

Secure Traveler

Midway Design Review
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The Team



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The Problem

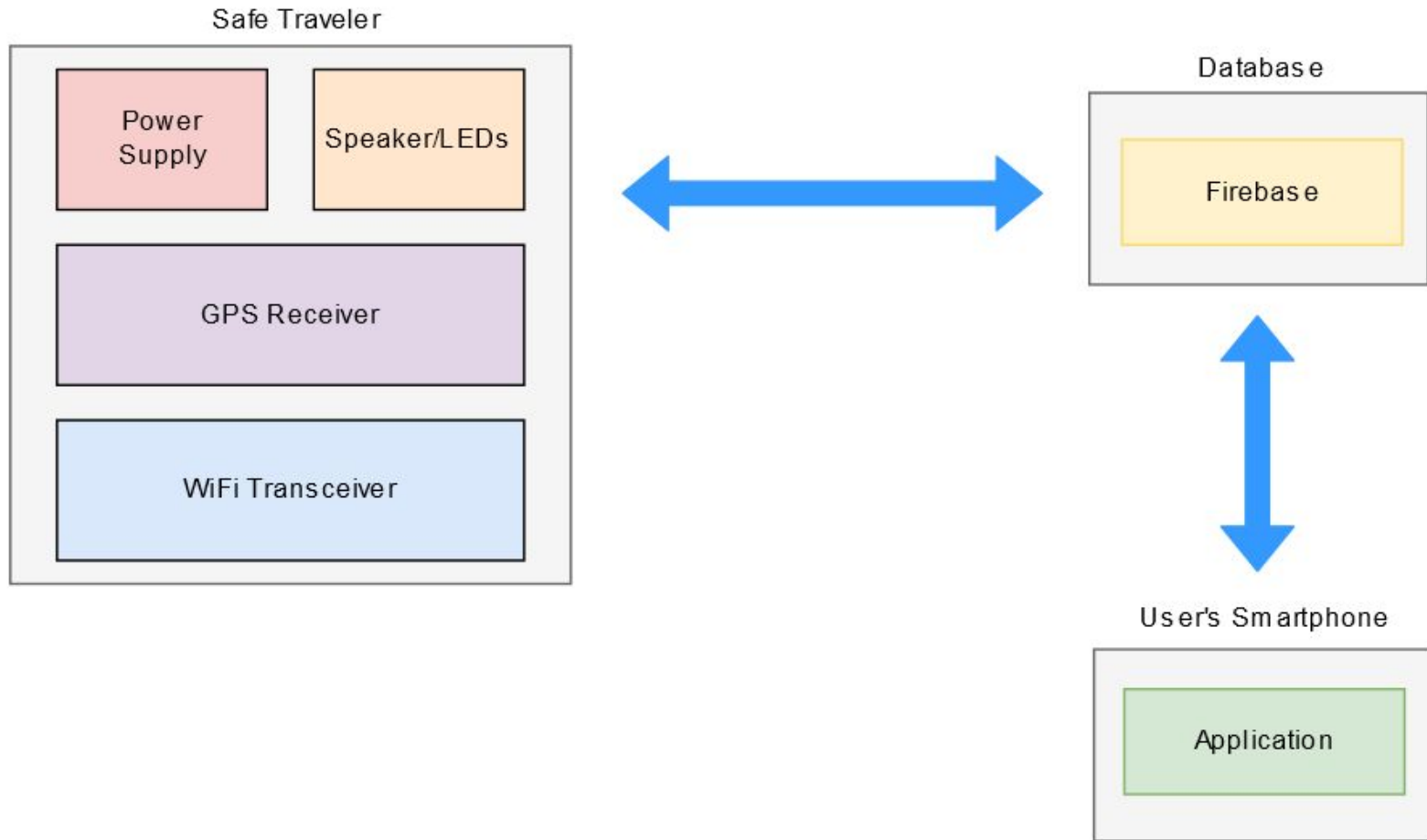
- We forget things, lose things, divide our limited attention, and make choices we later regret.
- Traveling tourists are prime suspects for theft.
- Our antiquated methods need to be improved as size decreases and price increases.
 - Retracing your steps
 - Asking others and security
 - Assuming you forgot to bring it
 - Hoping for a good samaritan to find it

