"BikeSmart" Vision Statement

This document describes the project, design, strategy, and goals of the "BikeSmart" Project - designed and implemented by the *Treadsetters* team.

Treadsetters

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The Problem

There is no existing platform that allows a bicycle to communicate with other devices via the internet. Because there is no embedded system to gather, relay, and ultimately interpret data from a bicycle, the rider is unable to take advantage of the potential associated with the Internet of Things/Internet of Everything (IoT) having a "connected bike". We believe that this system will provide a basis for developers to create profitable applications for users ranging from the casual commuter to the professional cyclist.

Importance

While certain aspects of placing a bike in the IoT may already be feasible simply through smartphone technology, there are distinct upstream and downstream data aspects that require a distinct embedded system as part of the bike.

Solution in Today's Market

There is no de facto solution for putting a bike on the Internet as of today. There are aspects of an Internet bike ecosystem that a company BitLock has started researching (http://bitlock.co/). BitLock allows for electronic unlocking of a bike within 3ft proximity, but does not support a remote unlock feature or good sharing protocol. Various fitness apps/wearables track activity and surface that information Google Location Services are getting better and google is making more of the information available to the user.

Desired Outcome

This project will: act as a proof of concept for further development in the integration of bikes into

the IoT, provide a service for connecting a bike to the IoT, include an application to demonstrate the service and proof of concept, and solve power and connectivity issues related to an embedded system on a bike.

Initial Project Milestones

Install basic sensors on bike capable of uploading data to database. Gather various metrics, including: GPS location, speed, altitude, and acceleration. We will also create a simple app that is able to retrieve the data and present it in some useful fashion. We will focus on the connectivity and conservation of device's power, and demonstrate this via an application. Specifically, we will: - Solve issues regarding a mobile embedded system - Design within power efficiency constraints - Design within connectivity constraints - Install additional sensors to gather data about data about the bike and rider's environment - Create a service to host information gathered from the bike - Collect and interpret location data - Collect and interpret sensor data - Share data between service and web - Take into account the following design constraints: - Security - Cost - Ease of Use - Create an app to demonstrate created service and add additional functionality, based on the following open ended examples: - Bike Sharing - App Suggestions - Theft Detection - Find my Bike - Bike activity/fitness tracker

Stretch goals

Ideally, we hope to create several applications that build upon the SmartBike platform and showcase the enormous potential of such a system. Additional app development for demonstration may build off the following design ideas:

- Bike Sharing
- Peer to Peer (Ex. LTE Direct or through carrier)
- Further sensor integration

Team Strategy

In order to achieve our goals, we will adhere to the following strategy while designing and building our product:

1. Break down the project from the 3 stages we have outlined into purposeful tasks that fit into 2 week sprints.
2. Investigate, evaluate and integrate technologies needed for our design.
3. Intermittent pull-requests for each iteration as well as the integration of unit tests.
4. Re-evaluate our progress at regular intervals, making changes as needed.
5. Be flexible!

We will be utilizing the Agile/Scrum process model to achieve our milestones. This will include a daily scrum "standing meeting" via Google Hangouts or after class, as well as a weekly meeting with our mentor to keep him updated. We have set up a Pivotal Tracker project to act as a virtual

scrum board and a Github repository to store our code and meeting minutes. Our main mode of communication is a Slack domain that allows us contact via multiple channels and lets us directly embed services like Google Documents into the threads. These tools will coordinate our team and help us set up a productive Agile model.

Technologies

Through our initial research into the implementation of our product, we compiled a mutable list of technologies that we expect to explore and utilize:

- Carrier enabled phone to prototype bike embedded system.
- Parse Platform(Backend) as a System
- Google Location Services API or similar to get location of devices
- External sensors to feed information to embedded system
- Android application to utilize information from service