Project Proposal: **Spacepark**

Spring 2022 Class Potential New Member Project

3/17/2022

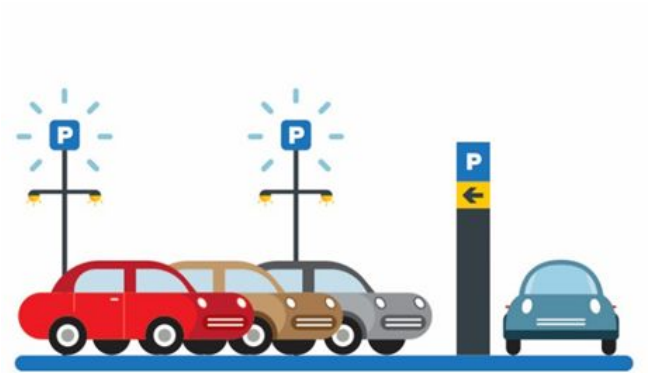
Overview

Problem

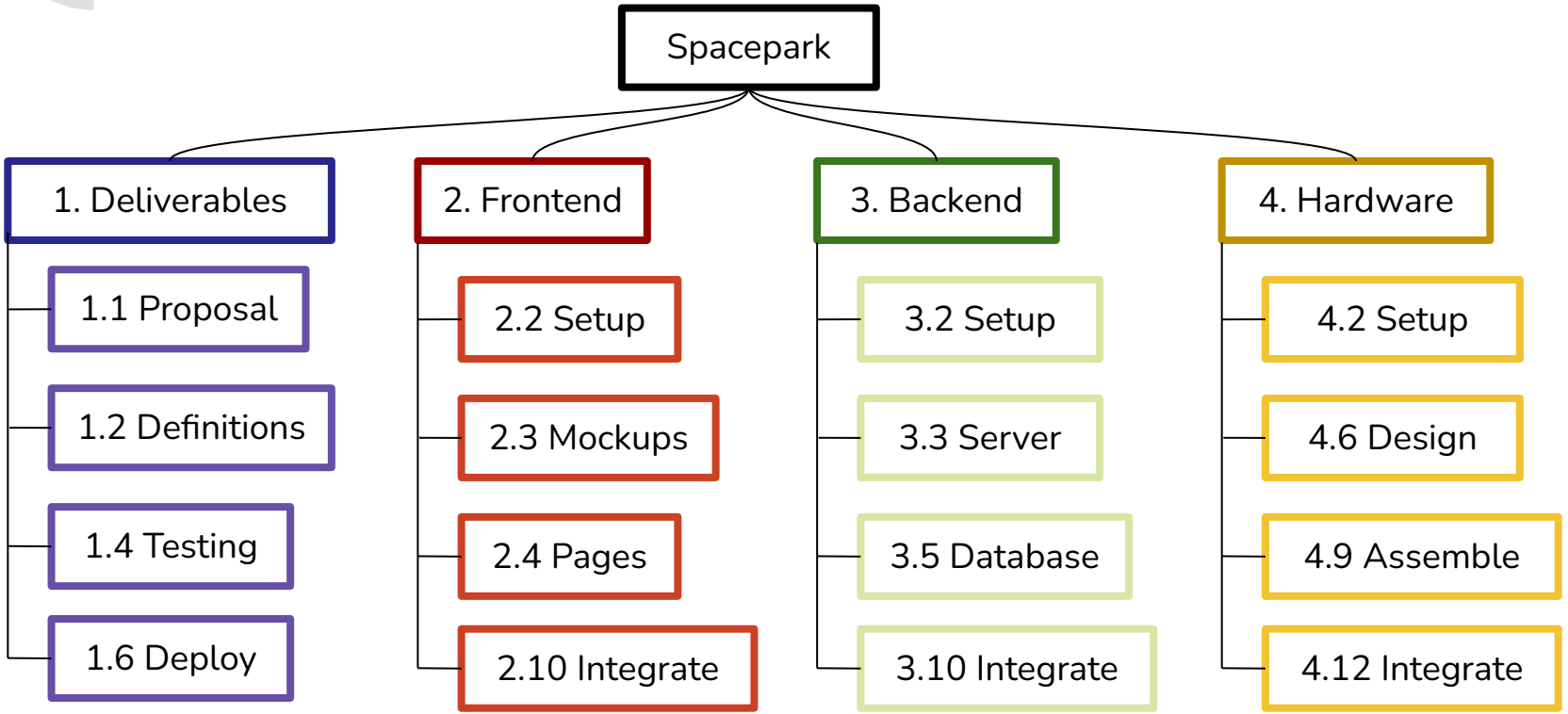
- Parking in San Jose State University has one problem
  - Too many cars but not enough available spots
- Issues
  - People are late to events
  - People get frustrated with finding a spot
  - People waste fuel and time

Solution: Domain & Service

- Spacepark
  - A device that tracks the occupancy of the cars in a garage
  - An application that allows users to see:
    - Current Occupancy
    - Capacity Frequency
    - Garage Reviews
    - Garage Information



