



Helmet Buddy

Breathe Easy, Ride Smart:
The Future of Helmet
Technology

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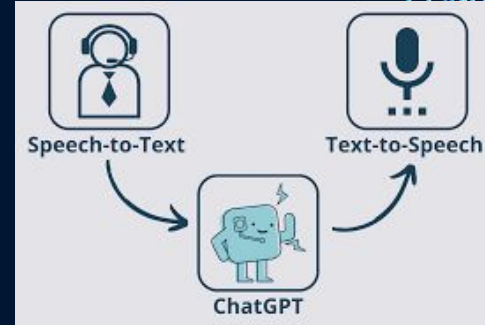
- 1. Refresher of Project Main Idea**
- 2. Current State of Design**
 - a. Reasons for our design decisions
 - b. Current Problems
- 3. Future Plans**
 - a. How we will fix current problems
 - b. Upcoming Features
 - c. Backup Plans
 - d. Workload Partition and Timeline

Main Idea

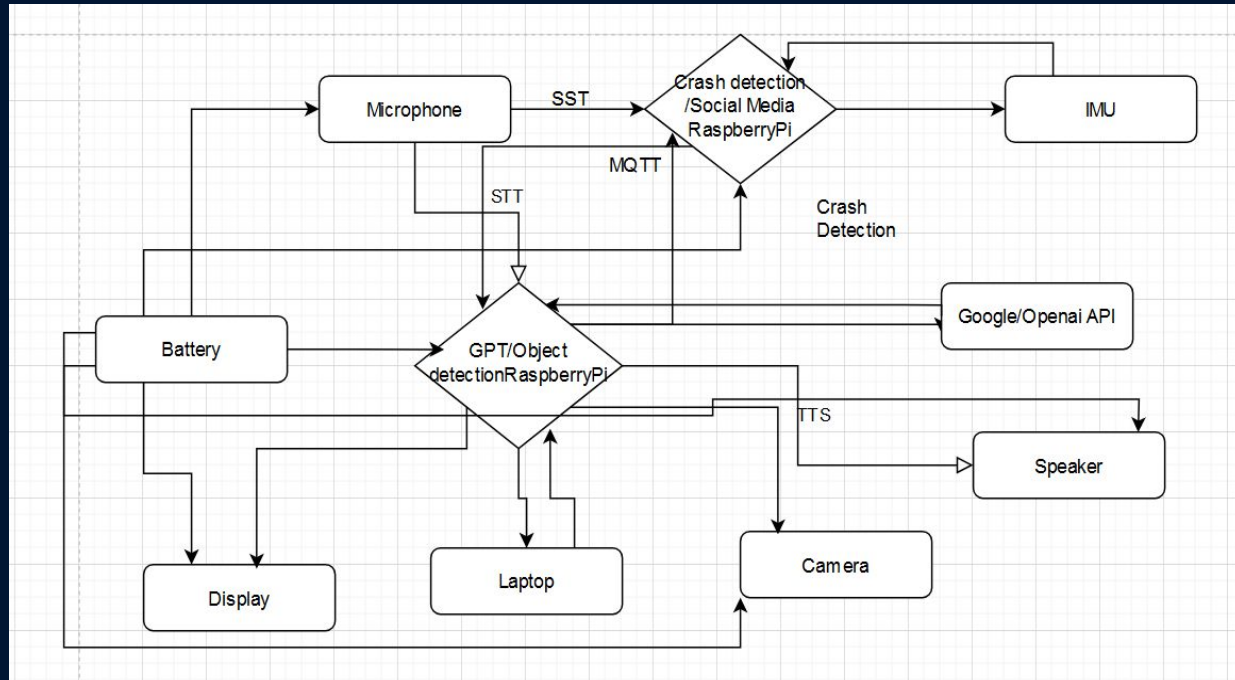
Goals of our Project:

