Real-time Traffic Tracking Sensor Web System

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document will be updated by the instructor when necessary

In this project, we will develop a real-time traffic tracking sensor web system. Such a system can leverage smart phone platform and its sensors (such as GPS, accelerometer and compass) to track real-time traffic situations and report to a sensor web database. The crowd-sourced data can then be visualized in Google maps (like the traffic map overlay on Google map).

The project can be partitioned into three milestones. If you do it alone, you must finish milestone 1; if your team has two members, you must finish milestone 1, and 2 or 3; if your team has three members, you must finish milestone 1, 2 and 3.

1. Milestone 1
    - Phone tracks car location with GPS and calculate speed (note that speed calculation is tricky)
        - If GPS signal is blocked, then discard data.
    - Phone periodically uploads location and speed records with timestamp to online database (Google's App Engine service for the online database).
        - If there is no data connection, then the data shall be buffered locally.
    - Online database server manages merging similar records, removing outdated records and compute route speed
    - Phone downloads speed records from server and visualize them on map view as colored dots
        - Google API: https://developers.google.com/maps/documentation/android/tileoverlay
        - Phone should only download records within the area displayed by the map
2. Milestone 2
    - Combine with phone compass or other information to identify the turn point of path
        - Identifying turning point is critical for speed calculation in local roads.
    - Displays weekly archived traffic data in google maps – user can inquire the archived traffic condition at certain historical time and day of a week.
        - Tab controller to switch between a live map and archived data map.
        - Sliding bar that allows user to slide the time and day (such as 1PM Monday) to see the achieved traffic data.
3. Milestone 3
    - Combine accelerometer information to determine walking/sitting/driving state and do not upload data from someone who carries the smart phone while walking or biking. Refer: http://www.cis.fordham.edu/wisdm/includes/files/sensorKDD-2010.pdf
    - Phones could also form ad hoc network through its wifi or bluetooth to exchange the traffic information, so that phones without Internet link can also exchange and get local traffic information. Refer: https://github.com/monk-dot/SPAN

You will need to do a middle and final demo & presentation and submit a project report in the end. It is highly encouraged for the communication between teams to unify the database fields so that the data can be shared and merged later to visualize the big metro area traffic maps of Atlanta.

Similar commercial system is available at https://www.waze.com/ and http://geoawesomeness.com/google-maps-starts-using-waze-traffic-crowd-sourced-data/.
An exemplary design and analysis can also be found at http://infolab.usc.edu/DocsDemos/Penny_GIS13.pdf.