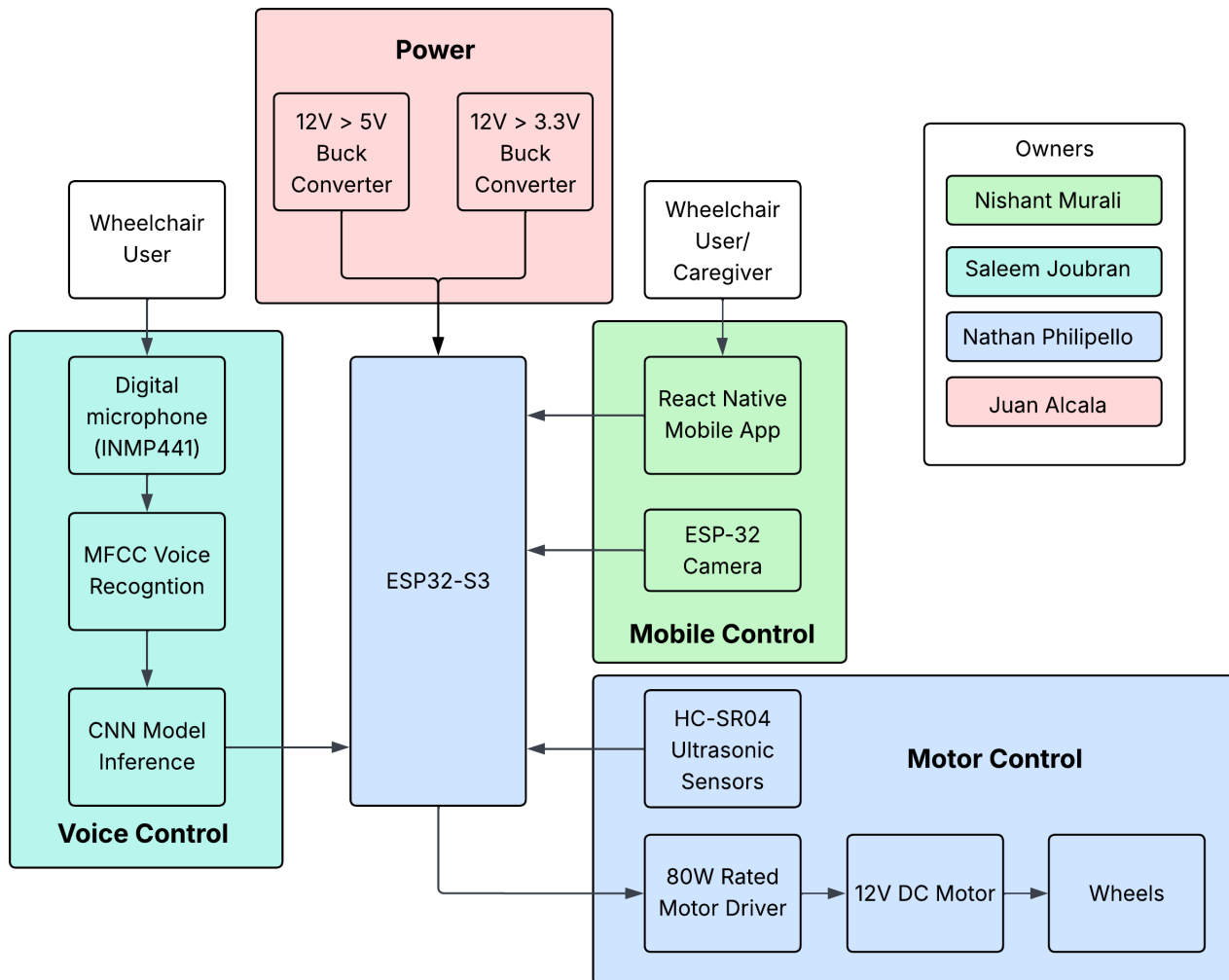
TA: Hadiur Khan

Project Summary

Problem:

Many wheelchair users face challenges operating manual controls, which can require caregiver assistance and limit independence.

Proposed Solution:

A voice-controlled navigation system enables hands-free operation of the wheelchair, increasing independence, safety, and convenience for all users.