A **Smart Helmet** with

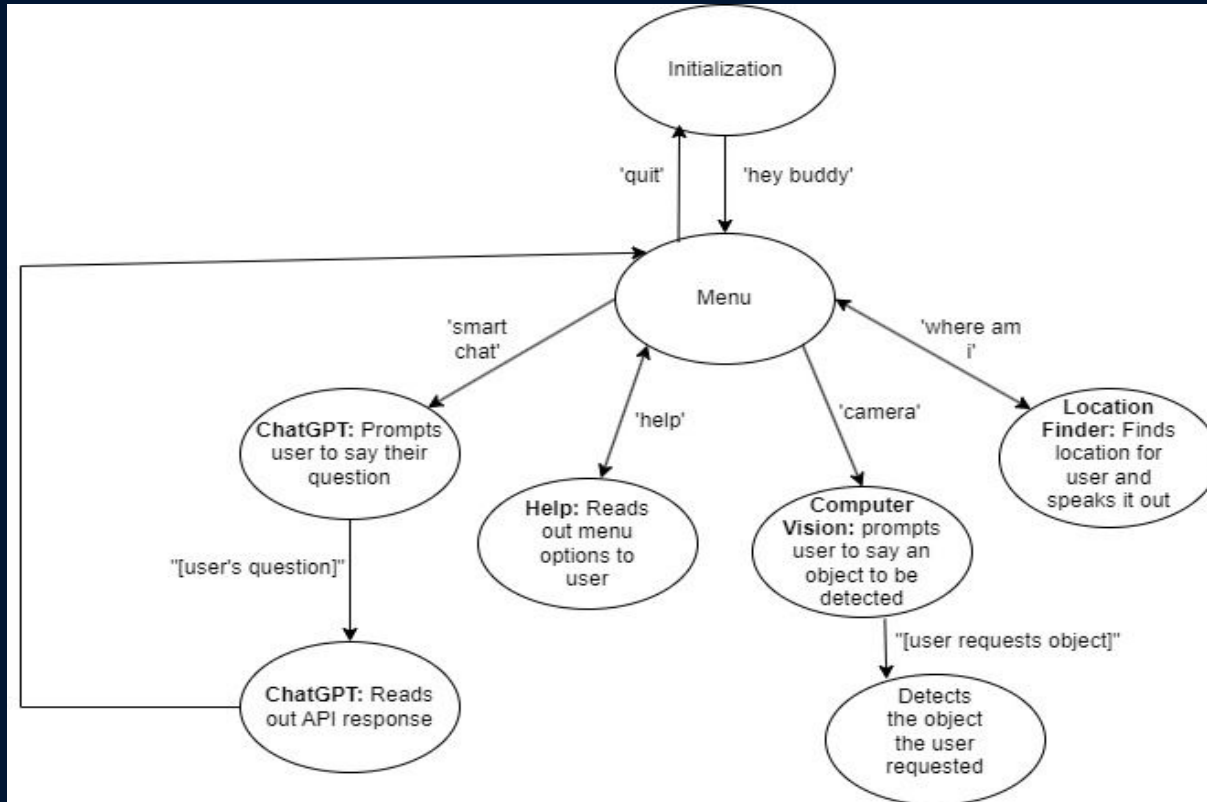
- Speech to Text and Text to Speech functionality
- ChatGPT Integration
- Object-Detecting Computer Vision
- UI display for accelerometer metrics
- Voice navigable menu



