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Crowdsourced Road Structure Condition Data

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CROWDSOURCED ROAD STRUCTURE CONDITION DATA

ABSTRACT

A system and method are disclosed for developing an accurate and free system for providing data on road structure conditions and to let users know what obstacles drivers encounter along their ride. The accelerometer data from multiple smartphones mounted on vehicles traveling along a road is fed back to data centers. The vibration data of dash mounted phones are identified, possible potholes are detected as peaks in the accelerometer data and registered with the user's location. The location of the device is derived from the current system of combining GPS, Wifi and Bluetooth data to identify precise location. Data from thousands of users are merged, to create a heat map that provides the city and drivers, information about the best/worst roads and potholes/bumps along the way. Cities could use this data to know how to use their resources better and users could plan their route for comfort or safety.

BACKGROUND

Potholes and badly structured roads damage vehicles. Information about the condition of the roads could help users to keep off the damaged roads. It is hard for a city to map out data about potholes and deteriorated roads over time. Also, surveying road structure conditions can be expensive and incomplete. Hence data on road conditions could be collected from users as they drive. This disclosure works towards providing data on road structure conditions and to develop a system for providing users a smoother ride.

DESCRIPTION

A system and method for providing data on road structure conditions by users traveling on vehicles riding along the road. The objective is to develop an accurate and free system to let users know what obstacles drivers would encounter along their ride. The system includes phones

that are fixed to the car with a dash mount as illustrated in FIG. 1 or in a cup holder. The system captures aggregate user data from a large number of drivers' devices while driving using a cloud-based server as illustrated in FIG. 2.



FIG. 1: Smartphone fixed to a car with a dash mount

The method of aggregating road structure data is illustrated in FIG. 3. In step A, the accelerometer data from multiple smartphones mounted on vehicles travelling along roads are fed back to the data centers as shown in FIG. 2. In step B, the vibration data of dashboard mounted smartphones are identified and retained while the handheld device data are filtered out. A still accelerometer pattern indicates that the phone is not held by a passenger, and if this is not found, the data is ignored. In step C possible potholes are detected as peaks and are registered with the users' location derived from the current system of combining GPS, Wifi and Bluetooth data to identify precise location of a device. The data are aggregated to detect possible potholes and roads in bad structural shape. Data from drivers that sway around a bump is ignored during aggregation against all the others that end up hitting it. In step D data from thousands of users are merged, to create a heat map that provides the city and drivers, information about the best/worst roads and potholes/bumps along the way for reference (step E).

The advantages of this system are that the city could use the map to focus survey groups and to develop an accurate and free system to let users know what obstacles drivers encounter along their ride. Also, cities could use this data to know how to use their road improvement resources better and users could plan their route for comfort or safety.

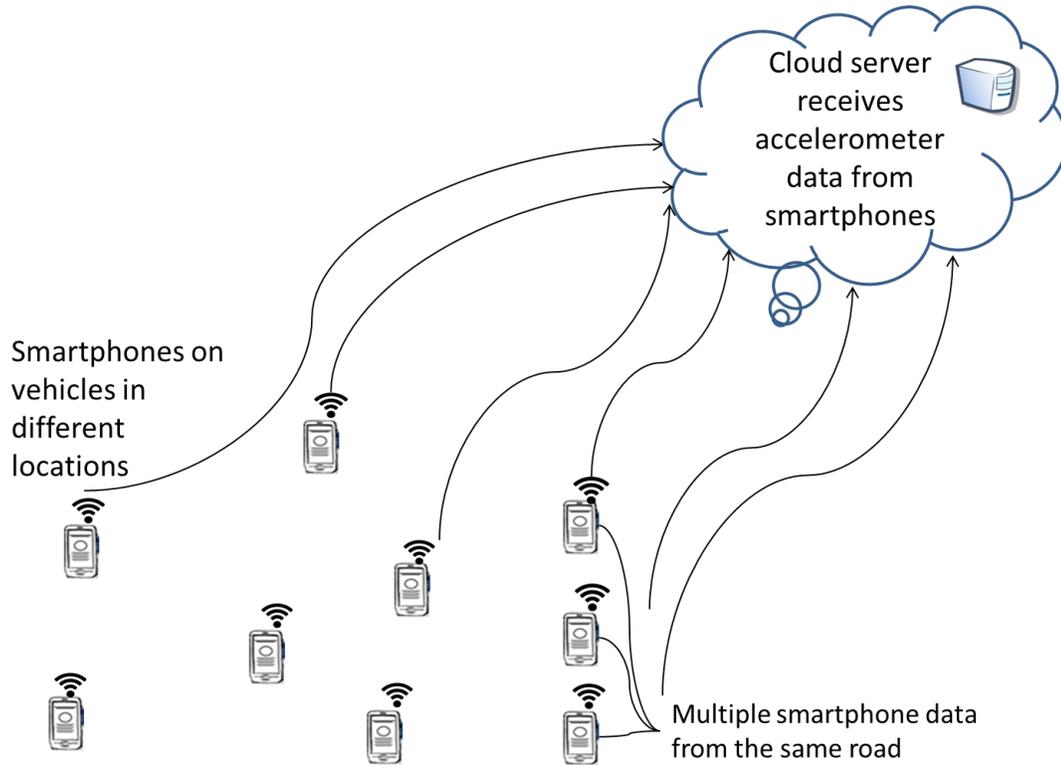


FIG. 2: System for recording road condition data from multiple smartphone inputs

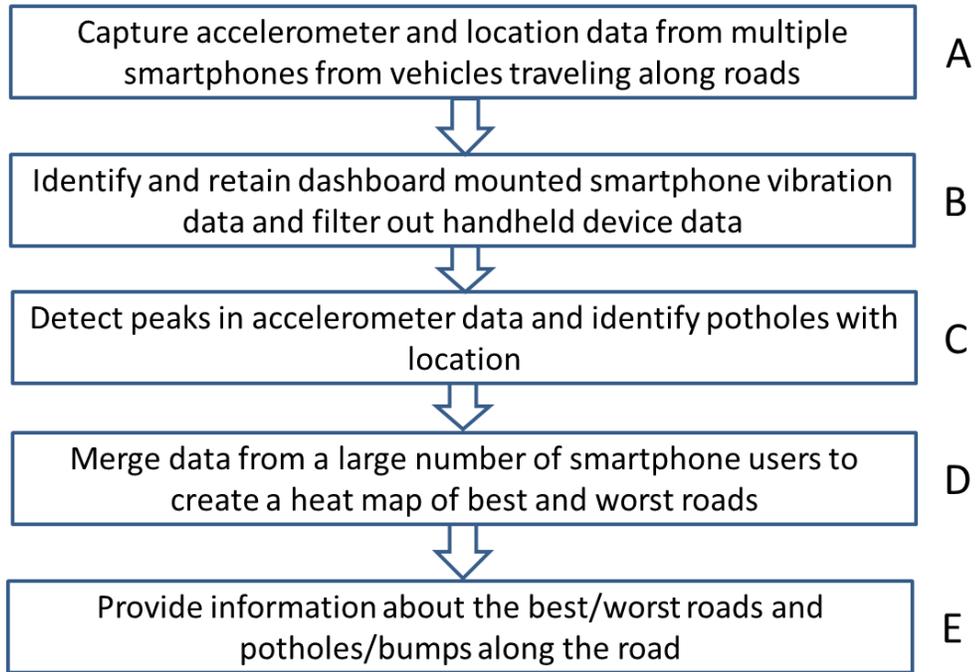


FIG. 3: Method of aggregating and providing road condition information