Hey CHEF!

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Team B2

- Use Case and Design Requirements
- Solution Approach
- System Specification
- Implementation Plan
- Project Management

Use Case + Requirements

Problem:

- Finding recipes and referencing while cooking is difficult → 2 hand task.

Solution:

- Hands-free recipe guidance via smart glasses with voice assistance and web app
- Recipe recommendations based on available ingredients

Requirements:

Smart Glasses	Voice Commands	Web App
- Weight < 150g - Battery life ~1 hour - Display current recipe step as text in user's line of vision	- Voice input process time < 4 seconds - Audio output delay < **2 seconds** >= 95% accuracy of audio and text instructions	- Latency < 3 seconds 95% of recipe recommendations require only ingredients provided by user

Technical Design Requirements

<u>Smart Glasses:</u>

- **Weight (<150g)**
  - Expected glasses weight (~50g)
  - Expected weight of components (~50g)
  - PCB weight: 100mm x 25mm → ~7.4g + 40g leeway for potential counterweight
- **Battery Life (~1 hour)**
  - Average Pico Current Draw: 40 mA
  - Battery: 500 mAh → 500/40 = 12.5 hours (with more components attached, this is needed)
- **Ease of Display:**
  - Ordered foldable, adjustable OLED that bends to fit comfortable eye view

Technical Design Requirements (cont.)

<u>Voice Commands:</u>
- **Input Process time (< 4 seconds)**
  - 0.5 to 2 seconds of latency for audio segments up to 4 seconds (Google API) + 400 ms network latency
  - Gives 2 seconds leeway for algorithmic processing
- **Output Process time (< 2 seconds)**
  - 200–500 milliseconds for the speech to start → typical TTS latency for long instructions, 1.5 second leeway for algorithmic processing
- **95% Accuracy**
  - Using Google Web Speech API or Microsoft Azure, both are 95%+ accuracy
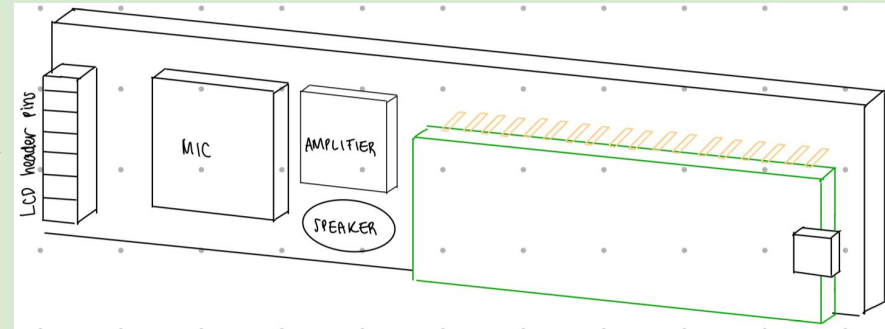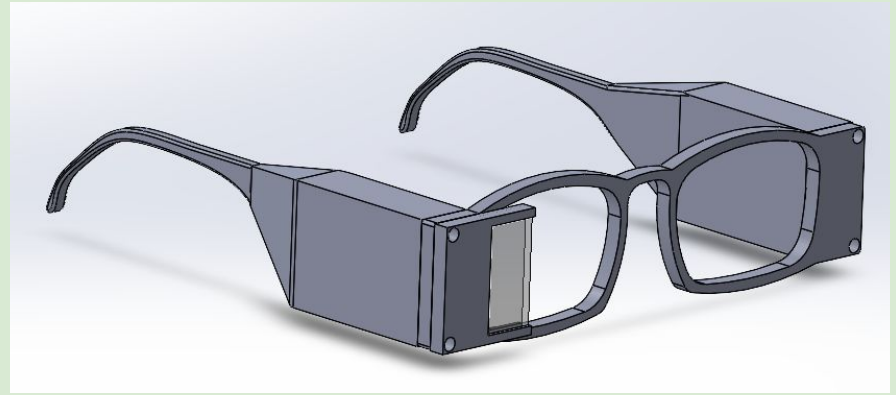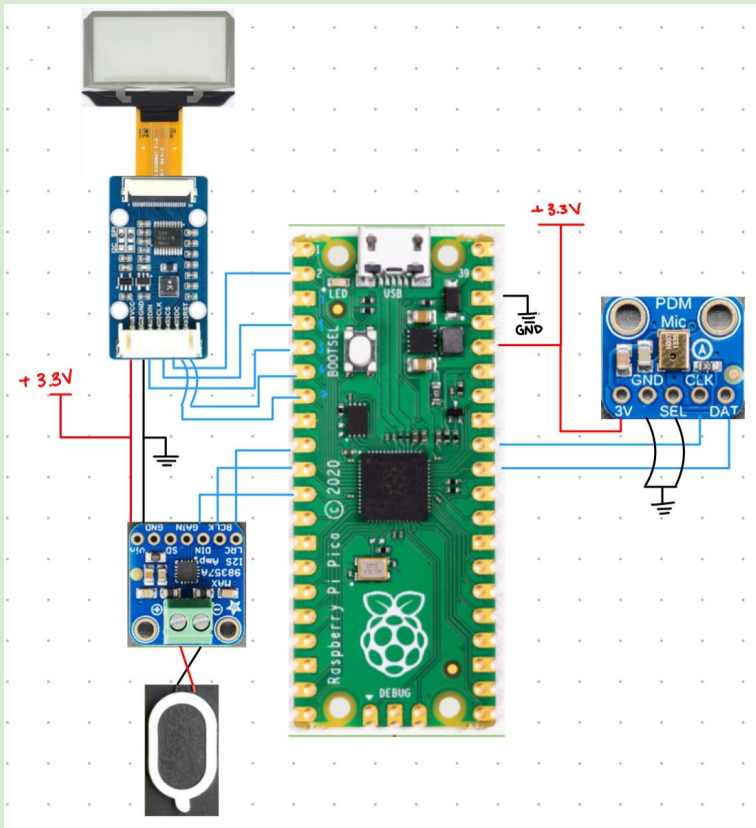
<u>Web App:</u>
- **Latency (< 3 seconds)**
  - 100-300ms to serve content over local area network, <= 2 seconds for algorithmic processing
- **95% Accuracy**
 - Up to 5% of recommendations may include omitted spices or condiments that users may have on hand