Current Plan of Design - System overview



Current State of Design - Voice Navigable Menu



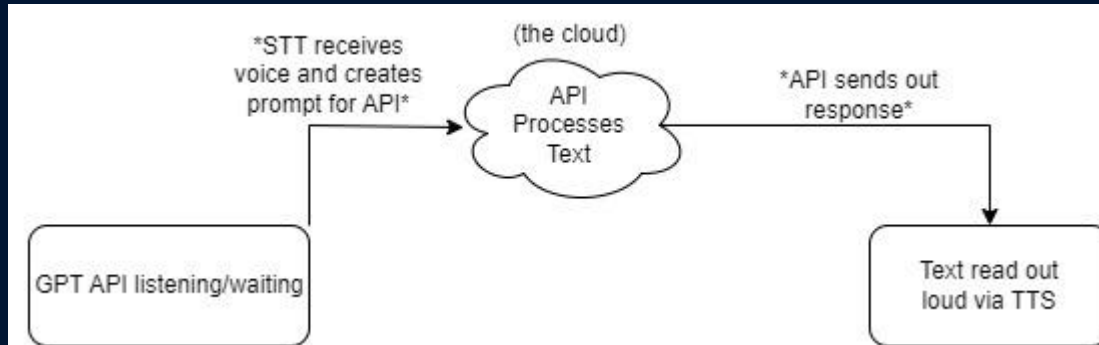
Current State of Design - STT & TTS

- For Speech to Text we use **Google Speech to Text**
 - Free
 - No API Key Required
 - Accurate
 - Standalone
 - Center point of other features
- Text to Speech: **pyttsx3** python library
 - Easy to integrate with python
 - Ease of use



Current State of Design - ChatGPT API integration

- GPT version 3.5 Turbo
- Reads text from our STT feature
- Gathers response from the API service then reads it out



Current State of Design - Object Detection

- Technology used
 - Transformers, torch, TinyYolo
- Voice control

Problems and Solutions

- Low Processing Power
 - Netcat and named Pipe
- Limited Object models
- Laptop Streaming

