Sign Tracking Device

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Problem Statement

Our client came to us with the problem that they are losing about 2-3 signs a month at \$300 a piece.

Project Statement

Our solution to this problem was developing a tracking device that can be inconspicuously attached to a traffic sign, and can communicate information about its location with a server over a long range network. It is also the development of a mobile friendly web application that can communicate with the server to pinpoint where each tracking device is located.

Deliverables

- The Device
 - Microcontroller
 - GPS Chip
 - Cellular Chip
 - Battery
- The Database
- The Mobile Friendly Web Application

<u>Design</u>





Major Components

- MSP430FR2433
- Hologram Dash (Ublox Sara-U260 Cellular Modem)
- Adafruit Ultimate GPS (MTK3339-PA6H)

Runtime States

- 0. Turn on GPS
- 1. Find and store location
- 2. Turn off GPS, then turn on Cell Modem
- 3. Save Cell Modem IMEI then transmit data
- 4. Sleep



Data Sent From Device

- GPS: ddmm ssss dddmm ssss
- IMEI: XXXXXXXXXXXXXXXXX



Power Consumption

Weekly Average: 14.44065mAh

Estimated Battery Life: 17 months

Data Plan Cost

\$0.40 to keep the device on the network

\$0.02 in data utilization each month.

- MCU \$1.29375
- Load Switch \$0.4495
- Voltage Regulator \$1.73
- Cell Chip \$59.00
- GPS Chip \$40.00
- Battery \$3.24
- Evaluation Module* \$89.00

*One time cost.

The Database

DeviceInfo		Sites	UserInfo
DeviceID		SiteID	ID
UserID		SiteName	Username
Site		SquareN	Email
Latitude		SquareE	PasswordHash
Longitude		SquareS	Password
Battery		SquareW	UserType
LastUpdateTime		Active	
	9	EstFlags	

Application Demo

Coming Up With The Application/Database Design

- Discussions with the client
- Wanting a less cluttered view
- Needed to reach all web browsers, and mobile devices

Testing the Application

- Test as you go
- User testing

Coming Up With The Device Design

- Finding appropriate hardware
- Cost-effective
- Resource efficient
 - Power
 - o Data

Testing the Device

- Individual development of each component
 - MCU Power control
 - Cellular Modem
 - GPS
- Integration of separate parts

Possible Scenarios

- Portability among multiple devices
- Portability among multiple browsers
- Portability among multiple systems
- Unresponsive tracking device
- Inexpensive production





The Application



The Application





Video Demo

