IOWA STATE UNIVERSITY

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# To Online Shop, or to Not Online Shop

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**Client/Advisors:** Goce Trajcevski

# Outline

1. Project Plan
2. System Design
3. Engineering Standards & Design Practices
4. Questions

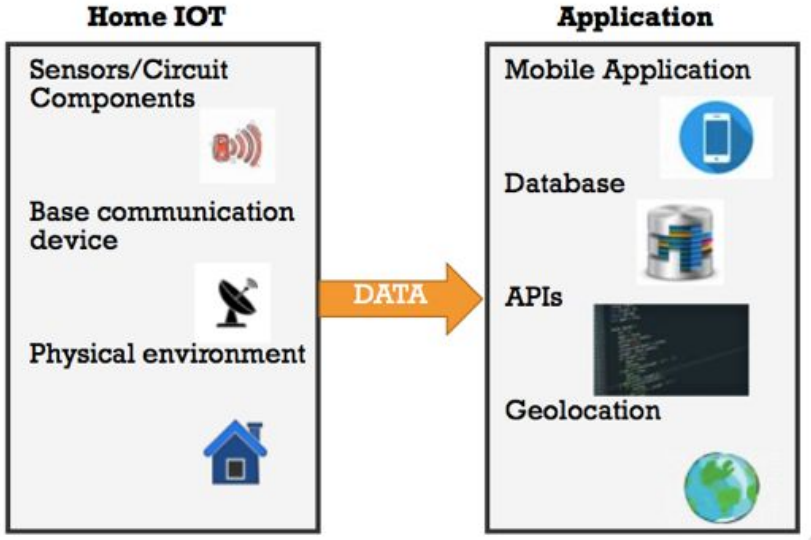
# Project Plan

# Problem Statement

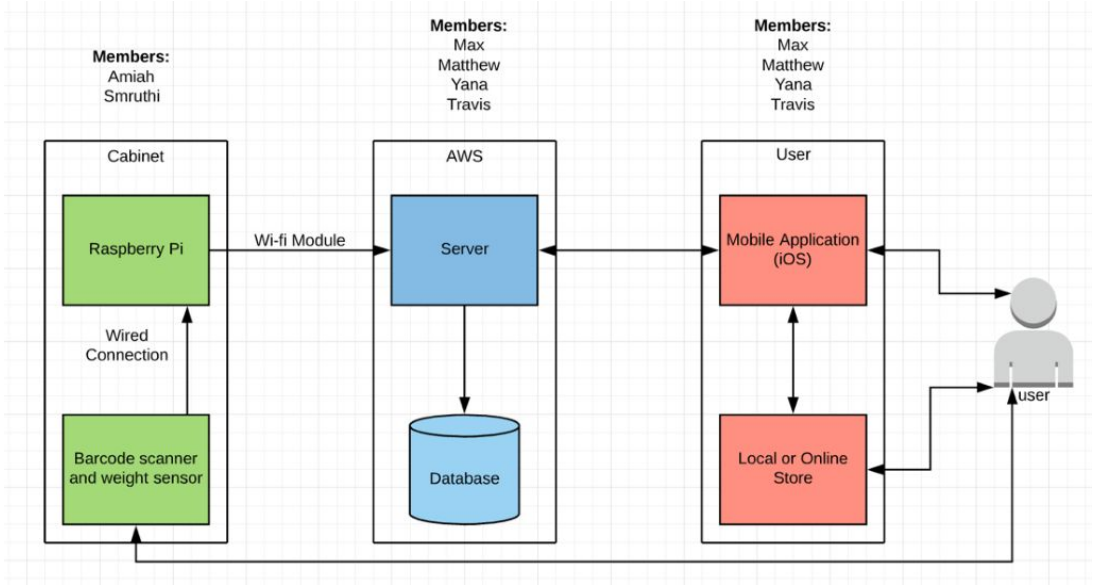
Design a solution that will help users find a balance between in-store and online shopping experiences.

# High-level Overview

- Our project consists of a home IOT device and a mobile application that communicate with one another via the database



# Conceptual Sketch



# Functional Requirements

- Develop an end-to-end IoT solution that will:
  - Monitor the status of items in a shelf or cabinet
  - Generate a list of items “to buy” and prepare an online order
  - Location-aware notification for users that certain items needed are available at a nearby store at acceptable prices
  - Automatic update of online orders if user decides to purchase items in store

# Technical Considerations and Constraints

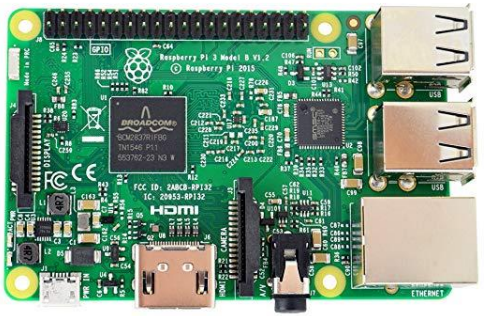
- Choice of Sensors - RFID vs. **Barcode Scanner**
- Database/Server - **Amazon Web Services**
- Master System - Arduino vs. **Raspberry Pi**
- **Mobile Application - iOS vs. Android Studio**