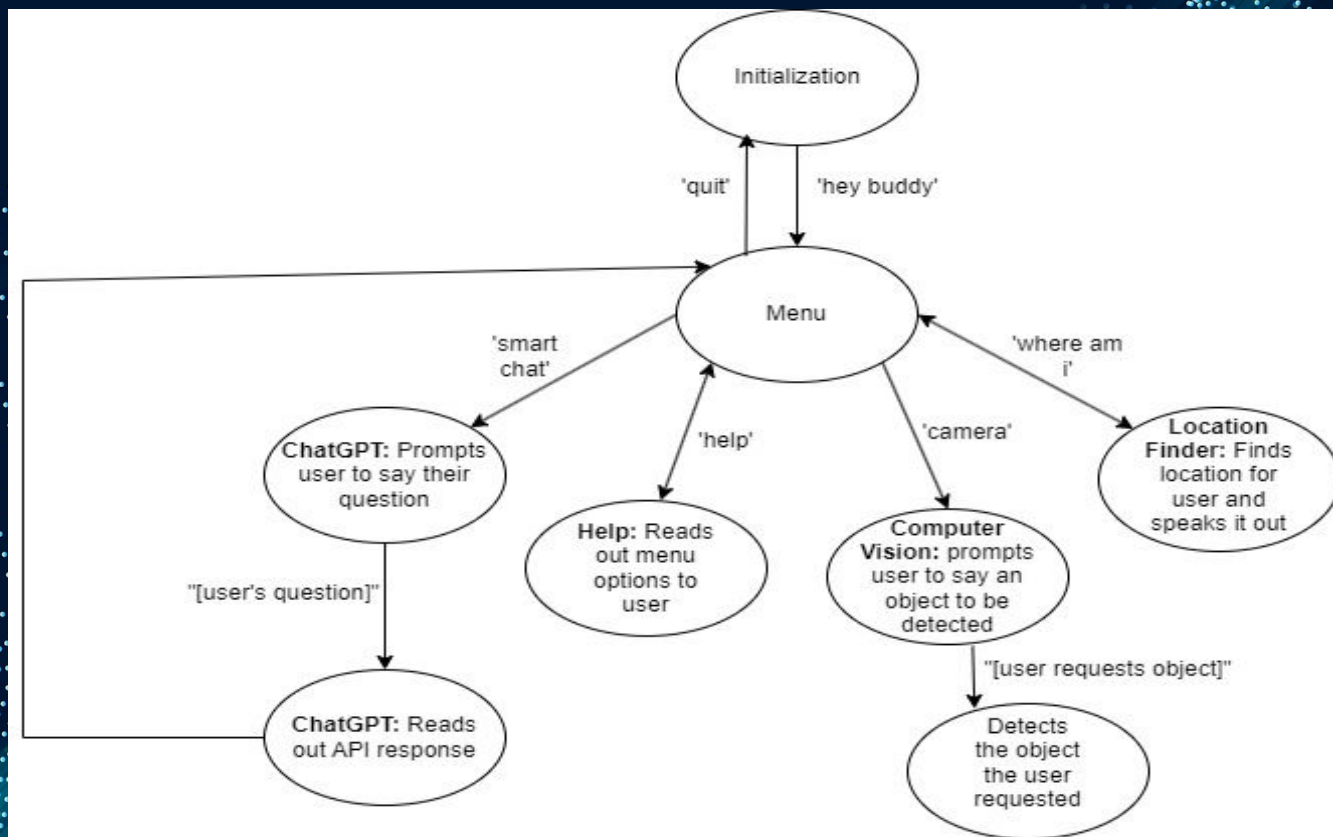


Current State of Design - Location Finder

- Uses **geocoders** library
 - Free and easily implementable
 - Reads out approximate location based on IP address
 - Only finds a rough estimation of location, not very precise/accurate.

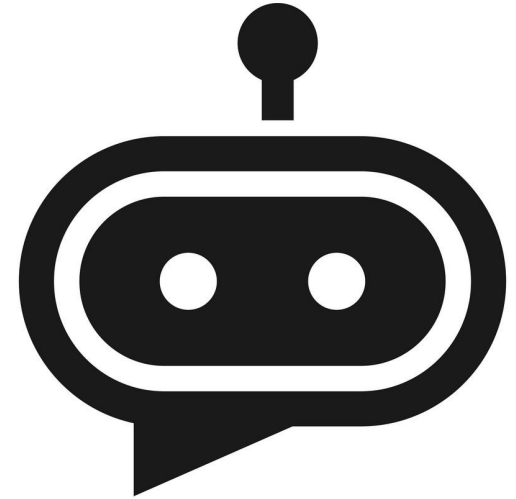


Demonstration Time



Future Plans - Testing and Plans to Remedy Problems

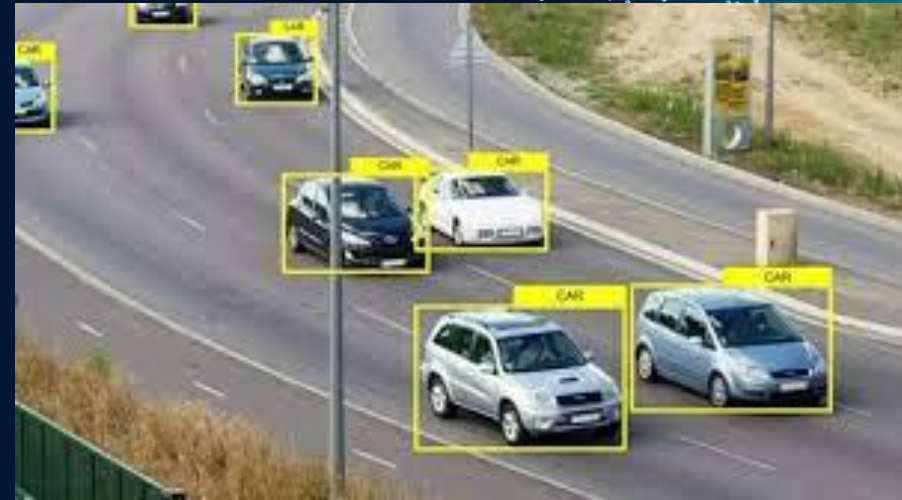
- **Speech to Text**
 - Experiment with different microphones
 - Experiment with volume threshold in code
- **Text to Speech**
 - Experiment with code to select other voices to read out text.
- **Location Finder**
 - Use a dedicated GPS dongle



Future Plans - Testing and Plans to Remedy Problems

Computer Vision

- Car/Pedestrian Detection
- More power
- Larger model



Future Plans - Backup Plans

- Computer Vision / Object Detection
 - Difficulties
 - Remote Connectivity to desktop
 - Alternative is rear-view camera
- Chatbot
 - Keep same voice
 - Keep same functionalities