Work Breakdown Structure



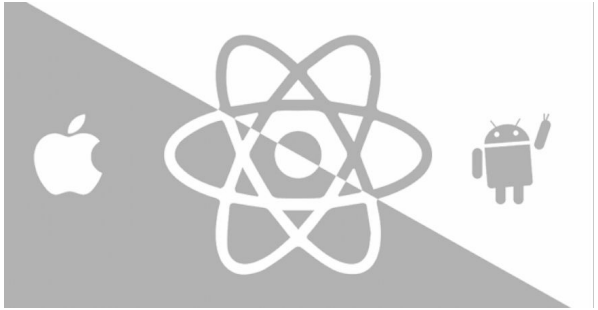
Execution Strategy

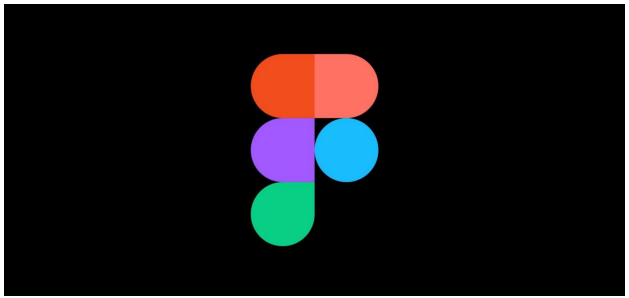
Frontend	Backend	Hardware
1. Yuki Saito	**1. Chloe Dang**	**1. Juggie Ray Heerey**
2. Anusri Chavali	2. Anushka Chokshi	2. Calvin Anderson
3. Erica Xue	3. Daanyaal Qureshi	3. Dylan Subijano
4. Ji Soo Kim	4. Harin Avvari	4. Nathan Lee
5. Neha Washikar	5. Nancy Diaz	5. Phillip Pham

Frontend

Technologies

- Languages
  - JavaScript and CSS
- Framework
  - React Native
- Tools
  - Figma
  - React Native Libraries
  - Expo





Functional Requirements

- Occupancy of the Garage
- View Garage Data
    - Garage address, cost per hour, time, pay station Location
- View Frequency of Occupancy of a Garage
- Last updated time for the Occupancy
- Review System
- Profile / Account

