CS590BD Big Data Analytics and Apps

Project : CyFit
A Bike activity Tracker

Project Goal and Objectives

Motivation

2014 is said to be the year of wearable tech, Tech Giants are already teasing us with their next big product be it Android's wear smartwatch, most rumoured iWatch etc. and services like Google Fit, Apple Health kit. Other tech wearable Google glass is already here.

The wearables which are already in market by solo startups are smartwatch like pebble, fitness trackers like fitbit, misfit shine etc.

Significance

The average human keeps track of all his financial activities of what is he earning, how much is spending throughs his Banking App on smartphone or bank statements. Even we students keep track of academic activities and the great grades we score !.

But Not many track their own body's health status or what's getting in or out and their physical activities. In past few years fitness activity trackers have picked the pace and many started using them, But most them are just pedometers and don't track other activities such as Cycling, Swimming, Gym activities. One has to manually keep log of them.

And as far as cycling activity is concerned there are Mobile Apps (like RunKeeper) which track activity based on GPS location, but they are error prone and Speed measured is always not correct. And Cyclocomputers in market, they are only good to display data, you dont have option to sync or download data to some service.

So, we are with this Project to Seamlessly track and log cycling activity and we are prototyping this idea with the TI Sensor Tag.

Objectives

Track and Log cycling activities and sync with Mobile App in real time.
Calculates

- Cadence
- Altitude, Elevation
- Appends GPS Data to activity

~~*and hopefully we may make an All activity tracker (pedometer functionality)*~~

A Moving Weather Station !. Yes A live moving weather station mounted on cycle or carried with user, from SensorTag.

Offer Data Export to merge with other Activity tracker services to deliver more insights.

System Features

Mobile app and Web Dashboard

Display Speed
Altitude
Compass
Weather Station

Live Bike Ride broadcast on Google Maps for Family and Friends
Live Neighbourhood Weather Data for public

Offer Deep Insights
Actionable Intelligence to deliver personalized suggestions (*to get better at activities*)

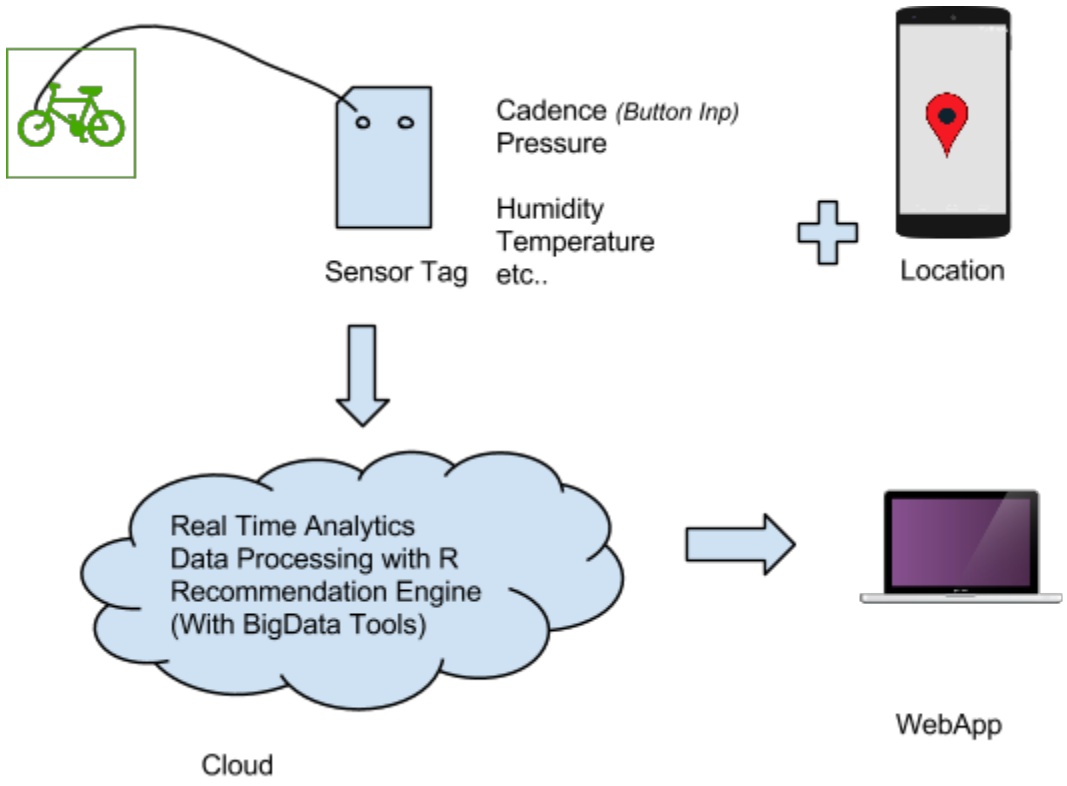
Expected
~~Food Logger service~~
~~Pedometer~~

Activity Recognition Scenario and Data Collection

Devices/Sensors

1. A cadence sensor attached to TI sensor Tag Button Input (A Small Hack)
2. Pressure Data service from SensorTag
3. GPS Sensor from Mobile
4. Whole Array of Sensors from SensorTag

Data Collection



Motion/Activity Model

Data Model

Primary Activity

Polling rate will about a Sec

TimeStamp	RPM	Altitude form Sea Level (Pressure service)	GPS Co-ords

Weather Station

Polling rate be will Low (maybe 30-60 Secs)

Timestamp	GPS Co-ords	Pressure	Humidity	Temperature	Ambient Light

Analytical Tasks

Data in real time is sent to the cloud and stored in HBASE, Data analysis is performed using statistical tools such as R.

Here we do Data wrangling and analysis and Derive derive insights for Primary activity done, such as Performance score, calories spent etc. and store them in Hbase.

The recommendation engine recommends how to improve performance, a better diet plan form a knowledge base.

The weather data with GPS data is just pushed to cloud and stored and Published to Web Service which will be an Civic Weather Forecast. By more richer data and insights can be offered in addition to official forecast.

Design of Mobile Client

Features, Styles, Technologies, GUI

A Tabbed view with

- MainActivity has a selectable Analog or digital Speedometer and Maximum Speed
- A Summary Report
- Food Logger

Mobile Client Technologies - The Mobile client communicates with an REST API and all others are standard ones which are supported by API 19