Solution Approach

Solution feature	Impact
Hands-free guidance with voice assistance	- People who have a hard time looking at screens - Reduce contamination between foods, handheld devices, and other surfaces
Recipe library recommendations	- Allows user to explore recipes from different cultural backgrounds
Lightweight, cost-friendly, and modular design	- Simplifies production on a large scale, making it an economically viable solution
Recipe filters and preferences	- Cater to different cultural cuisines and dietary preferences, encouraging inclusivity
Friendly user-interface	- Allow a variety of people of different skill levels to learn how to cook
Mic and speaker on glasses	- Easier to hear instructions and convey requests

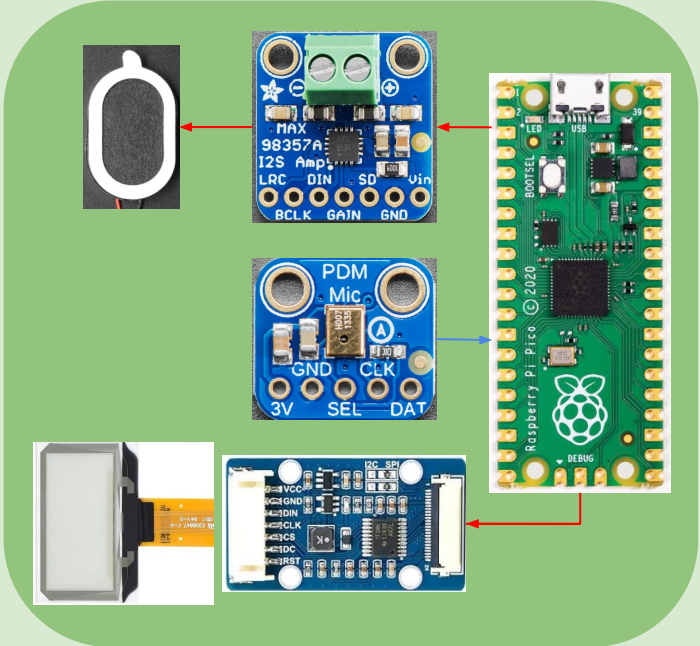# System Specification: Physical Device

System Specification: Web Application
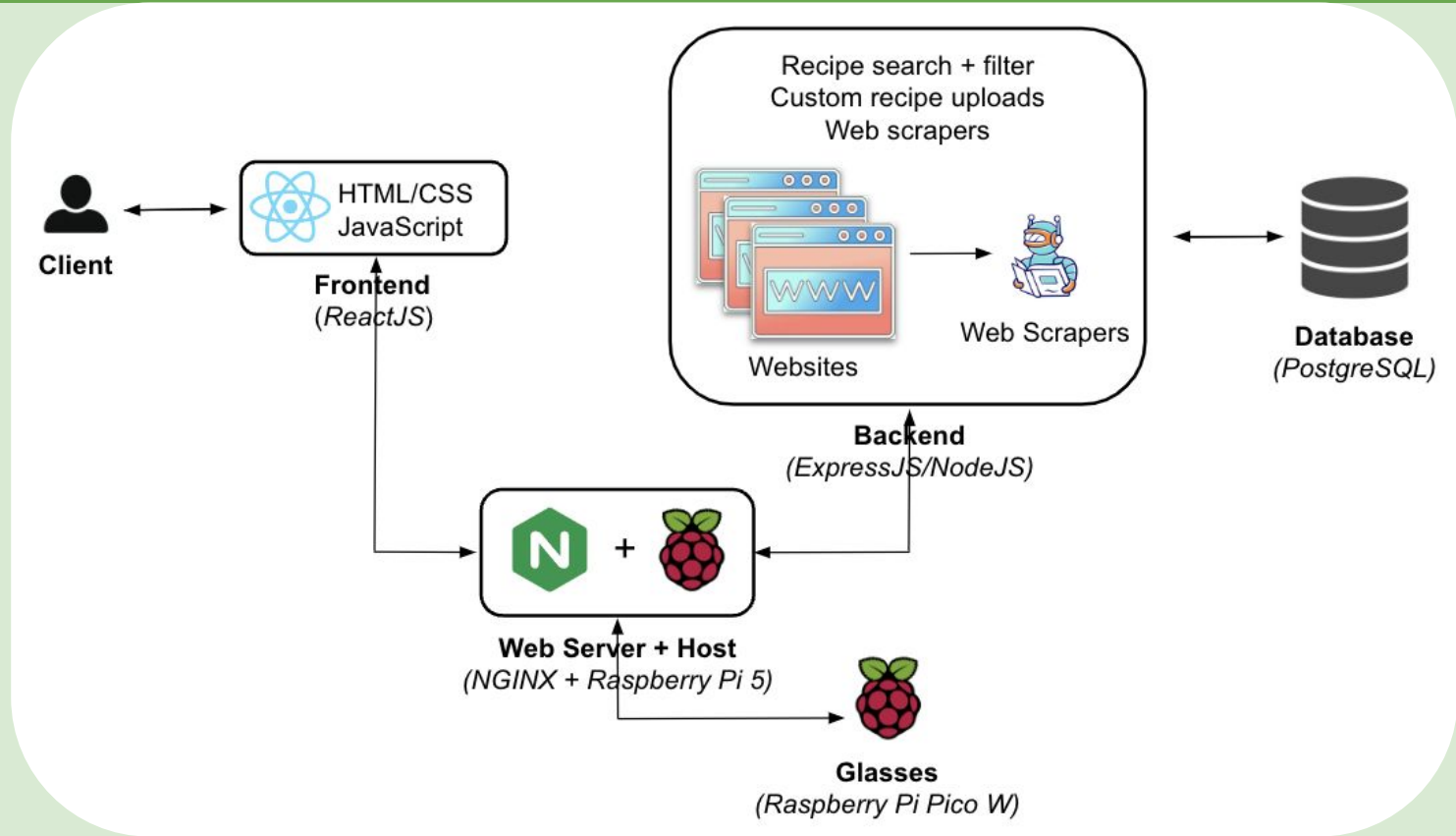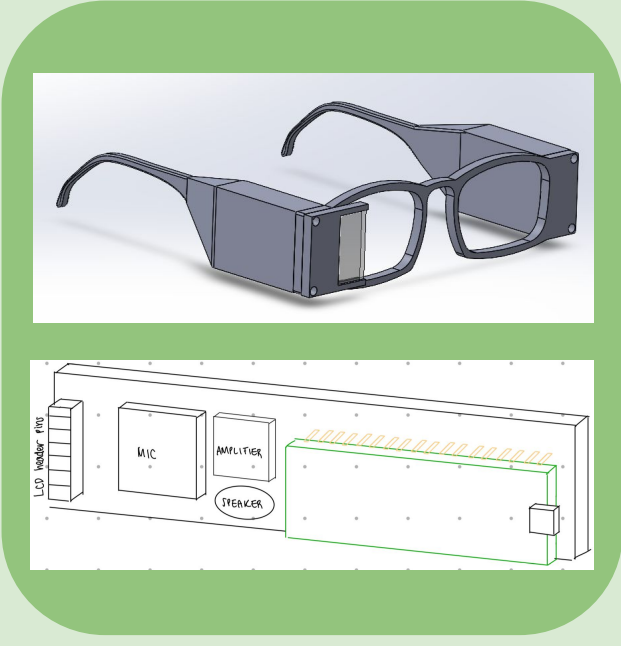
Implementation Plan