Our Solution

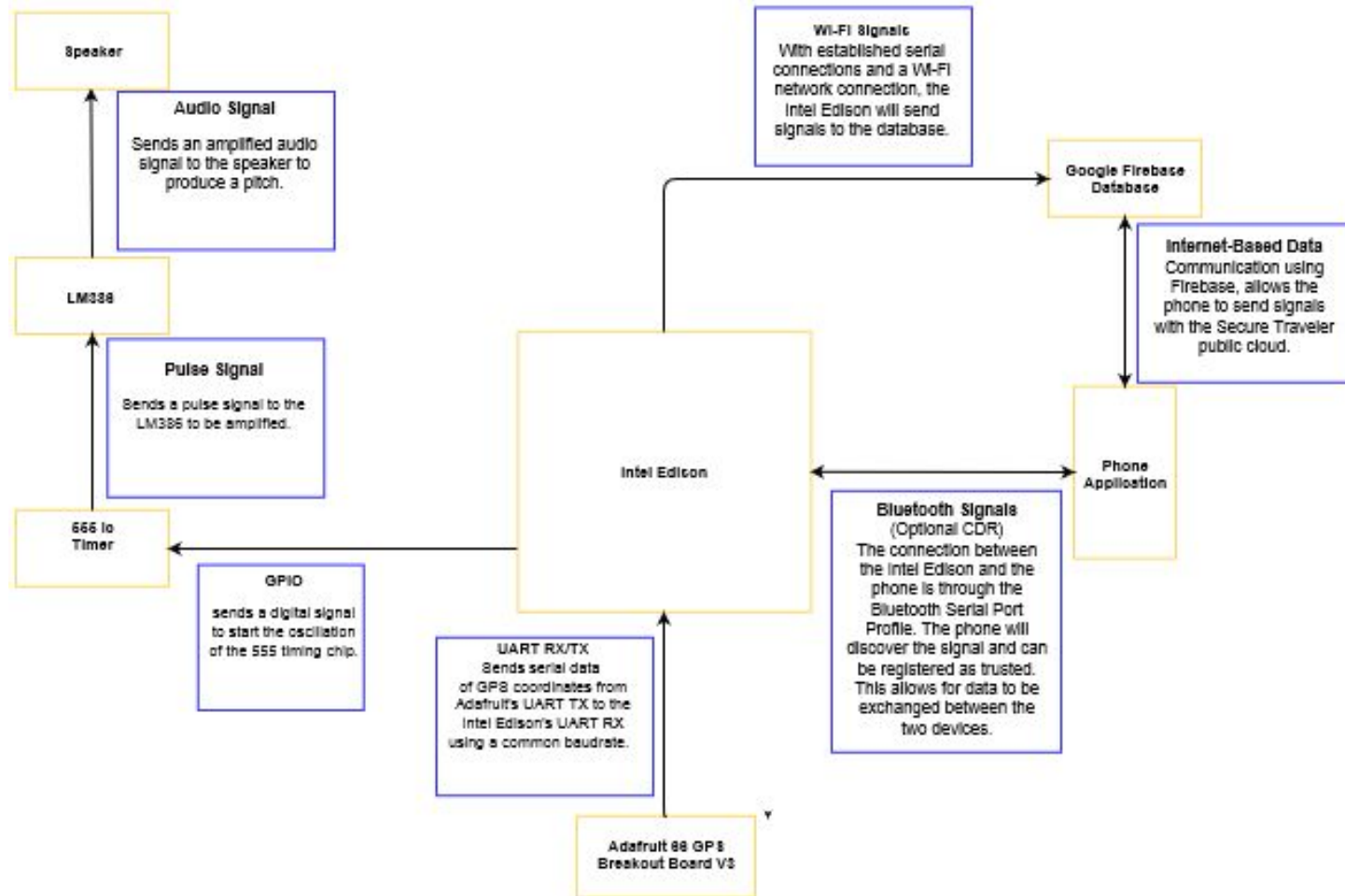
- Secure Traveler
 - Device
 - Smartphone
 - Application
 - Database
 - Google Firebase
- PCB
 - GPS
 - WiFi (Bluetooth option)
 - Power
 - Audio/LEDs



Block Diagram



High Level Diagram



Safe Traveler Requirements

- Connection Range: greater than 30 Meters Indoors
- Audio Range: greater than 50 Meters Outdoors
- Battery life: 2 months for Safe Traveler
- Weight: < 1 lb
- Response time: under 1 seconds
- Server: 50+ connections
- Size: <6 square inches
- Cost: Each unit < \$25 when mass produced

Intel EDI2BB.AL.K Edison Breakout Board Kit

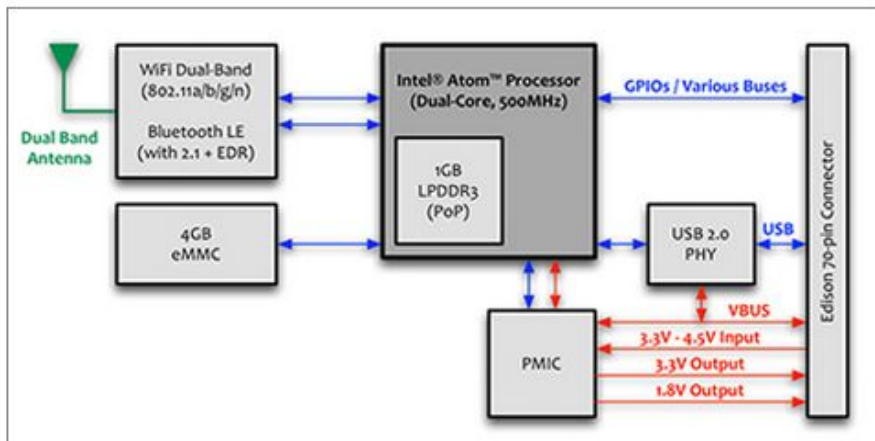
Ideal Size of the Device: As compact as possible

