Secure Traveler

Midway Design Review
December 9, 2016

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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

Safe Traveler

- Power Supply
- Speaker/LEDs
- GPS Receiver
- WiFi Transceiver

Database

- Firebase

User's Smartphone

- Application
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

Connect LED to FIX, LED blinks at 1Hz when looking for a FIX, and blinks once per 15sec when FIX is found.

- Edison Pin 61 GP130 UART_1_RX
- Edison Pin 46 GP131 UART_1_TX
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 = 40mAh/7uA = 5,714 hours.

2. Intel Edison
   - External power source 7-15V
   - Ability to use on-board charger IC with a Lithium battery.
Database

- Firebase
  - 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

[Diagram showing communication between Safe Traveler and User's Smartphone 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?