# Possible Risks and Mitigations

- **Sensor Degradation** - Sensors may not calibrated over time
  - Response - Calibrate the sensors on a regular basis
- **Communication** - A connection with the application and the database updating timely
  - Response - Having strong time constraints on sending updated information to the database
- **Unfamiliarity** - New Technology
  - Securing outside sources to compile information and placing in uniform location

# Resource Requirements

- Raspberry Pi 3 Model B
- Barcode scanner
- Wires and circuit components
- Power supply
- AWS server and database
- Makeshift cabinet and items for test simulation



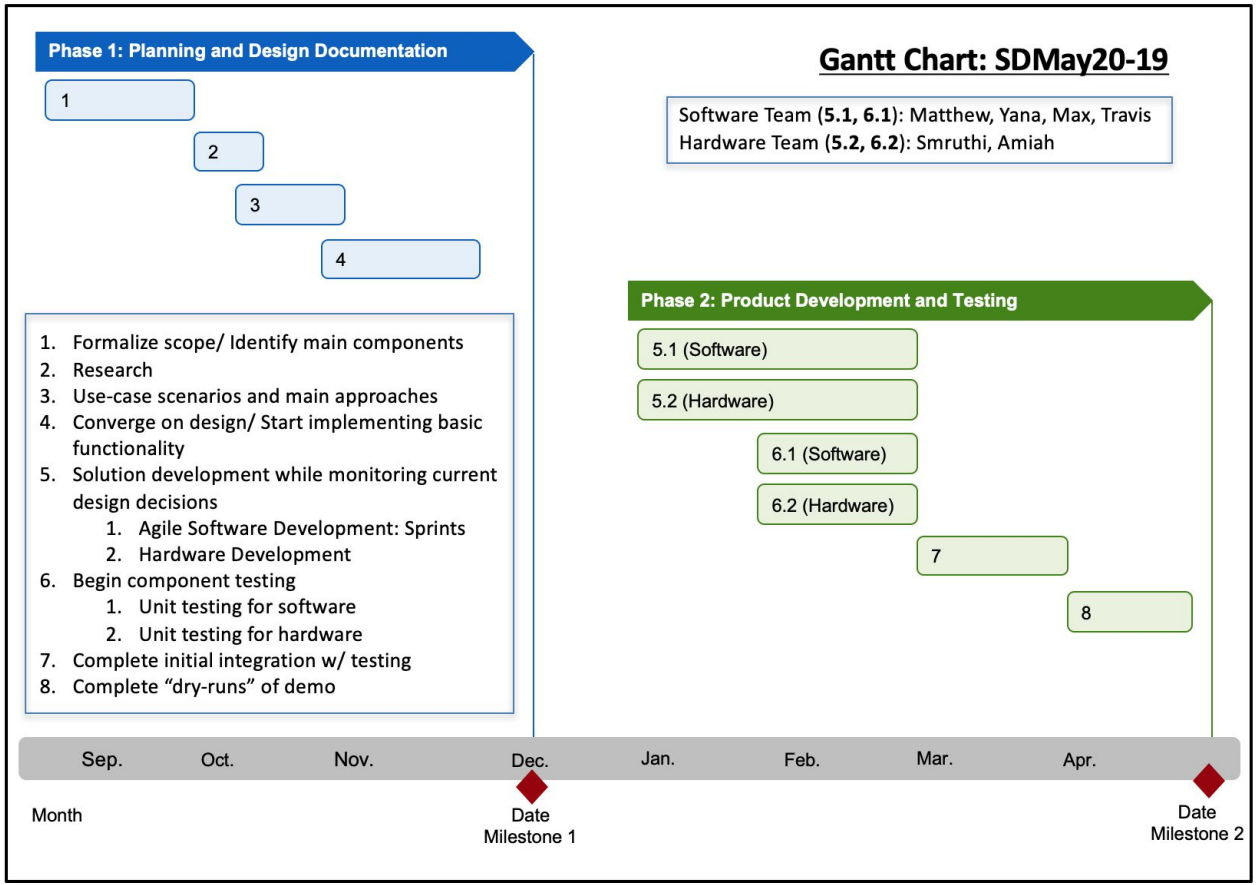
# Financial Requirements

Budget: **Under $200**

Material Costs:

- Raspberry Pi, Power Supply, SD Card: **$52**
- Barcode Scanner: **$29**
- **Total : $81**