Size in Demo: Breadboards

Goal before CDR: Optimized on Breadboard

Point of Diversifying: Wireless Device

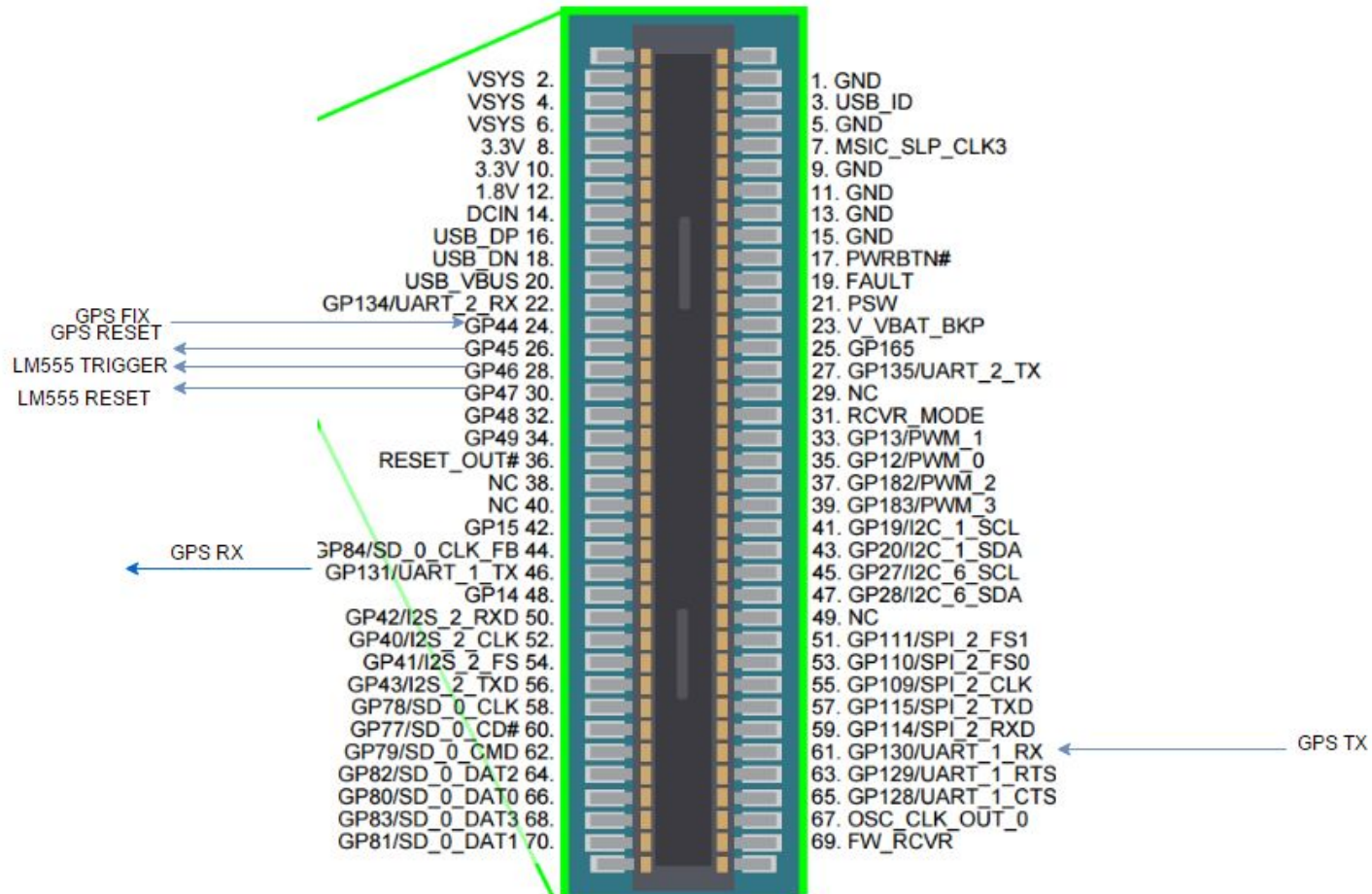
Price: \$61.98



Architecture

- Dual-core Intel® Atom™ processor at 500 MHz
- 1 GB DDR3 RAM, 4 GB eMMC flash
- 40 multiplexed GPIO interfaces
- Bluetooth* 4.0, Wi-Fi*
- Yocto Project*, Brillo*
- Arduino* compatible
- Open-source software development environment
- C/C++, Python*, Node.js*, HTML5, JavaScript*