Non Functional Requirements

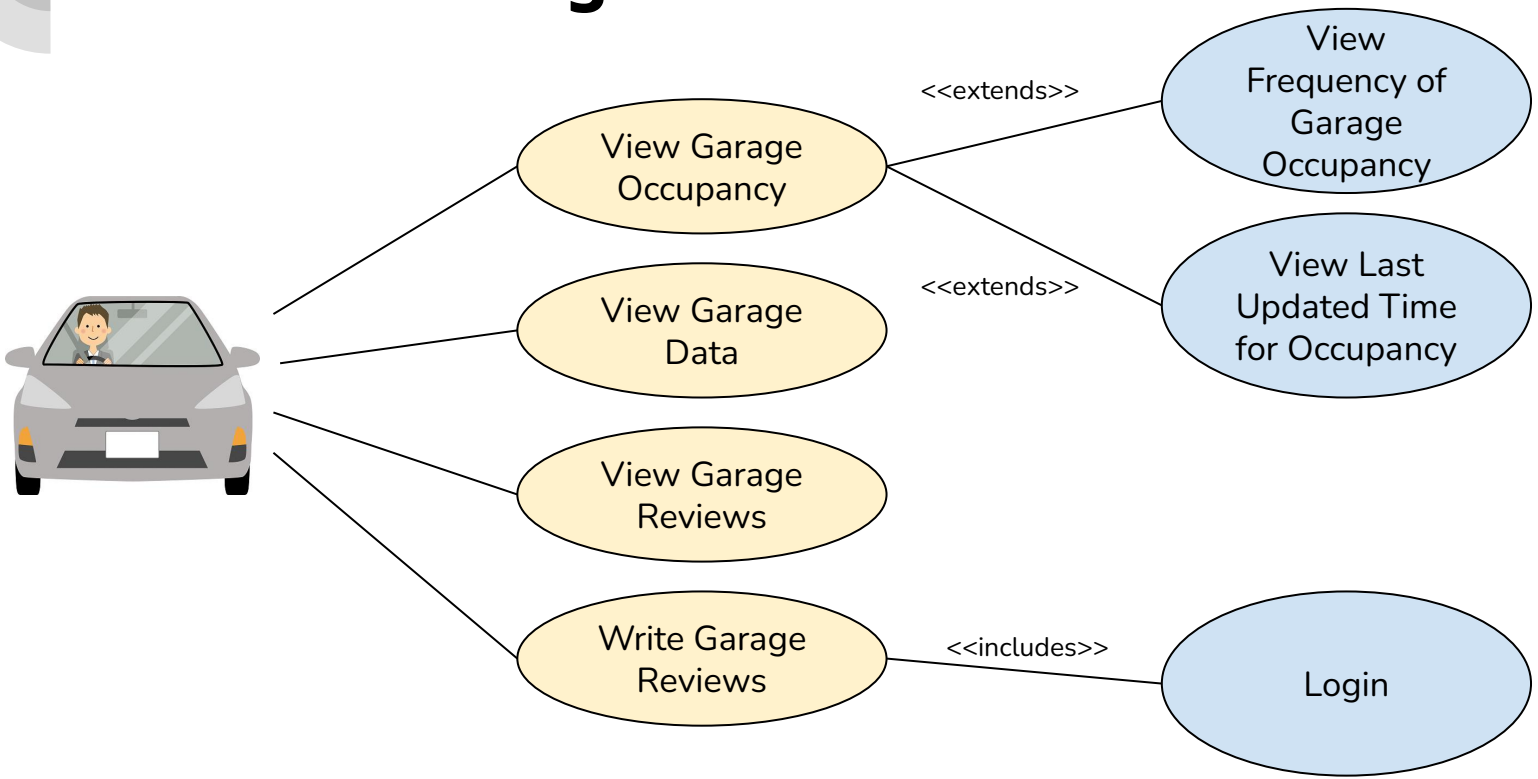
Availability

- React Native works on IOS and Android

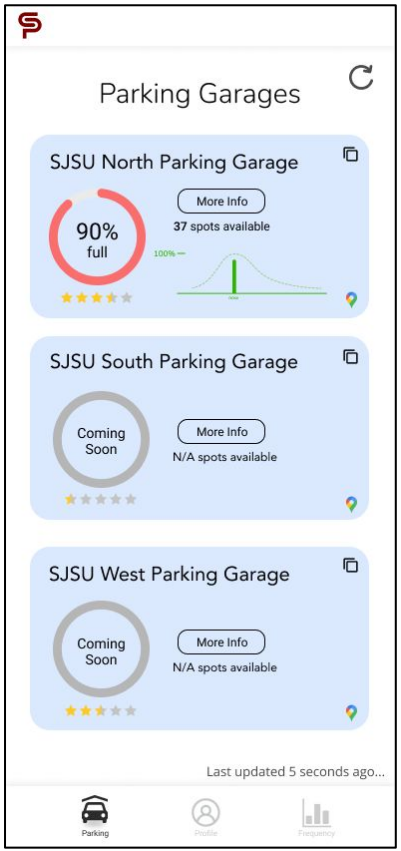
Usability

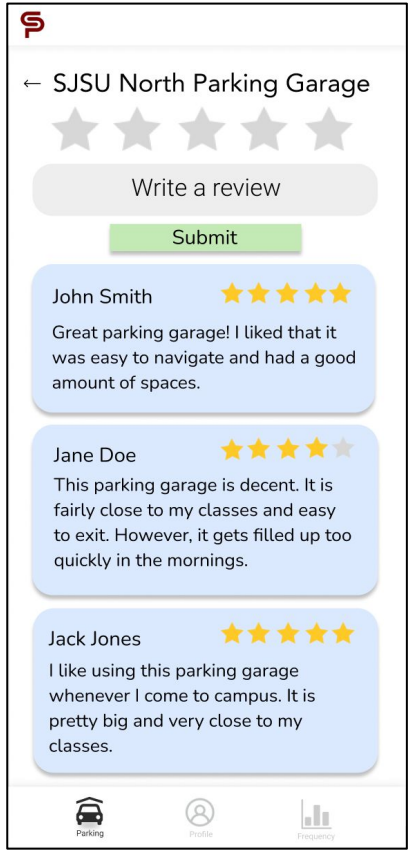
- Interactive user onboarding
  - Feature overview for first use
- No neon colors
- Simple fonts
- Reach all functional requirements within 3 screen taps regardless of current page

Use Case Diagram



UI/UX Mockups





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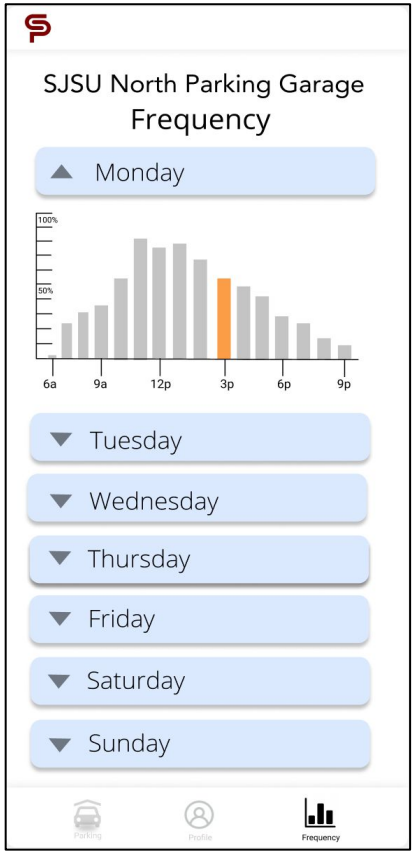
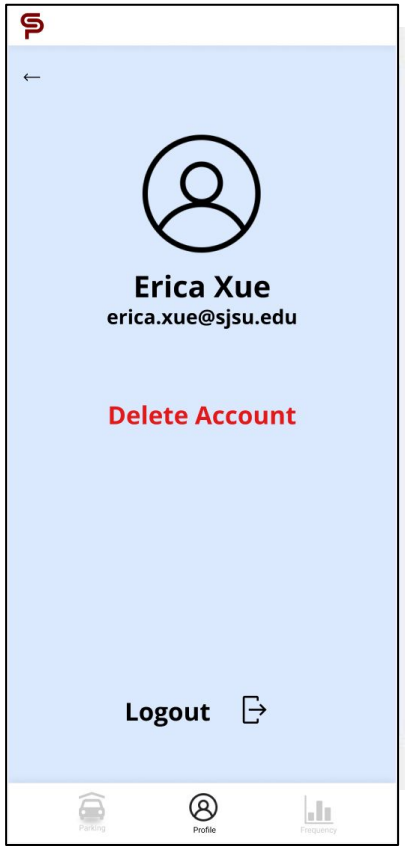
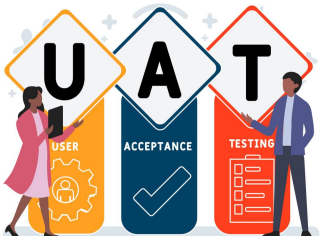