Microphone

Joystick

Electrical Engine

Ultrasonic Sensors

Project/Subsystem Overview

Project Timeline

Order designed PCB (Completed 9/18)	Integrate voice command on the motors (Completed 9/18)	Integrate voice command to the app (Complete by 9/26)	Integrate mobile app to motor control (Complete by 10/1)	Validate Drivetrain can handle weight limit (Complete by 10/8)	Validate mobile app controls with motor driver (Completed by 10/8)	Validate control and response time (Complete by 11/7)

Voice Command Recognition

Saleem Joubran

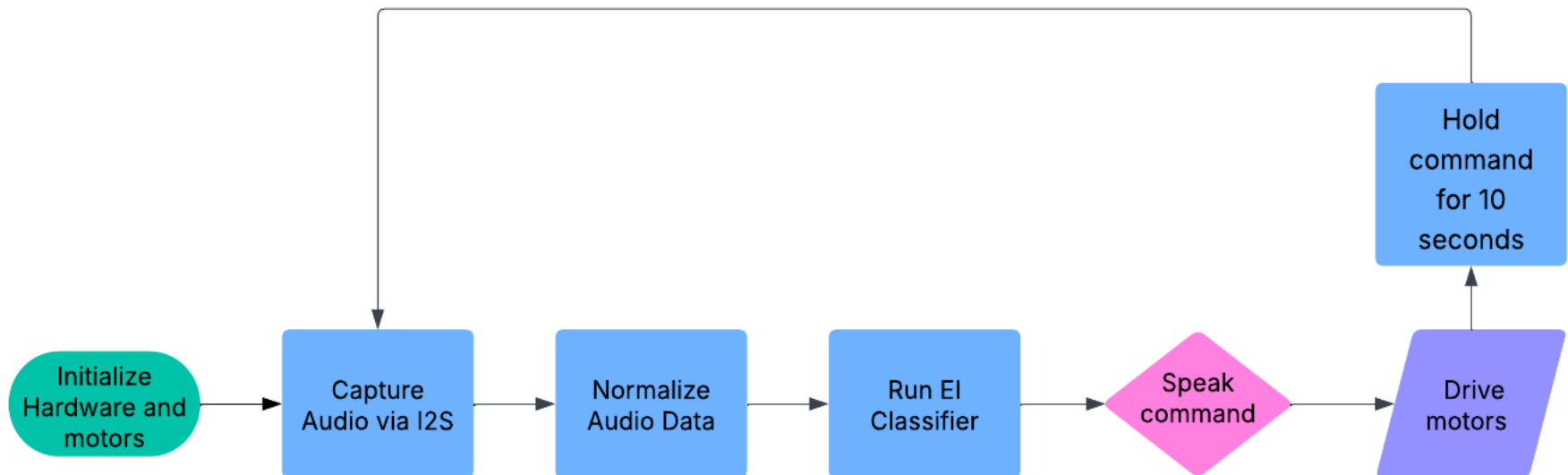| Accomplishments since last update 13 hours of effort	Ongoing progress/problems and plans until the next presentation
• Verified feedback from voice command to motor control • Integrated I2S microphone to wheelchair	• Test response time from voice to motor controls • Live accuracy testing on the wheelchair

Voice Command Recognition

Integration Results:
Wheelchair successfully responds to voice commands

Functional Testing:
Verified correct motor response from given voice command

Mobile Control and Monitoring

Nishant Murali

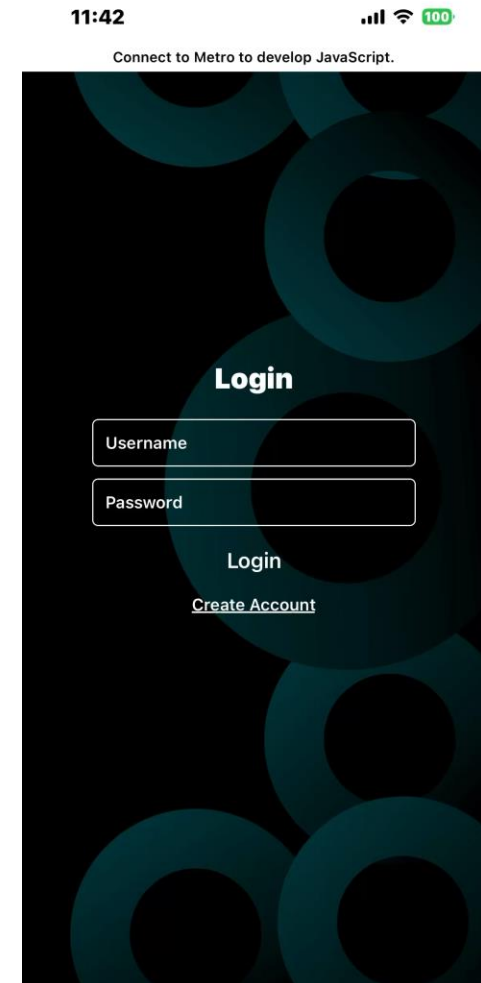| Accomplishments since last update 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
• Configured connections between microcontroller, camera, and app • Completed code for app integration with microcontroller • Completed voice control integration to the app	• On-going tests for voice controls on app • App controls test will be complete by next review