Pin Diagram Intel Edison



Adafruit Ultimate GPS Breakout Version 3

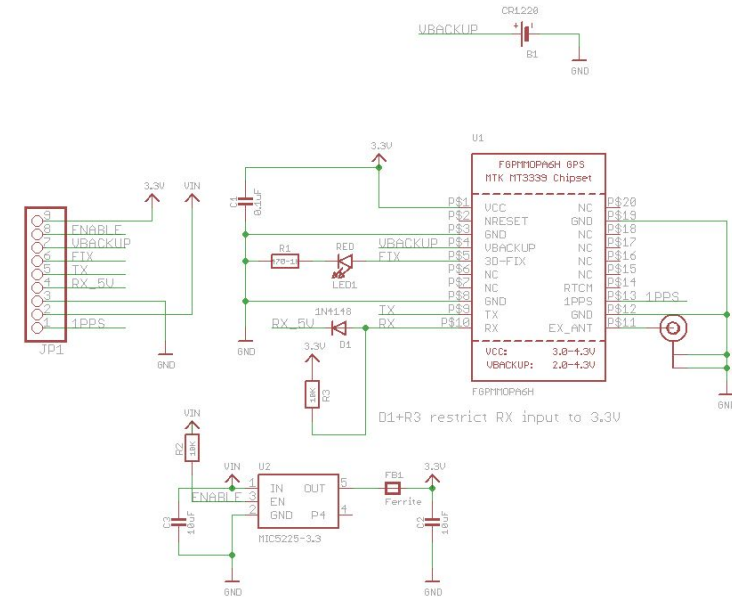
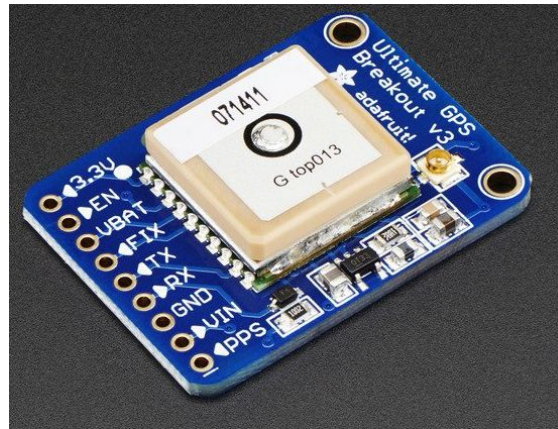
Ideal communication range: 30-50 meters Indoors

Communication range in Demo:

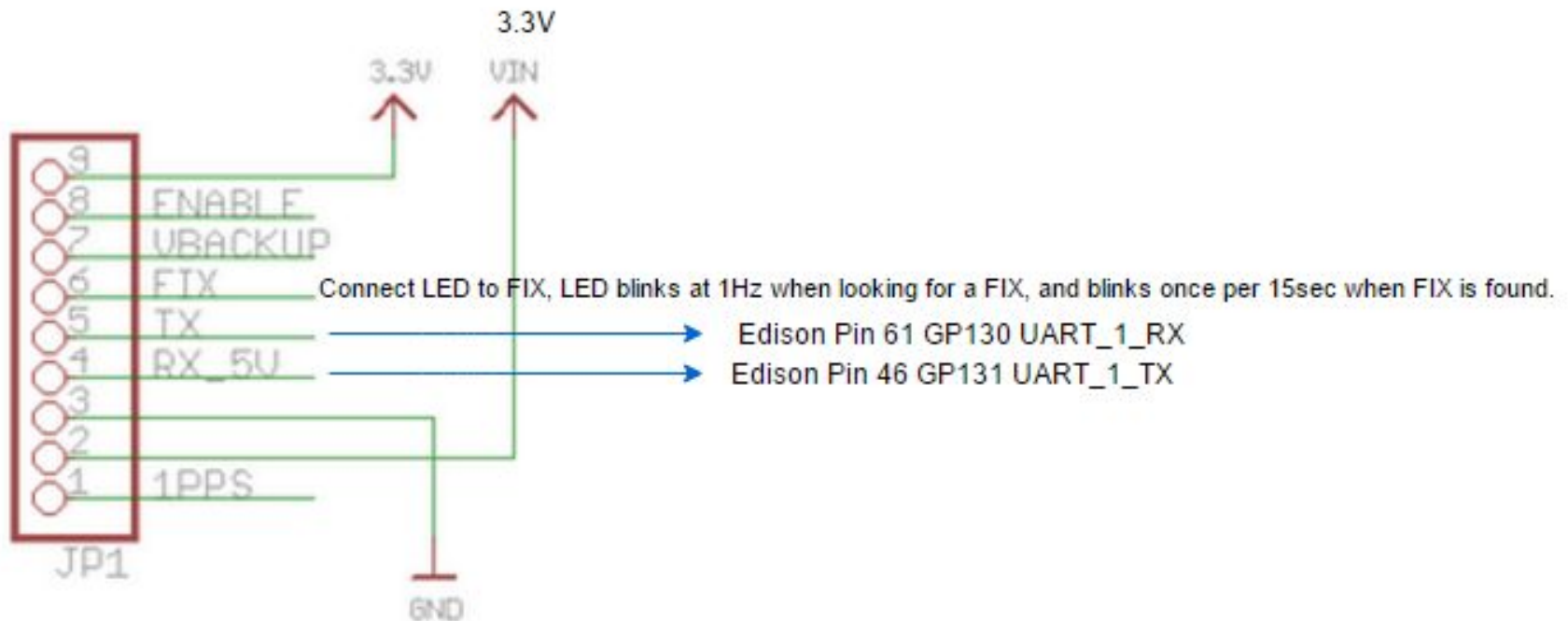
Goal before CDR: 30-50 meters Indoors

Point of Diversifying: When Goal is achieved or complications occur

Price: \$51.19

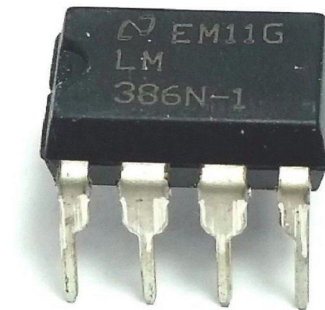
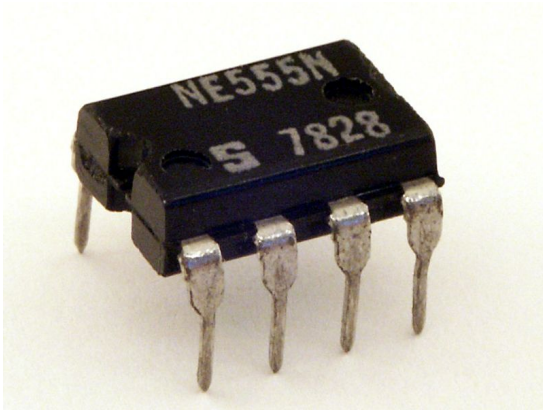


Pin Diagram GPS



555 Timer IC and LM386N-1 Audio Amplifier

- Decided upon for CDR due to
 - Very low cost dealing with cost limitations
 - Multiple sources of availability
 - Extreme versatility
 - Widespread design knowledge
- Price: \$1 and \$2
- Paired with test Speaker until Wireless version designed at CDR



Power Source

Ideal power consumption: 3-5 V

Power Consumption in Demo: 3.3V

Goal before CDR: 3-5 V

Optional Power Sources:

1. GPS

-Can use real-time clock in GPS with a CR1220 3V battery because GPS memory is volatile.

-RTC draws 7uA

-CR1220 battery life = $40\text{mAh}/7\text{uA} = 5,714$ hours.

2. Intel Edison

-External power source 7-15V

-Ability to use on-board charger IC with a Lithium battery.

Database

- **Firestore**
 - Store/manage data
 - Location
 - User Profile
 - Settings
 - Requirements
 - Fast, reliable, and secure
 - Implementation
 - Swift 3.0 and/or Python
 - Switched from PDR



Smartphone

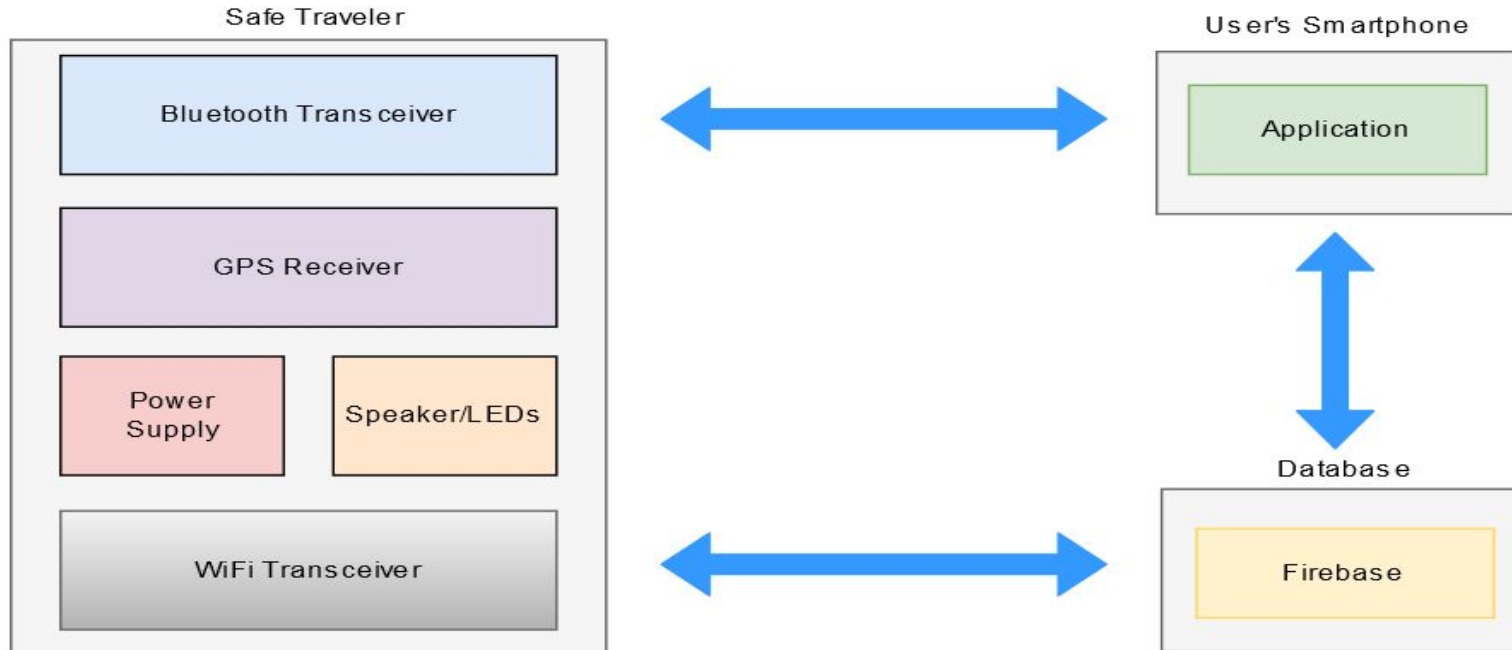
- Application
 - Send device coordinates to server
 - Google Maps API
 - Determine device location
 - User Interface(for CDR)
 - Display device location
 - Enable/Disable device speaker
 - Push Notifications
 - Reminders
 - Settings
 - Enable/Disable push notifications
 - Set distance