Testing

- User Acceptance Testing
  - Manually testing all static pages by simulating client use cases
- Unit Testing
  - Using Jest to test components of the React Native application



Tasks: Point of Contact

WBS NUMBER	TASK TITLE	TASK OWNER
2	Frontend	Yuki
2.1	Learn Technologies	All
2.2	Setup Structure	Yuki
2.3	Finalize Mockups	All
2.4	Static Pages : Login, Signup	Ji Soo, Erica
2.5	Static Pages: Garage View, Frequency	Neha, Anusri
2.6	Static Pages: More Info	Ji Soo, Neha
2.7	Static Pages: Reviews	Erica, Anusri
2.8	Code Review	Yuki
2.9	API Requests	All
2.10	Integration	Leads

Tasks: Scheduling - Sprint 1 & 2

WBS NUMBER	TASK TITLE	WEEK 1 (3/14/22)					WEEK 2 (3/21/22)					WEEK 3 (3/28/22)				
		3/14	3/15	3/16	3/17	3/18	3/21	3/22	3/23	3/24	3/25	3/28	3/29	3/30	3/31	4/1
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2.8	Code Review															
2.9	API Requests															
3	Integration															

Tasks: Scheduling - Sprint 2 & 3

WBS NUMBER	TASK TITLE	WEEK 4 (4/4/22)					WEEK 5 (4/11/22)					WEEK 6 (4/18/22)			
		4/4	4/5	4/6	4/7	4/8	4/11	4/12	4/13	4/14	4/15	4/18	4/19	4/20	4/21
2	Frontend														
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2.6	Static Pages: More Info														
2.7	Static Pages: Review														
2.8	Code Review														
2.9	API Requests														
3	Integration														

Core Learning Outcomes

- Technical
  - Figma
    - Develop UI/UX design skills and practices
  - React Native + Expo
    - Libraries
    - JavaScript, CSS
  - Hosting applications from local machine