# Project Timeline



# System Design

# Functional Decomposition

**1 Proof of Concept**

- Data collection from senors
- Data is being transmitted to datebase from senosor
- Front-end can visualize data from the database

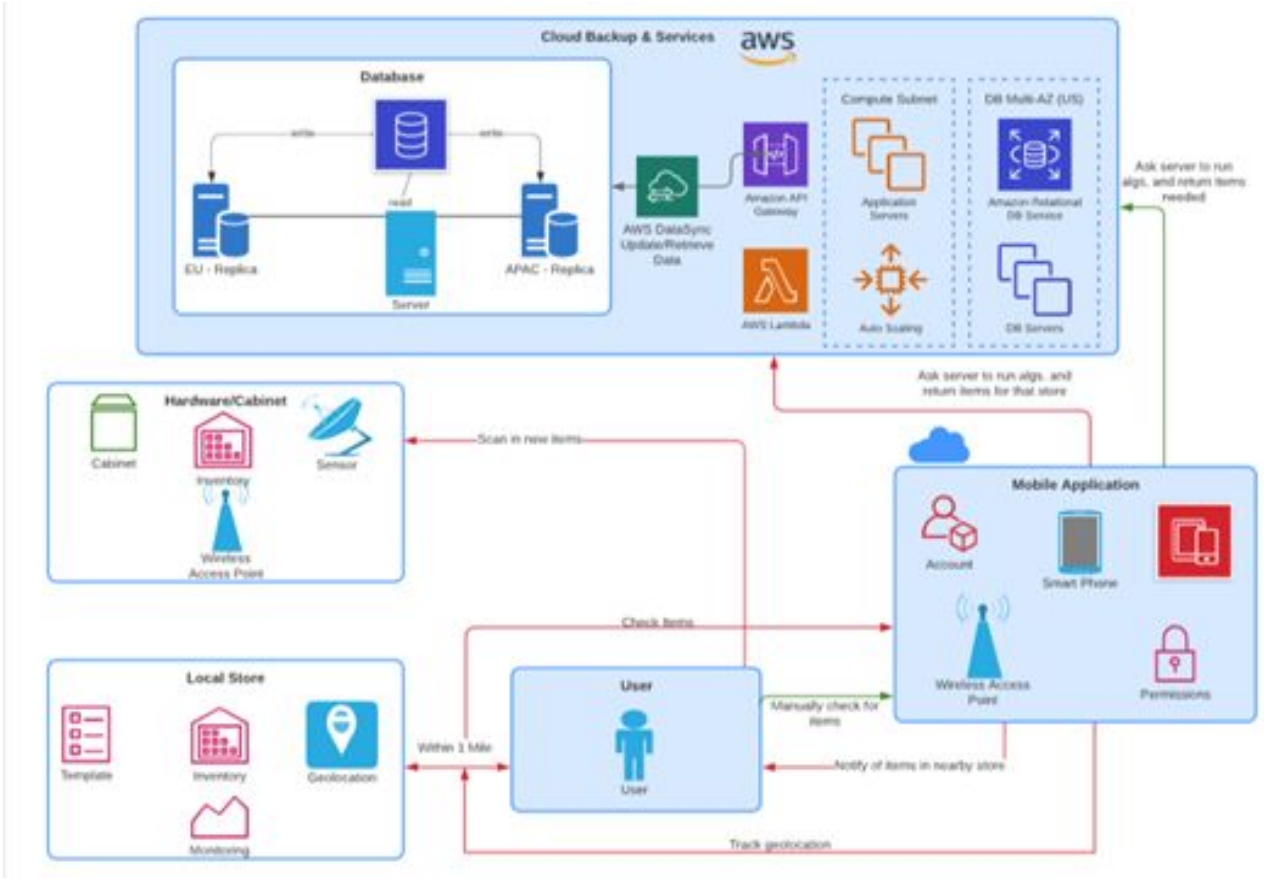
**2 Minimum Viable Product**

- Integrate system for multiple sensors to be registered to a specific product
- Demand for new item purchase can be generated based on pantry contents

**3 Finalized Product**

- Complete integration of sensor arrays for multiple products
- Purchase suggestion for multiple products can be determined