Proposed MDR Deliverables

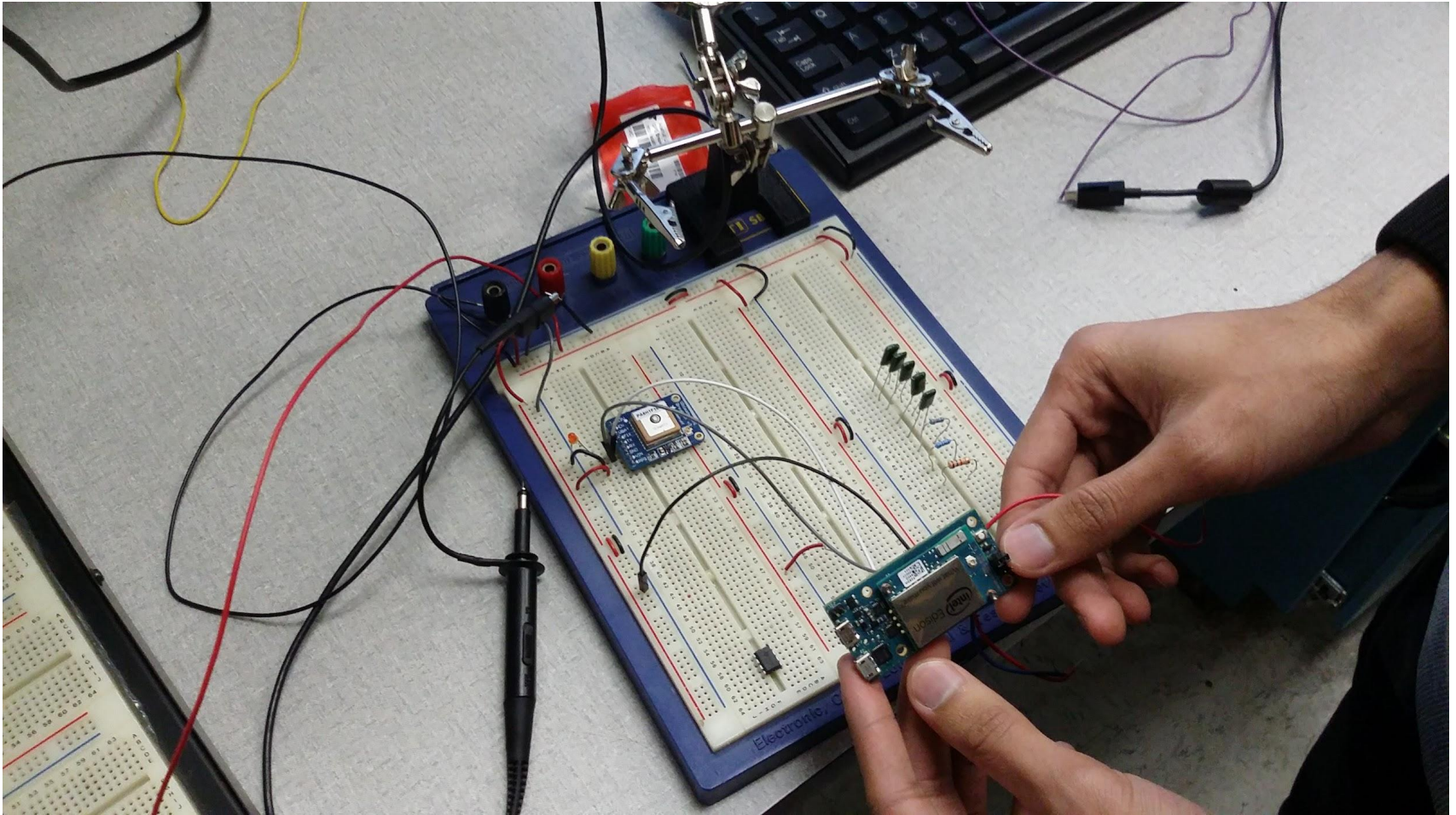
- Demonstration of communication between device and application via Bluetooth
- Demonstration of location data storage on server
- Demonstration of Google Maps integration for displaying location data retrieved from server