Backend

Technologies

Languages

- Python

Framework

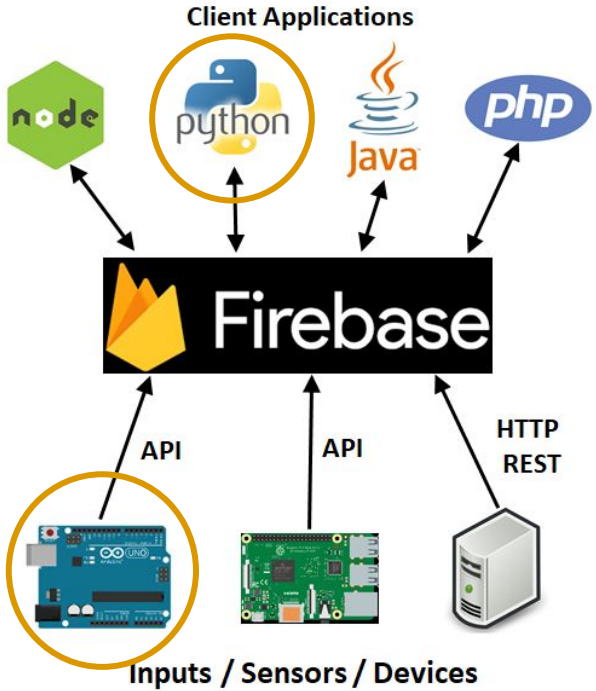
- Flask server

Tools

- Google’s Firebase Realtime Database Arduino Library

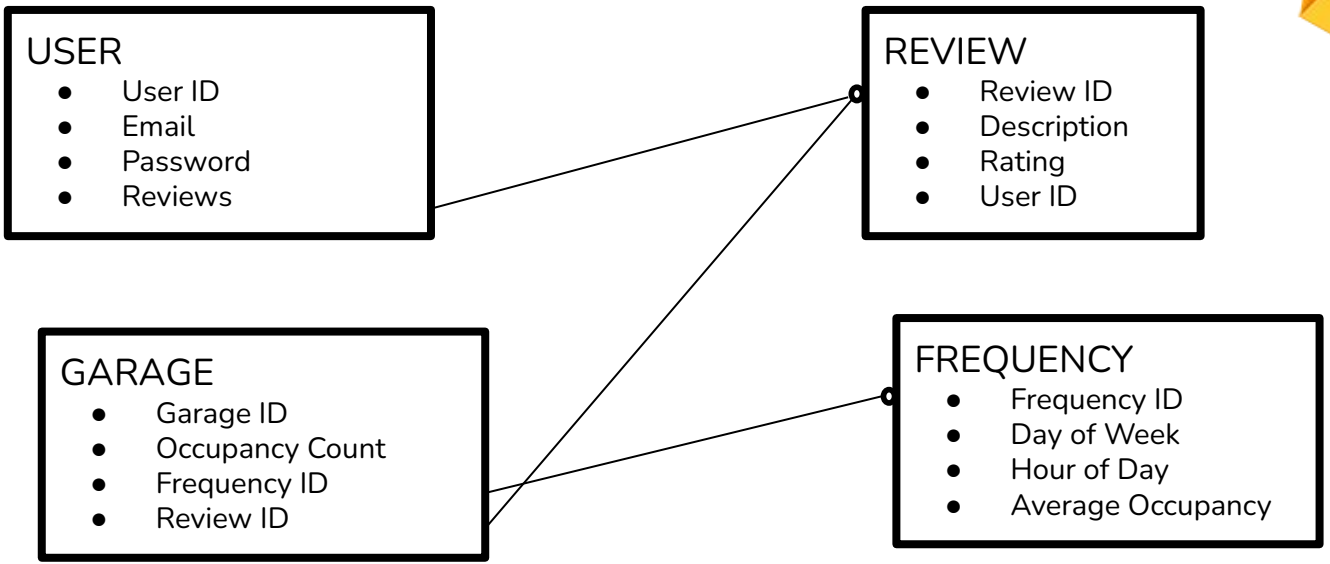
Functional Requirements

- Occupancy
  - Updated in real-time for each garage
- Frequency of Occupancy
  - Averages in 1-hour intervals of each day of the week
  - Storing occupancy data for days that have passed in the current semester and corresponding past semesters
- User Accounts Information
- User Reviews



Database Structure

Google’s Firebase Realtime Database Arduino Library

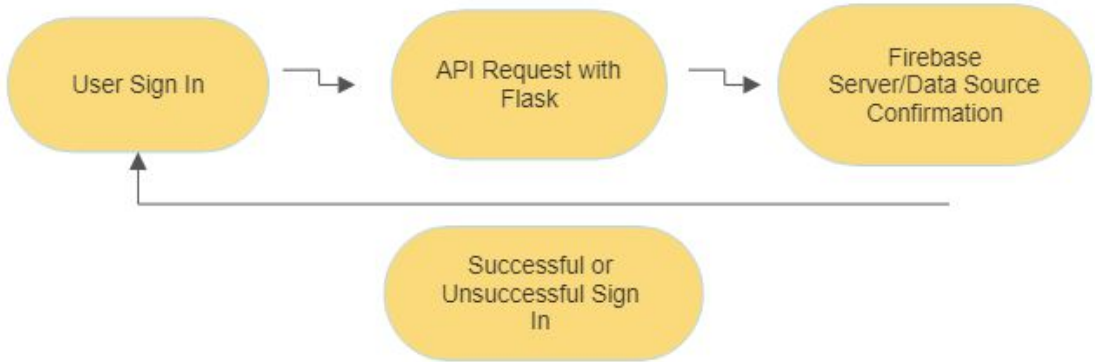


Unit Testing

- Test for email validity
- Username validity
- Full parking garage
    - Tests to make sure it does not show more spaces than available
- Occupancy does not become negative
- Test multiple situations

API Testing

- Testing response and parameters
  - User Sign In - Username and Password Authentication Testing
  - Reviews



Tasks: Point of Contact

WBS NUMBER	TASK TITLE	TASK OWNER
3	Backend	Chloe
3.1	Learn Technologies	All
3.2	Setup Structure	Chloe
3.3	Flask Server (Connection to React Native)	Harin, Chloe
3.4	Google Firebase Database Setup	Daanyaal, Harin
3.5	Database: Occupancy and Frequency Storage	Chloe
3.6	Database: User Accounts & Authentication	Nancy
3.7	Database: User Reviews	Anushka
3.8	Code Review	Chloe
3.9	API Requests	All
3.10	Integration	Leads

Tasks: Scheduling - Sprint 1 & 2

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3	Backend	Chloe															
3.1	Learn Technologies	All															
3.2	Setup Structure	Chloe															
3.3	Flask Server (Connection to React Native)	Harin, Chloe															
3.4	Google Firebase Database Setup	Daanyaal, Harin															

Tasks: Scheduling - Sprint 2 & 3

WBS NUMBER	TASK TITLE	TASK OWNER	WEEK 4 (4/4/22)					WEEK 5 (4/11/22)					WEEK 6 (4/18/22)			
			4/4	4/5	4/6	4/7	4/8	4/11	4/12	4/13	4/14	4/15	4/18	4/19	4/20	4/21
3.5	Database: Occupancy and Frequency Storage	Chloe														
3.6	Database: User Accounts & Authentication	Nancy														
3.7	Database: User Reviews	Anushka														
3.8	Code Review	Chloe														
3.9	API Requests	All														
3.1	Integration	Leads														

Core Learning Outcomes

- Understanding object oriented programming languages like Python
- Understanding micro web framework such as Flask
- Getting familiarity with noSQL databases
- Learning application architecture through integration
- Collaborating and planning by communicating with multiple teams

Hardware

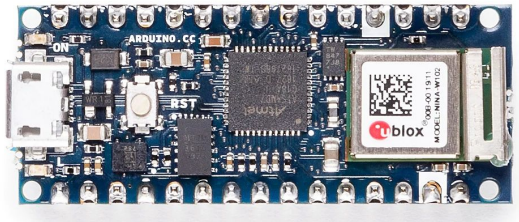
Technologies

Hardware

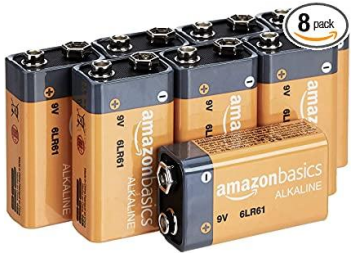
- Arduino Nano 33 Internet of Things (IoT)
- Ultrasonic Distance Sensor (model HC-SR04)
    - Google Firebase API
    - Breadboard