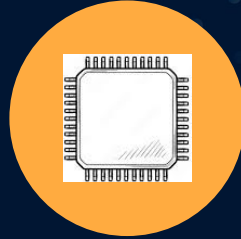


Future Work



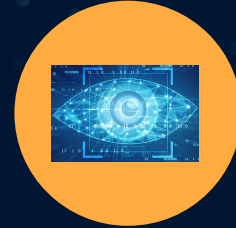
Helmet Prototype

- Acquire and repurpose existing model
- Modify to accommodate components



Code Optimization

- Add functionalities
- Decrease delay
- Create a network using Parallelism



Vision Responsivity

- Decrease latency in image detection
- Train specific image models

Future Work and Testing



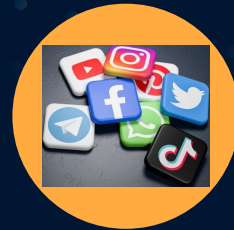
Crash Detection

- IMU detects sudden changes in acceleration



Transparent Display

- Live heads-up display
- AR overlay
- Bounding boxes for image detection



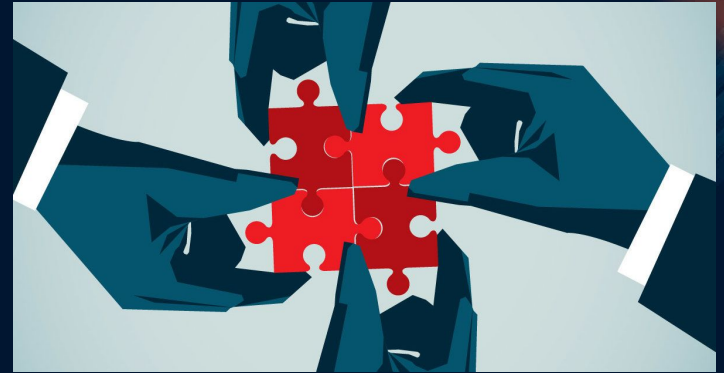
Social Media Integration

- Use existing STT model create interface to access several social media platforms

Workload Partition and Timeline



- Display, Social Media Integration, Helmet Acquisition and Prototype
- Display, Crash Detection, Streaming
- STT/TTS Optimization, Social Media Integration
- STT/TTS Optimization, Social Media Integration, Streaming



...Timeline

	Phase 1	Phase 2	Phase 3
Weeks 1-2	Additional Functionality	Component Integration	Power Supply
Weeks 3-7	Feature Optimization	Aesthetics	Fully Operational model
Weeks 8-10	User Trials	Debugging and Optimization	Present Finished Product

Current Cost Breakdown

Quantity	Unit Cost	Total Cost	Item Description
1	\$3.95	\$3.95	Raspberry Pi Zero FPC Camera Cable
1	\$2.95	\$2.95	Flex Cable for Raspberry Pi Camera or Display - 24" / 610mm
1	\$35.00	\$35.00	Raspberry Pi Camera Module 3 - 12MP 120 Degree Wide Angle Lens
1	\$7.65	\$7.65	Mini HDMI to Standard HDMI:
1	\$10	\$10	Raspberry Pi 4 Power Supply:
1	\$67.65	\$67.65	Raspberry Pi4 B 4GB RAM:
1	\$5.49	\$5.49	PNY 32GB SD Card:
1	\$13.94	\$13.94	Keyboard:
1	\$7.98	\$7.98	Mini USB Mlc:
1	\$9.99	\$9.99	Anker 4-port USB HUB:
1	\$13.99	\$13.99	MillISO USB PC microphone
Total		174.64	

Summary

1. Speech to Text and Text to Speech: Supports spoken language into text and text synthesization into spoken language and location acquisition
2. ChatGPT Integration: ChatGPT integration allowing users to:
 - engage in conversations
 - ask questions
 - receive text-based responses.
 -
3. Object-Detecting Computer Vision: Detect and identify objects
4. Voice-Navigable Menu: Navigate menus and access various features

Thank You

BACKUP VIDEO

https://drive.google.com/file/d/1SW_zGVJfN6pH-RGle7MTwcO_sRDmWDfN/view?usp=sharing

