

Personalized Awareness and Safety with Mobile Phones as Sources and Sinks

Anna Yu, Athanasios Bamis, Dimitrios Lymberopoulos, Thiago Teixeira and Andreas Savvides
Embedded Networks and Applications Lab
Electrical Engineering Department
Yale University, New Haven, CT 06520
Email: {firstname.lastname}@yale.edu

Abstract

Today's mobile phones are equipped with an increasing set of sensors including GPS, accelerometers, cameras, and more that makes them ideal source nodes in urban sensing applications. The growing displays and internet connectivity also makes these phones excellent sinks of just-in-time information, including information from other sensors deployed in the infrastructure. Exploiting these features, our personalized safety and awareness system tries to enhance personal safety of users around the clock through a collection of services that process personal and aggregate community data to track, escort, flag, supervise behaviors and help users coordinate to enhance the collective safety of the group. Designed for individuals and groups that operate on campuses and beyond, it intends to make campuses safer, by going beyond the processing of individual location data and by providing services based on the application of intelligent behavior sensing algorithms and collaborative models to aggregate sensor data.

I. INTRODUCTION

Most campus security plans consist of scattered emergency phones, scheduled shuttles, and foot or vehicle escorts, but such plans are not always very effective with rising student population numbers and sudden spikes in localized security demand. Moreover, many campus security implementations are unreliable and unable to meet the needs of busy individuals. Confusing timetables, unclear pick-up locations, and limited hours of service discourage many people from actually using campus security services. To compound this problem, many people hesitate to call for a security escort out of embarrassment, or false beliefs that they are immune to danger. To address some of these challenges, our system takes a broader view to personal safety, leveraging GPS mobile phones and social networking to introduce dynamic safety practices. Our system provides user customizable activity monitoring that begins to form the basic virtual escort tracking for small trips on foot, longer term tracking during travels, and escalates up to model-driven activity monitoring and community based coordination for safety. Instead of focusing on security and privacy issues our research is directed towards the creation of semantic meaning from the sensor data, particularly reasoning with user locations in time and space, also using context information extracted from maps. Privacy issues are implicitly handled by exploiting the phones' local processing capabilities, provisioning for the use of security and privacy from other researchers [8] and by operating in community mode where users are willing to share some level of private information in aggregate form with other members of the community to enhance community-wide safety.

In this position paper we describe a personal safety and awareness framework that is currently being developed as part of the Behavior-Scope (BScope) project at Yale [1]. This is centered on the use of smartphones as sources and sinks of information and involves coordination among multiple phones as well as other sensors deployed in the environment. The mobile phones coordinate with a central server to provide a set of services to the users. For instance, when walking across campus, users can put their mobile phone client application in a virtual escort mode. This service provides a panic button option and tracks the travel progress of the user to ensure that the user safely reached the intended destination. During longer trips, a travel service sends automatic emails and text messages to family and friends providing updates about the trip. For more general personal safety, the phone also learns the daily routines of the user and notifies a set of registered recipients at different levels of behavior deviations. Finally, a set of aggregate location information and inputs from campus security are used to coordinate the movements of users