Languages

- C / C++
    - Arduino IDE
    - WiFiNINA library

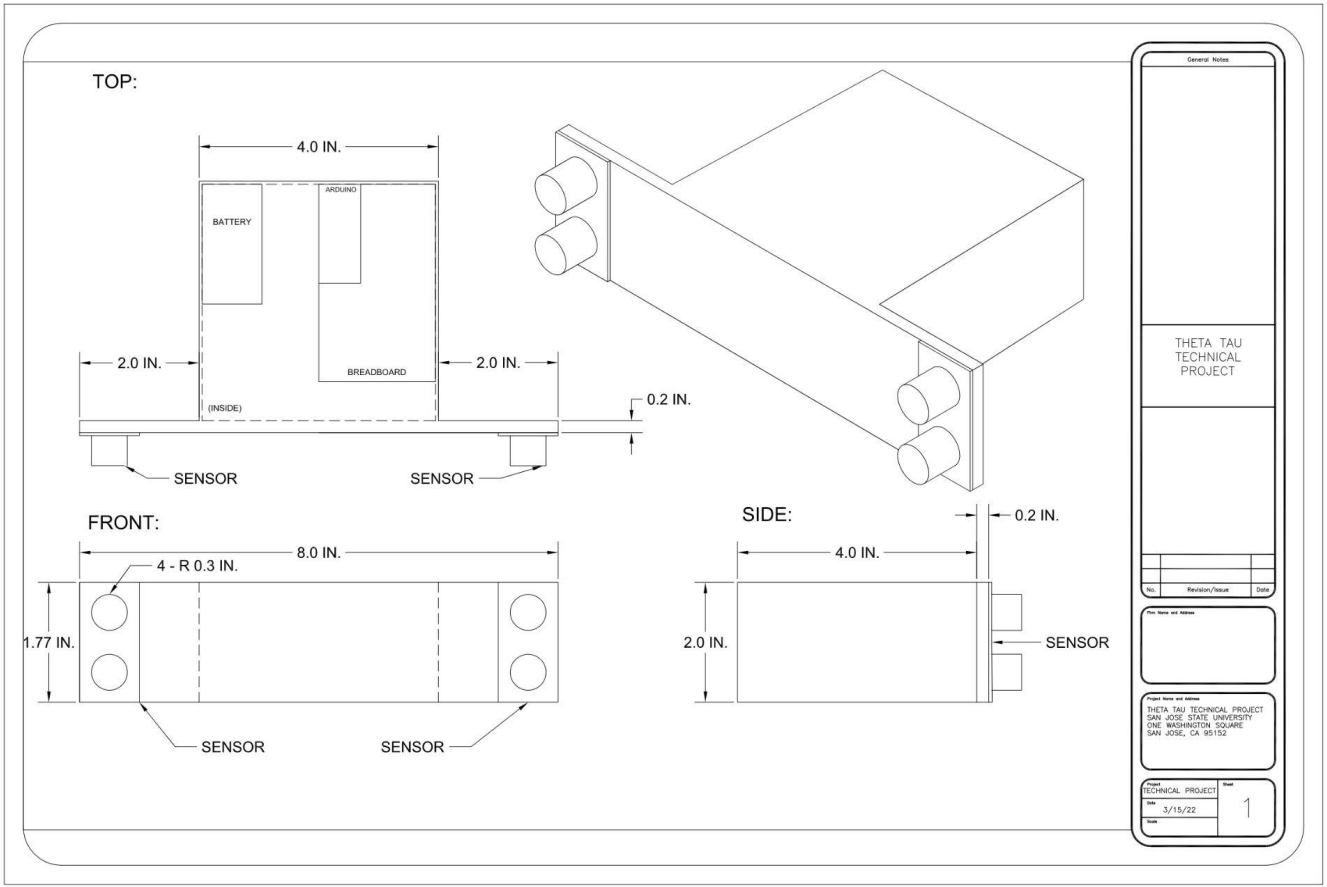


Equipment

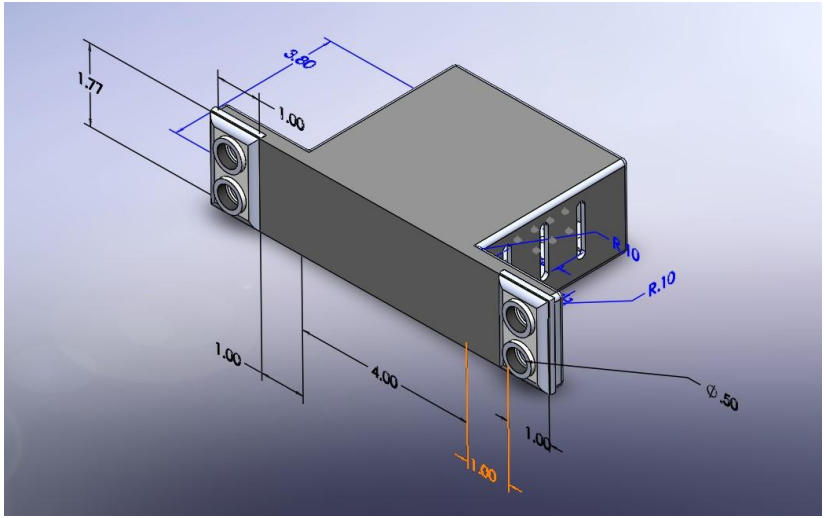


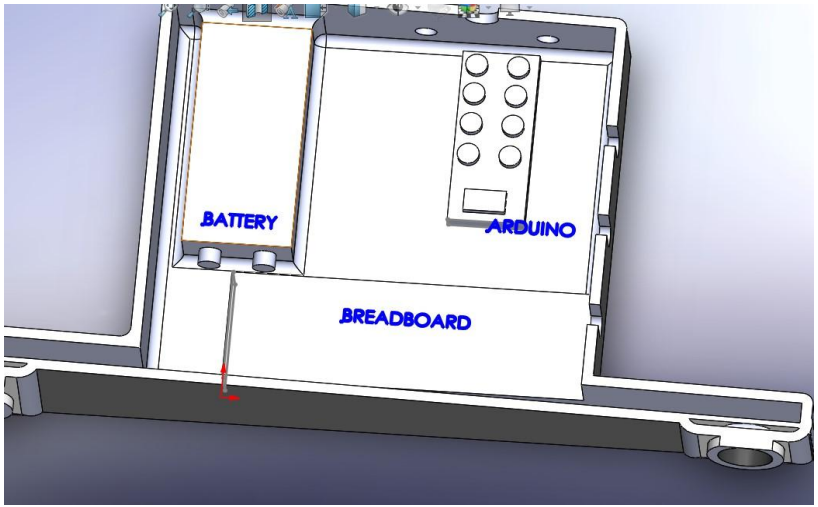
- Arduino Nano 33 IoT with headers
    - Functionality
    - Benefits of using the Arduino
- Ultrasonic Distance Sensor (HC-SR04)
    - Functionality
    - Advantages it provides
- 9 Volt Batteries + Battery Holder

Intended Design (CAD Drawings)



Intended Design (3D Model Concept)





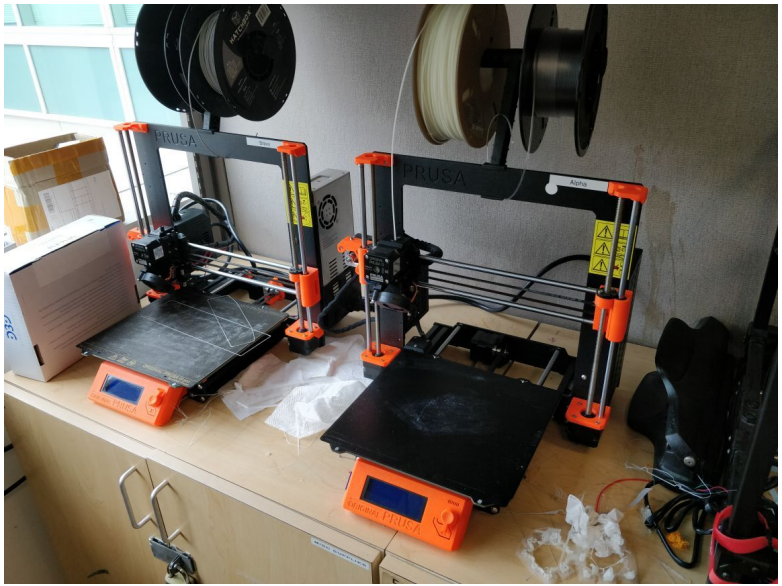
*In inches

Use Cases (API Descriptions)

- Setting up Wifi Chip (NINA-W102)
- Wifi Chip allows Arduino to Ping Server set up by BackEnd
- Setting up TimeClock from Wifi Chip using epoch number

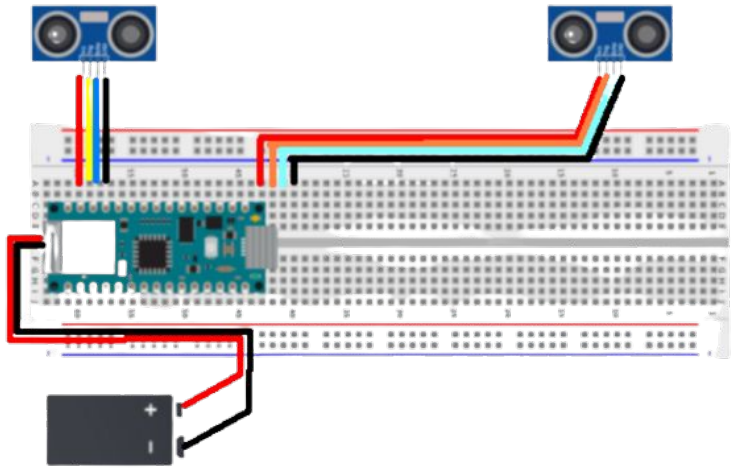
Materials and Testing

- 3D Printed Polymer, lightweight and durable
    - Stress testing through Finite Element Analysis (FEA)
- Testing of sensors, hardware efficiency tweaking, & data collection



Use Cases (Hardware Descriptions)

- Ultrasonic Sensors
  - Detecting Cars
  - Coding Sensitivity
- Breadboard
  - Organization
- 3D printing
  - Non-conductive



Tasks: Point of Contact

WBS NUMBER	TASK TITLE	TASK OWNER
4	Hardware	Juggie
4.1	Learn Technologies	All
4.2	Obtain Equipment	All
4.3	Equipment Functionality Test	Juggie
4.4	Final Design Accuracy Testing	All
4.5	Organizing Electronic Hardware	Calvin
4.6	Cad Design	Dylan
4.7	FEA Testing	Dylan, Daanyaal
4.8	Print 3D Design	Dylan, Phillip
4.9	Assembling Hardware into 3D printed Design	All
4.10	Implement Arduino IDE	Juggie, Nathan, Calvin
4.11	Wifi Chip Set Up	Juggie, Nathan, Calvin, Dylan
4.12	Ultrasonic Sensor Coding Logic / Integration	Leads