Mobile Control and Monitoring
Nishant Murali

Integration
- Voice control integrated with mobile app
- App has been integrated with final microcontroller

Testing
- On-going test with voice control accuracy
- Future test with app controls and motor driver

Motor Driver & Sensors

Nathan Philipello

Accomplishments since last presentation 12 hrs of effort	Ongoing progress/problems and plans until the next presentation
• On-going wheelchair drivetrain testing • Created Prototype of motor driver on Protoboard for testing before ordering parts.	• Last semesters Motor Driver failed after integrating and initial testing • Rebuilding ledge detection sensor mounts

Motor Driver & Sensors

Nathan Philipello

- Power BJT Failed during testing causes include
  - Overheating of BJT
  - BJT not fully saturating driving current too low
  - Arcing across positive battery terminal due to loose connection
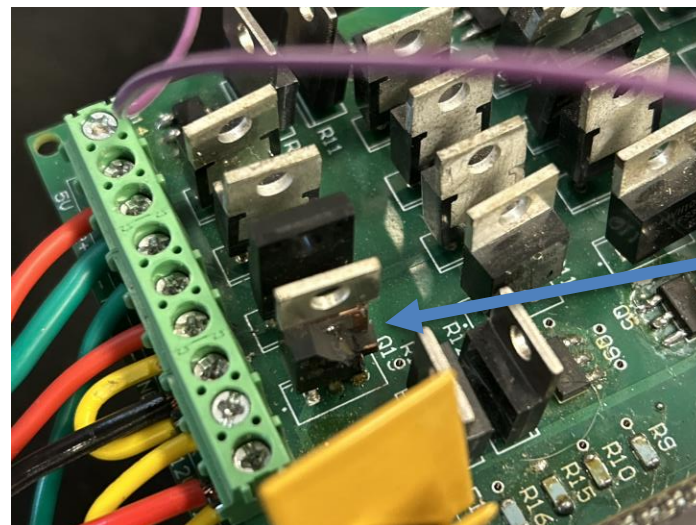
Good BJT

Bad BJT

Power

Juan Alcala

| Accomplishments since last update 9 hrs of effort	Ongoing progress/problems and plans until the next presentation
	• Designing enclosure using SolidWorks • Soldering integrated PCB

Power

Juan Alcala

- Soldering Fully integrated PCB
  - Input via a 12V 35Ahr lead acid battery (unregulated)
    - Peak power consumption: 135.5W
  - 3.3V and 5V supply via buck converters (regulated)
    - Line and load testing successful in ECEN 403
  - Motor Driver
    - New drive system allowed wheelchair to move faster = more current flowing in the motor driver
    - Power BJT blew and waiting on Nathan to implement changes
  - Started soldering, waiting on more parts to arrive

- Working on enclosure for the PCB
  - Clear airflow path
  - New measurements: 230x160x90mm
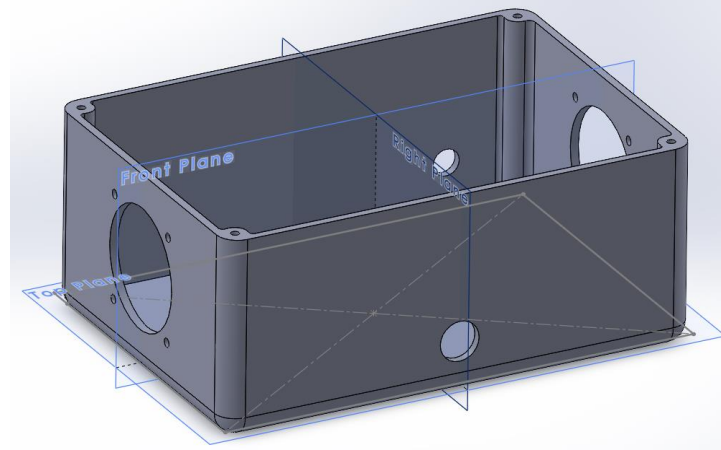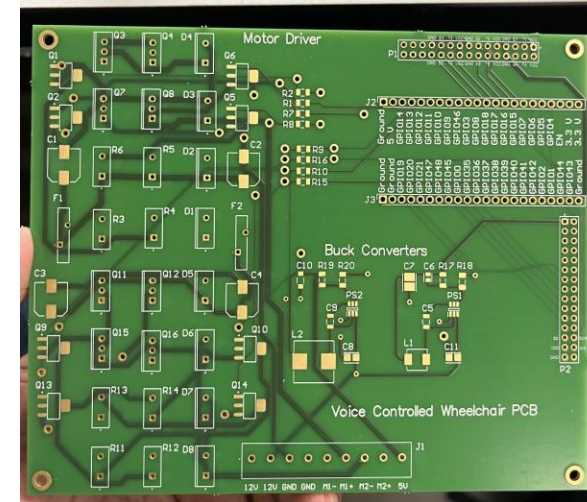
Execution Plan

