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ANKIT PATEL

*An Efficient Location Information Management System (LIMS)
For Smartphone Applications*

Abstract

In recent years, location information is commonly used in context-aware, social networking applications and pervasive systems. These applications and systems may require knowledge of the current location of users, devices, and services. Although location information exits in traditional computing environments, the greatest potential of location information is in a smartphone-pervasive computing environment where users enjoy unrestricted mobility and ubiquitous information access. All the mobile devices that contain a global positioning system (GPS) receiver generate sensor events in response to changes in position. The rate at which sensor events are generated is as high as 120 transactions/ minute. The volume of data generated by repeatedly querying location information results in a need for a location information management system (LIMS).

This thesis presents a LIMS that is able to gather, process, and manage GPS information from an Android application executing on a mobile device. The LIMS presented in this work efficiently stores large amounts of data and allows users to visualize aggregated GPS information garnered from multiple nearby users within a 50 meter radius. The proposed LIMS provides an effective database system that can accommodate 10,000 users, each transmitting GPS coordinates at a frequency of 2 transactions/ second. The system scales to the complexity of context-aware applications, to a variety of location sensors and users, and to multiple geographic regions. The LIMS developed from this work provides timely and reliable location information that can facilitate mobile social networking applications. We also explore a positioning algorithm, which provides a general approach to optimize location accuracy for Android social networking applications. We also analyze the power consumption of GPS to get location information by a smartphone.

Thesis Committee

Carl Eckberg, Thesis Chair, Department of Computer Science
Christopher Paolini, Department of Computer Science
Mahasweta Sarkar, Department of Electrical and Computer Engineering