# Detailed Design



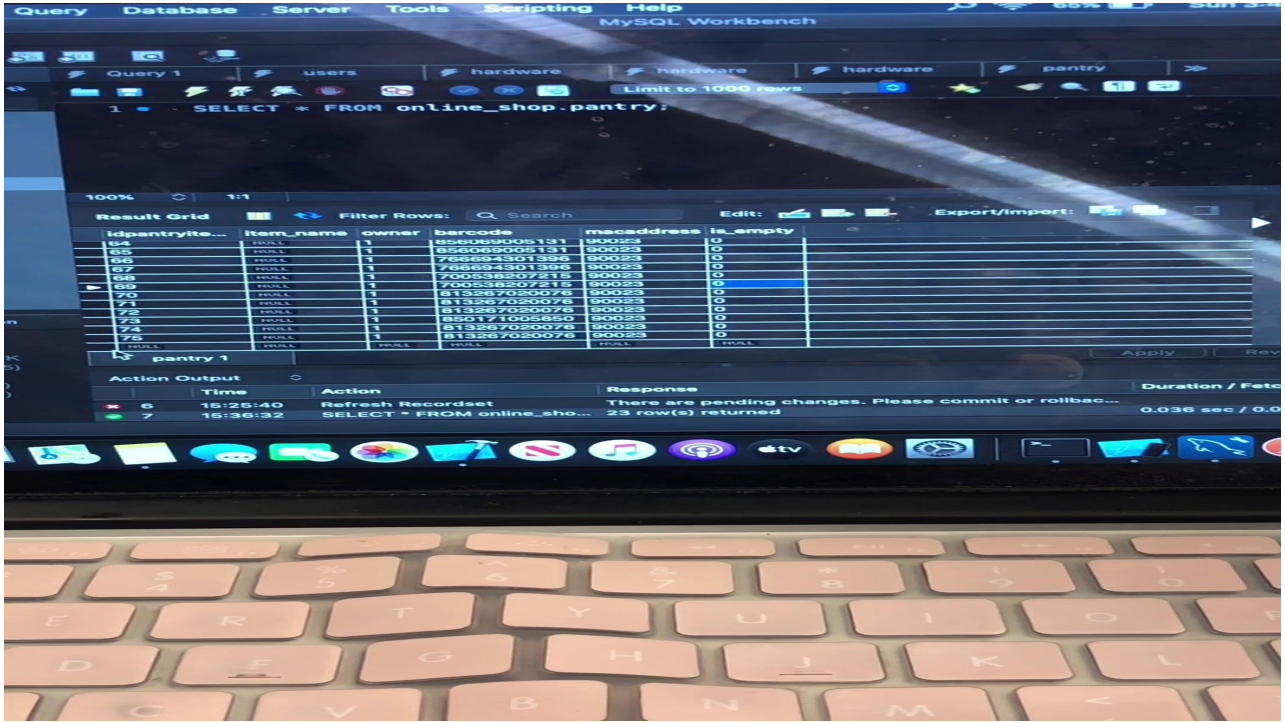
# Technology Platforms

- Raspbian
- Barcode scanner
- AWS server and database
- Xcode (Swift)
- GitLab

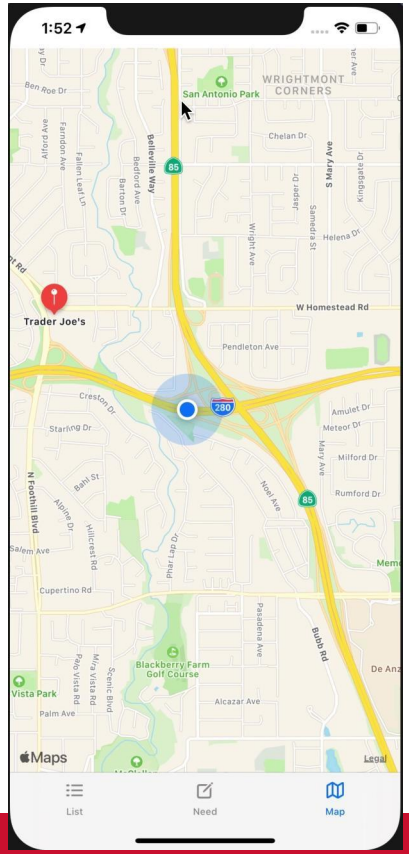
# Functional Test Plan

- **Hardware Testing**
  - Manually verified connections
  - Python Scripts
- **Software Testing**
  - XCTest: built-in unit testing with XCode
  - Manual scenarios
- **Integration Testing**

# Prototype Implementation - Hardware



# Prototype Implementations - App



# Engineering Standards & Design Practices

# Engineer Standards & Practices

- IEEE 1028-1997 - IEEE Standard for Software Reviews
- IEEE 802.11 - Wi-Fi between ESP8266 and Raspberry Pi
- IEEE - 1532 In-System Configuration of Programmable Devices

# Task Responsibility

Amiah Gooding - Electrical Engineer, Hardware
Matthew Martin - Report Manager/Scrum Master, Software-Backend
Max Minard - Software Manager, Software-Frontend
Smruthi Sandhanam - Meeting Manager, Hardware
Travis Stanger - Test Engineer, Software-Backend
Yana Aleksandrova - Meeting Facilitator, Software-Frontend

# Project Expansion

- Weight Sensor - tracking several of the same item
- Modular Design - can be scaled up to different parts of kitchen
- In-app online purchase - purchase everything from app no redirection

# Questions?