Voice Controlled Wheelchair
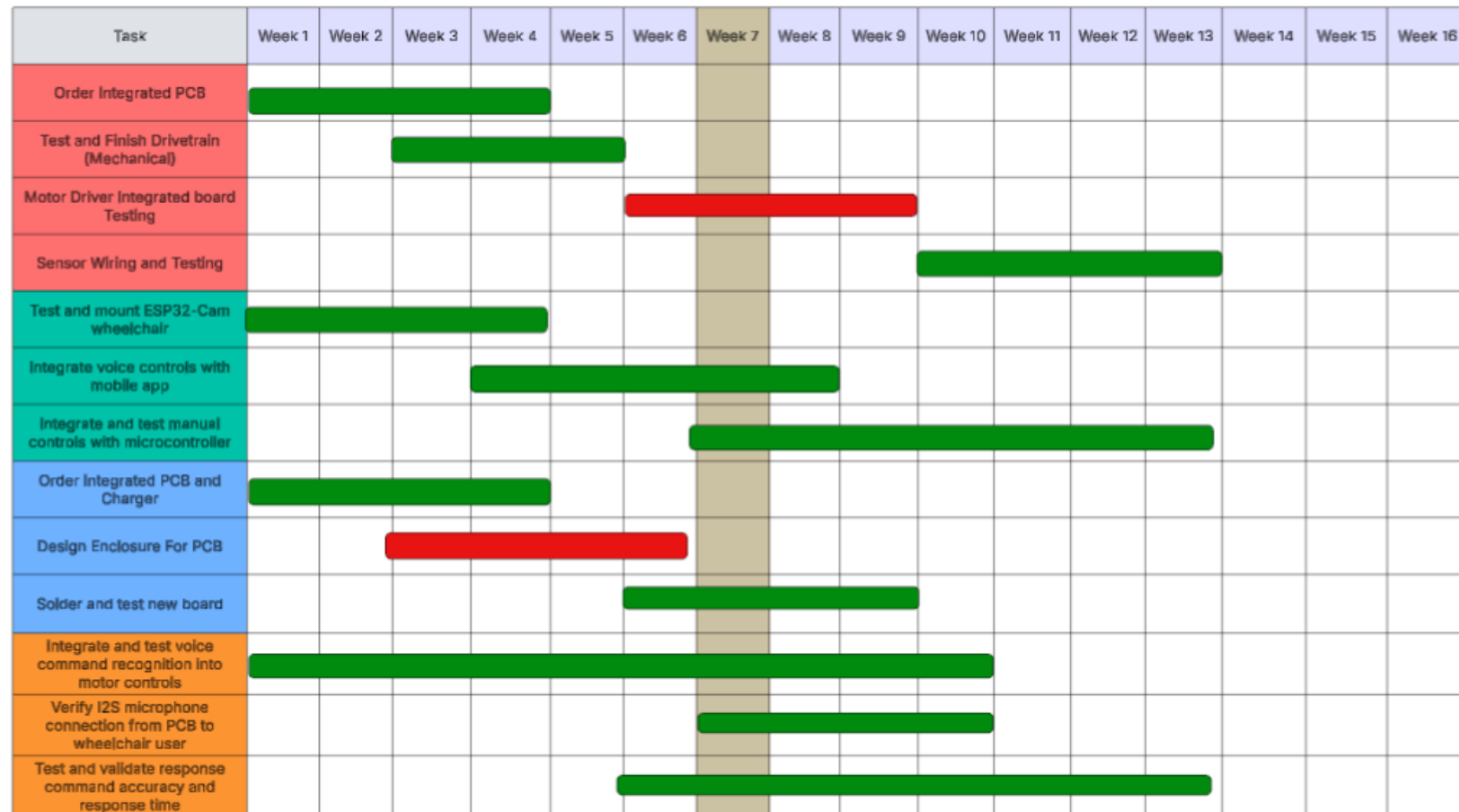
System Validation Plan

Owner	Test	Detail	Data	Status
Saleem	Motor response time from voice command	Timer for motor response	Response within half a second	Not Tested
Saleem	Voice command accuracy	Voice command is accurate for motors and app	>90% real-time accuracy	Not Tested
Nathan	The wheelchair is able to move a 100 lbs person at >= 2 mph.	Wheelchair is able to move over 10 ft with person in chair	N/A	Not Tested
Nishant	Motor response time from app controls	Timer for motor response from app's manual and voice controls	N/A	Not Tested
Juan	Wheelchair sensors startup check	Check voltage and current on each sensor when wheelchair is turned on	5V, 15mA	Not Tested

Thank you!