# IOWA STATE UNIVERSITY SD May 20-19

### To Online Shop, or to Not Online Shop

**Team Members:** Amiah Gooding, Matthew Martin, Maxwell Minard, Travis Stanger, Smruthi Sandhanam, and Yana Aleksandrova

Client/Advisors: Goce Trajcevski

### Outline

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



# **Project Plan**

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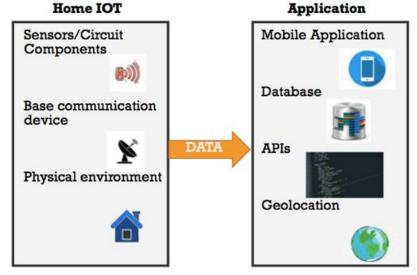
### **Problem Statement**

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

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## **High-level Overview**

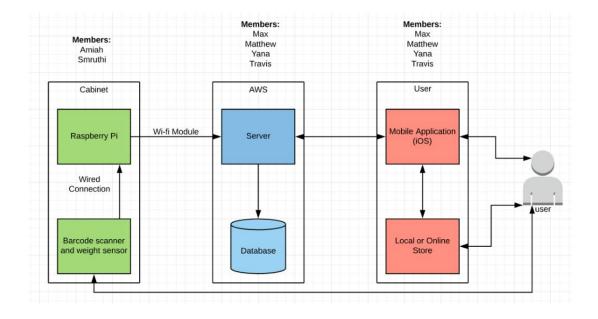
 Our project consists of a home IOT device and a mobile application that communicate with one another via the database



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### **Conceptual Sketch**



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### **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

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- AWS server and database
- Makeshift cabinet and items for test simulation



### **Financial Requirements**

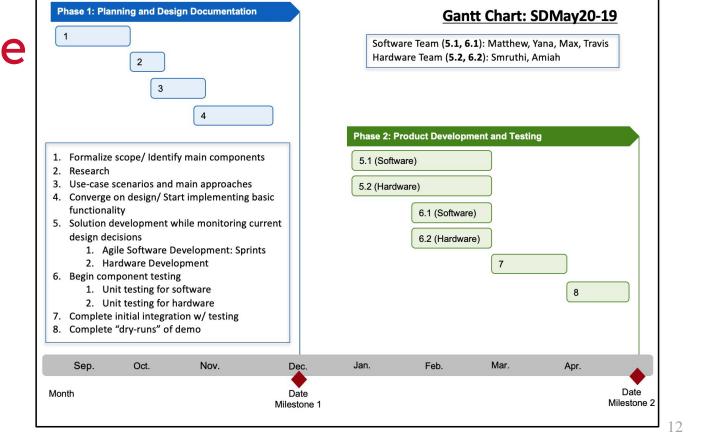
Budget: Under \$200

Material Costs:

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



### Project Timeline



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# System Design

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### **Functional Decomposition**

Proof of Concept

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



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

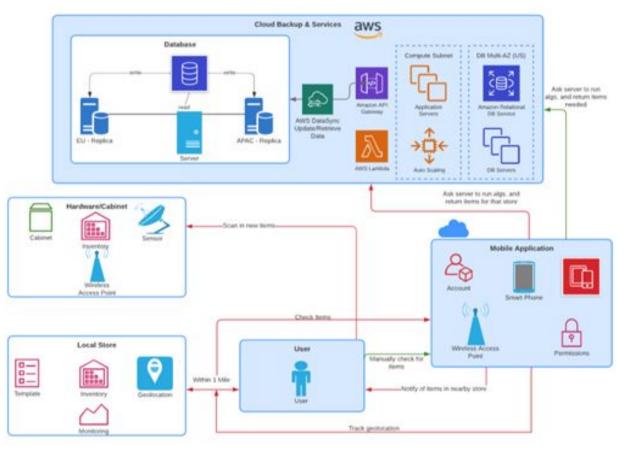
- Complete integration of sensor arrays for multiple products
- Purchase suggestion for multiple products can be determined

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## Detailed Design



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## **Technology Platforms**

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



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### **Functional Test Plan**

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

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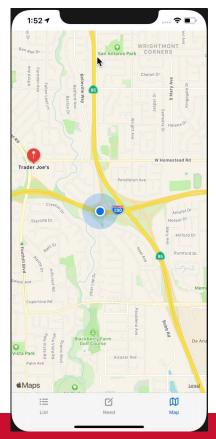


### Prototype Implementation -Hardware

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### **Prototype Implementations - App**



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# Engineering Standards & Design Practices



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### **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

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## 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?**

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