Demonstration of MDR Deliverables

Communication between device and application via Bluetooth



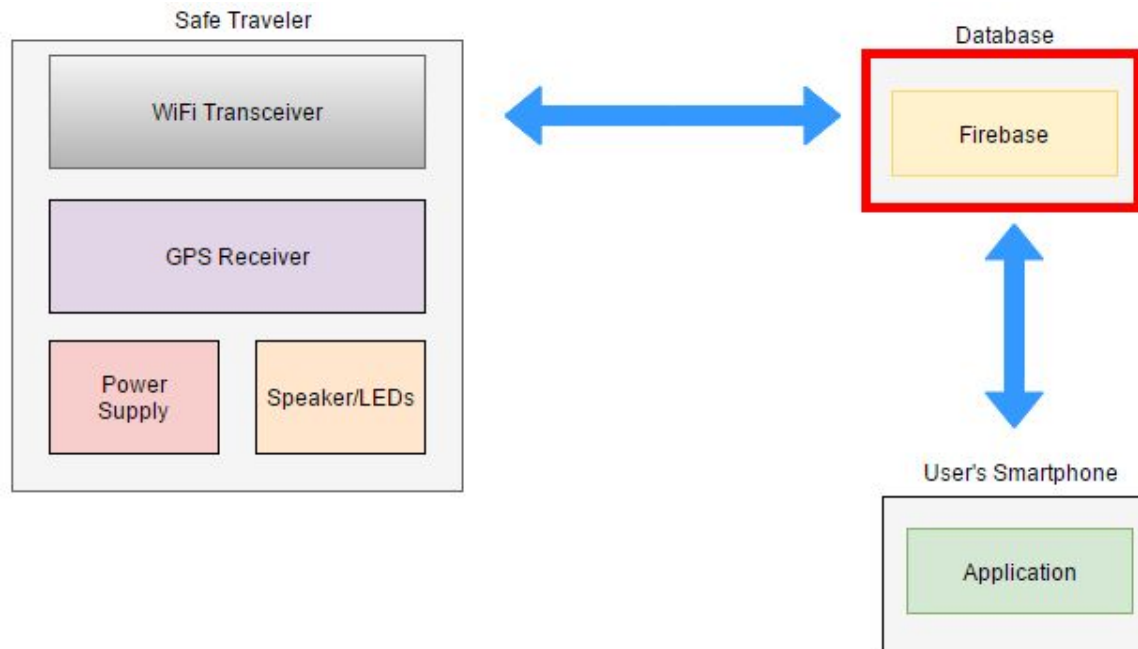
Demonstration of MDR Deliverables



Demonstration of MDR Deliverables

Location data storage on server

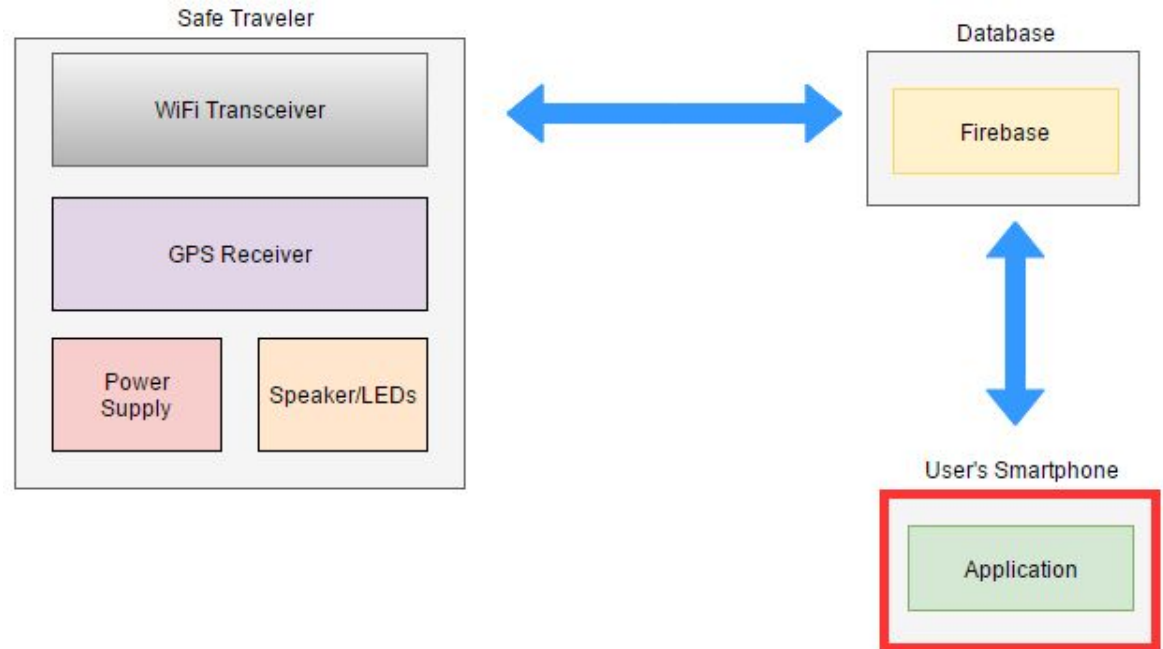
100 simultaneous connections for Public Server