Testing

Test:
- Run 3 user tests by experience level
  - Beginner - cooks <2 meals per week
  - Intermediate - cooks <6 meals per week
  - Advanced - cooks >=6 meals per week
- From user tests, gather the following data:
  - Battery life
  - Voice command + web app latency
 - Voice command + LCD + web app accuracy

Physical Design Tests	Criteria	Failure Control
Weight	Weight measured is <150g	Decrease % infill on glasses or remove counterweight
Battery Life	Device runs for at least one hour in each test run	Increase battery (mAh) and decrease weight elsewhere

Testing

Latency Tests	Criteria	Failure Control
Voice Commands	No input from the glasses shall take more than 4 seconds to process No output from the glasses shall take more than 4 seconds	Change Python module used for voice input Optimize voice command processing algorithm
Web App	No input/output from the webapp shall take more than 3 seconds	Upgrade hardware to decrease latency between physical device and web app

Accuracy Tests	Criteria	Failure Control
Voice Commands	Of all commands inputted by the user (via voice), >= 95% of generated responses shall be relevant	Change voice command hardware or algorithm
LCD	>=95% of the text shown on the LCD shall display steps and ingredients generated by the recipe algorithm	No control needed - simply fix LCD implementation
Web App	Of all recipes requested by the user, >=95% of them will include all relevant ingredients and preferences	Change recipe generation algorithm

Project Management + Schedule
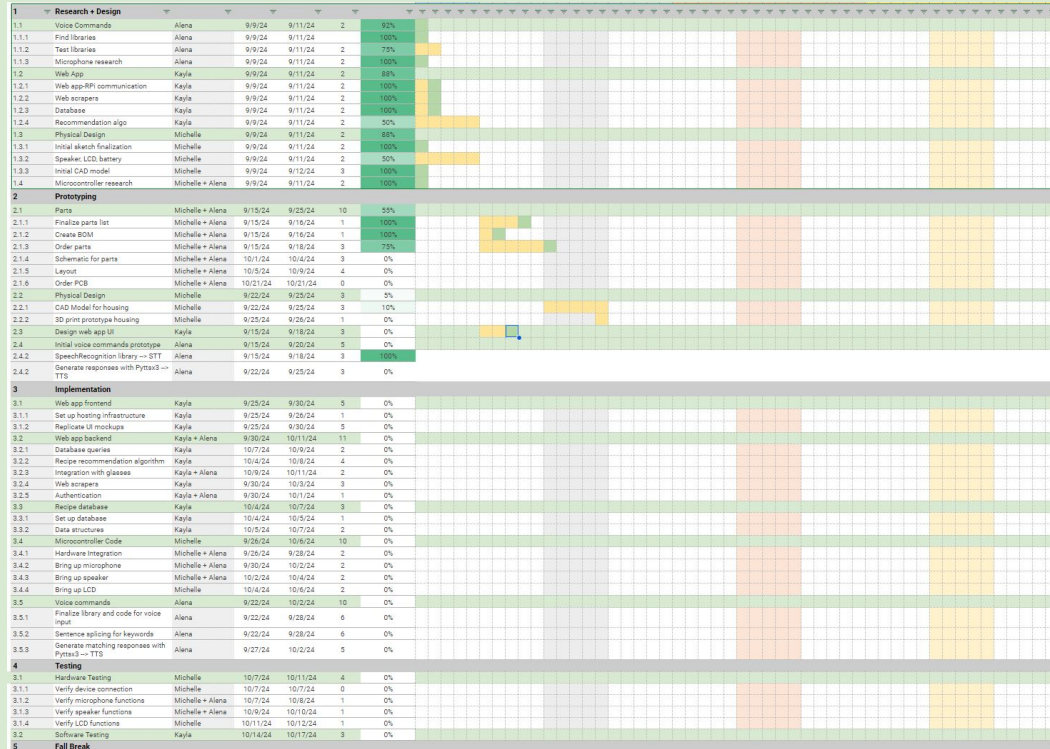
Team Member	Task
Michelle	Physical Design Device Integration ● Sub-Device Communication
Alena	Voice Commands Device Integration ● Sub-Device Communication

Kayla	Web App
	    ● Recipe Algorithm
	    ● Web Scraping
	    ● Database

All	Glasses + web app integration