



BUSCA

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Motivation

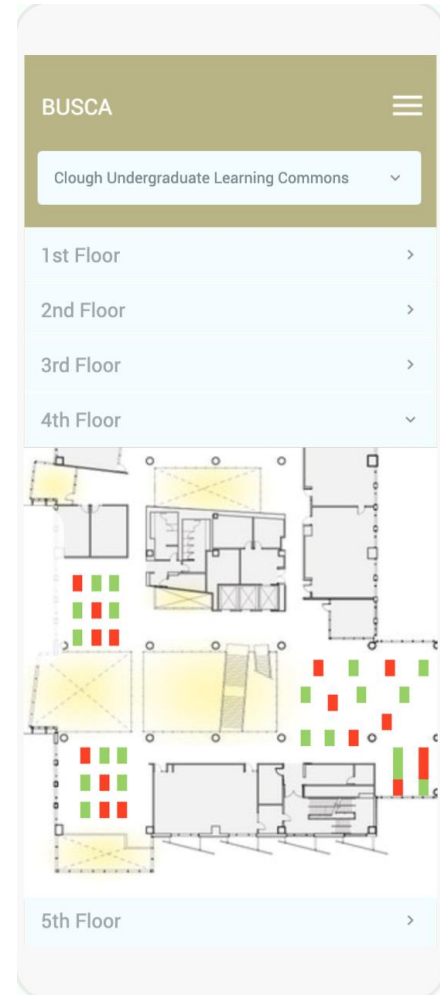
The CULC problem

- Nice study spaces
- Huge building
- Always packed

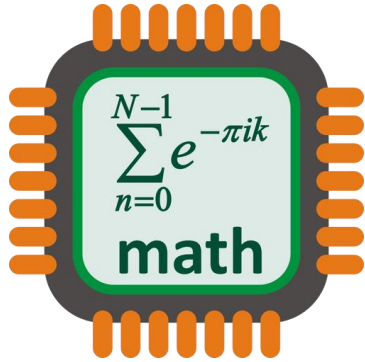


Objective

- Connect students with available study spaces in real time
- Cost-effective, non-invasive
- User friendly UI



Background

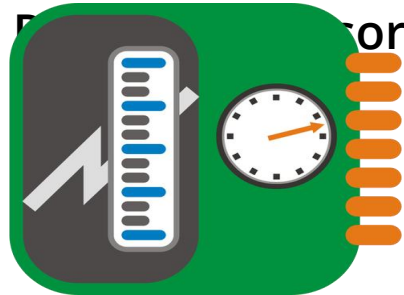


Microcontroller Unit



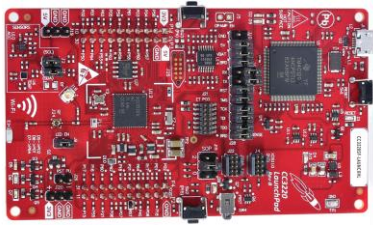
Cloud Server

Network



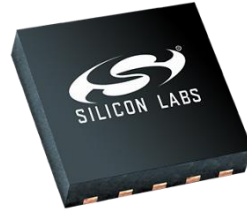
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Technical Specifications



MCU

- I2C Interface
- Wi-Fi Connectivity
- 15mm x 15mm x 2mm
- Current Draw: $< 200 \mu\text{A}$



Proximity Sensor

- Voltage: 3.3 V
- Current Draw: $< 100 \mu\text{A}$
- Minimum Range: 50 cm
- Minimum Angle: 40°
- 90% confidence



Power

- Life: 4 months
- Capacity: $> 1 \text{ Ah}$
- Easily replaceable

Design Approach—Sensors and Microcontroller

- Multiple sensor connecting to MCU via I2C
- Local data collection and processing
- Microcontroller uses Wi-Fi to connect to server



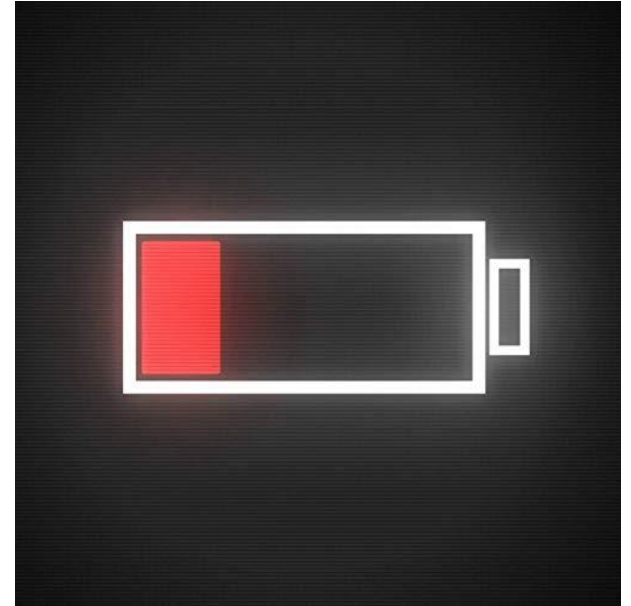
Design Approach—Server and Mobile App

- Uses Message Queuing Telemetry Transport (MQTT), runs on TCP
- Periodically retrieves data from MCU and updates on App