Demonstration of MDR Deliverables

Google Maps integration for displaying location data retrieved from server

Skeleton:
UI Kit XCode
187 Lines of Code



MDR Deliverables Wrap-up

- Split up of the Deliverables:
 - James McNaney - Intel Edison + GPS Transceiver
 - Manjot Chahal - Intel Edison + Firebase Server
 - Cameron Adams - Application + GPS Transceiver
 - Sam Tang - Application + Firebase Server

- Mistakes from MDR:
 - Total Cost: \$150.58
 - Mistake on
 - Antenova M10578-A3 (Price: \$25.74)
 - Antenova SR4G008 (Price: \$11.67)
 - Skittish to buy Extra Parts
 - Resulted in panic after an Intel Edison burned out
 - Stopped us from being able to expand easily due to part limitations
 - May have been beneficial in the long run due to saving \$42.86

Expansion

- Diversifying the device
 - A lightweight version with cheaper parts
 - A higher power, higher accuracy device
 - A more impact resistant version

- Security Features
 - Wifi features to expand the range for locating devices
 - Alert authorities upon being reported as missing/stolen

Proposed CDR Deliverables

- **Demonstrate the Audio Skeleton**
 - Show tests for Audio Skeleton, Minimum Range 20 Meters
 - Decide Speaker that complements Audio Final Design
- **Optimization of GPS and Intel Edison**
 - Test Advantages of Bluetooth and WiFi from Current Design
 - Power, Range, Size, Efficiency, and Heat Test and Charts
 - Optimizing Breadboard for Advancement to Wireless after CDR
- **Build Firebase Server for Testing and Finalization**
 - Add Device Keys and User Profiles
- **Finalize the Application**
 - Add Functionality, Devices, Sound, Push Notifications
 - Trial Bluetooth connection

Individual Responsibilities for CDR

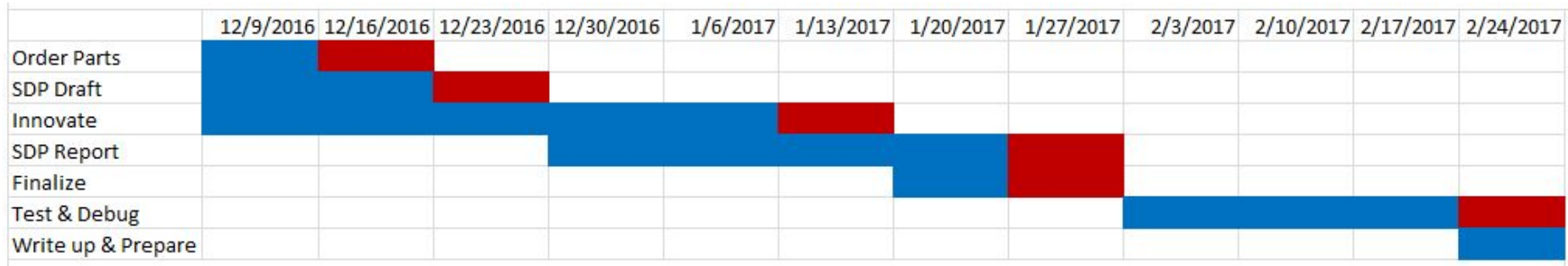
- James McNaney
 - Power Management + Board Layout
- Manjot Chahal
 - Server Management + Communication
- Cameron Adams
 - Audio Communication + User Interface
- Sam Tang
 - Application Design + Team Coordinator

Schedule until CDR

- SDP Draft due Dec 22nd
 - Group Work: James McNaney and Cameron Adams
- Audio Skeleton due Jan 17th
 - James McNaney and Cameron Adams
- Bluetooth Innovation due Jan 17th
 - Sam Tang and Manjot Chahal
- Server Device Keys/User Profile due Jan 17th
 - Sam Tang and Manjot Chahal
- SDP Report due Jan 30th
 - Group Work: Manjot and Cameron Adams
- Power Management due Jan 30th
 - Sam Tang and James McNaney

Schedule and Gantt Chart

- Finalize Audio Design due Jan 30th
 - James McNaney and Cameron Adams
- Finalize User Interface due Jan 30th
 - Sam Tang and Cameron Adams
- Finalize Application Settings/Testing due Jan 30th
 - Sam Tang and Manjot Chahal
- Finalize Breadboard due Jan 30th
 - James McNaney and Manjot Chahal



Questions?