Tasks: Scheduling - Sprint 1 & 2

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4.3	Cad Design	Juggie																
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Tasks: Scheduling - Sprint 1 & 2

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4	Hardware	Juggie													
4.7	Print 3D Design	Dylan, Phillip													
4.8	Assembling Hardware into 3D printed Design	Dylan, Daanyaal													
4.9	Organizing Electronic Hardware	All													
4.1	Ultrasonic Sensor Coding Logic / Integration	Juggie, Nathan													

Tasks: Scheduling - Sprint 2 & 3

WBS NUMBER	TASK TITLE	TASK OWNER	WEEK 3 (3/28/22)					WEEK 4 (4/4/22)					WEEK 5 (4/11/22)					WEEK 6 (4/18/22)			
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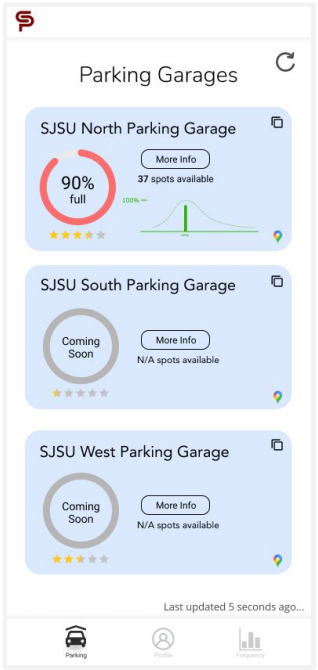
4	Hardware	Juggie																			
4.1	Ultrasonic Sensor Coding Logic / Integration	Juggie, Nathan, Calvin																			
4.11	Final Design Accuracy Testing	Leads																			

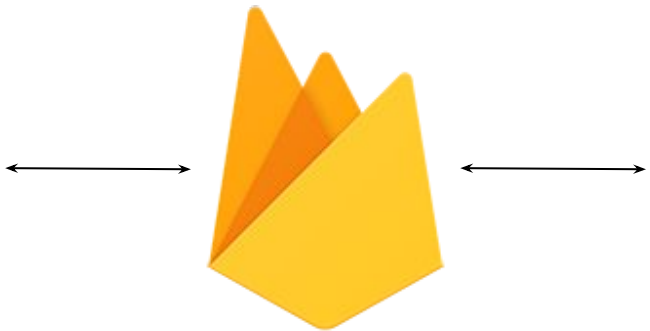
Core Learning Outcomes

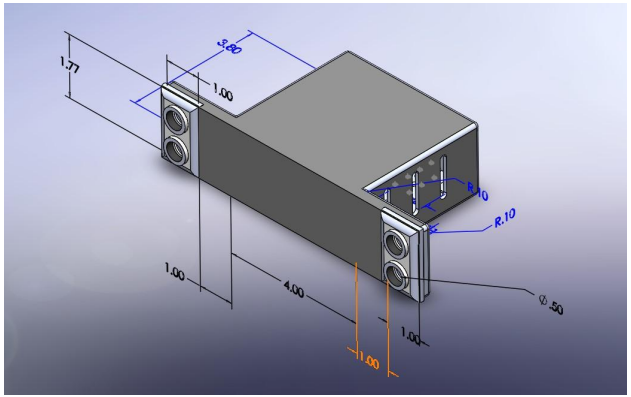
- Understanding how to connect Arduino to WiFi
- Integrating database to Arduino realtime
- Learning 3D diagrams and design
- Testing hardware components
- Collaborating and planning by communicating with multiple teams

Conclusion

Minimum Viable Product







*In inches

Competitive Analysis

- Parkstash
  - Information is not useful
    - Shown in % not in numerical values
  - No information on the garages
  - No feedback available

Budget

Sector	Vendor	Item	Cost
Hardware	Arduino Store US	Arduino	$20.70
Hardware	Sparkfun	Ultrasonic Sensors	$9 (2pcs)
Hardware	Amazon	Battery	$10.98 (8pcs)
Hardware	Amazon	Battery Housing Unit	$9 (5pcs)
Hardware	Amazon	Breadboard	$8 (4pcs)
Hardware	Amazon	Bronze Box Hinge	$5.75 (10pcs)
			Total: $63.43 (from research)
			Budget: $90

*Specific locations/budget for items found to ensure we get all products required.

Fundraising Details

Bake Sale Social and Fundraising

- Potential New Member Brotherhood Event to bake goods (Hosted at Anushka or Nathan's house)
- Baked goods sold for funding on campus (likely 7th street) - after SJSU approval
    - Selling brownies ~$24 estimated profit

Rough Schedule - Bake Sale

April 9/10th: Meet to make baked goods/social for Zeta Class

Week of April 11th: Sell goods in SJSU

Week of April 17th: Secondary Alternative Fundraiser

Fundraising Details

Alternative Fundraising Idea: Instagram Bingo Cards (dependent on need of funding)

- Fundraising Instagram account
- Shared by Potential New Members
- Post Bingo cards filled with challenges on Instagram stories
- Challenges will be unlocked via Venmo Payment
- Challenges will be filmed, tagging Instagram account that has paid for challenge
- Would like to implement on week of April 17th

Thank you