Design Approach——Major constraints

- Sensor range, accuracy and cost
- MCU power consumption and maintenance

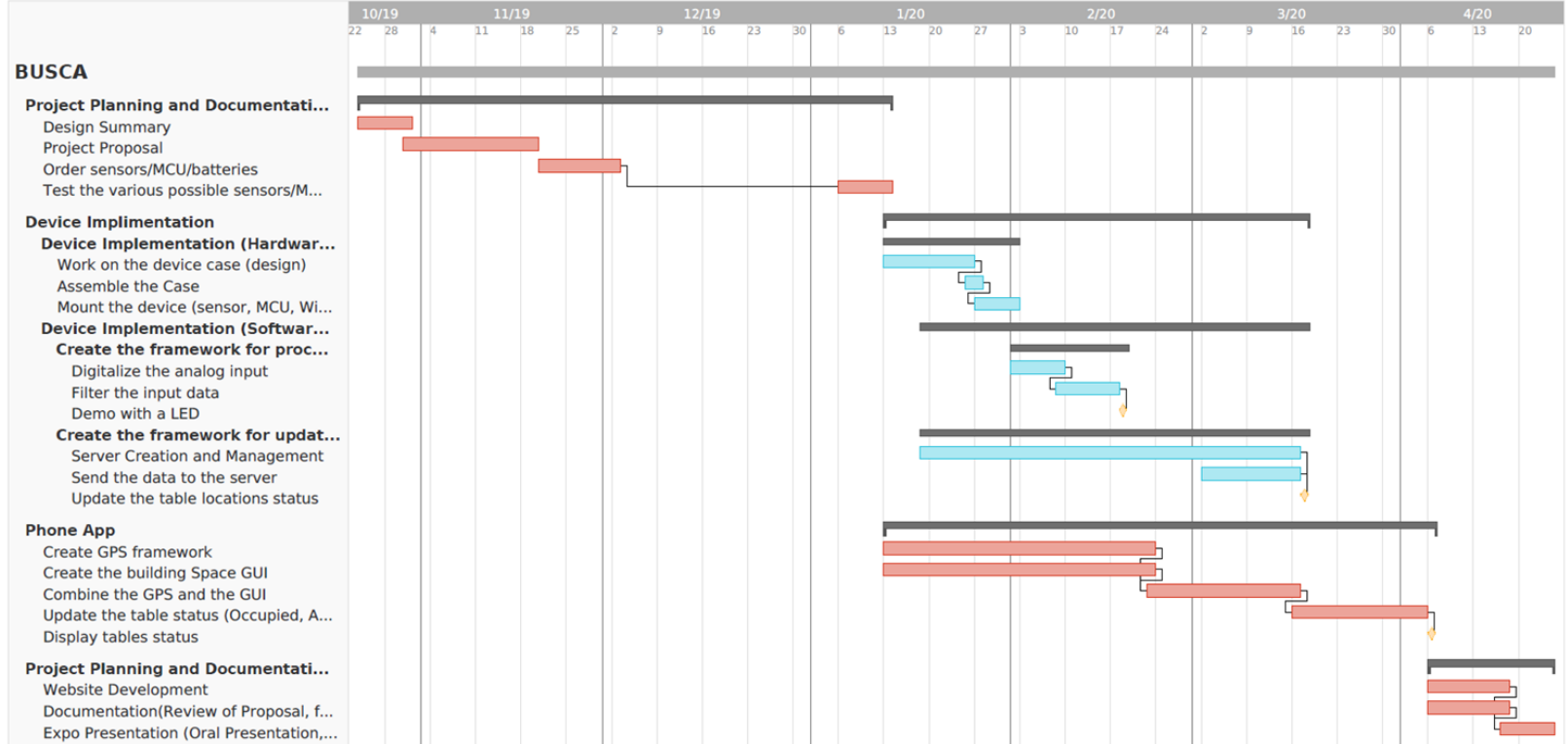


Scheduling

- **Project Planning (35 days)**
 - Location Inspection
 - Part Ordering
 - Documentation
- **Device Implementation (62 days)**
 - Hardware Implementation
 - Software Implementation
- **Mobile App (83 days)**
 - Back-end Architecture
 - UI Design and Experience



Gantt Chart



Market and Cost Analysis

- Target market is college and university campuses
- Potential for counter-serve restaurants
- No direct competitors

Prototype Costs	\$79.58
Labor Costs	\$46,827.00
Total Development Costs	\$133,925.22



Business Model

- 10,000 unit production round
- 10 clients expected within five years
- Clients must sign a one year minimum contract

Setup Fee (per unit)	\$35
Operation Fee (per month per unit)	\$12
Revenue (one year of operation per unit)	\$179.00
Profit (one year of operation per unit)	\$34.77, 19.42%
Total Revenue	\$1,790,000.00
Total Profit	\$370,770