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A Survey Onsherlock: Micro-Environment Sensing For Smart Phones

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ABSTRACT: Nowadays, Context-awareness is getting very important for mobile and pervasive applications on smartphones. Whereas human-centric contexts have been deeply researched, few attempts have studied from phones. We consider such immediate surroundings as micro-environment, usually several to a dozen of centimeters, around a phone. In this study, we design and implement Sherlock, a micro-environment sensing platform that automatically records sensor data and characterizes the micro-environment of smartphones. The platform runs as a daemon process on a smartphone and provides finer-grained environment information to upper layer applications via programming interfaces. As a long-term running middleware, Sherlock considers both energy consumption and security. We develop Sherlock on Android OS and systematically evaluate its performance with data collected on fifteen scenarios during three weeks. The preliminary results show that by using Sherlock we can achieve low energy cost, rapid system deployment, and competitive sensing accuracy.

KEYWORDS: Context-Awareness, pervasive applications, micro-environment, energy consumption, security.

LINTRODUCTION

In our mobile all the sensors are continuously broadcasting the data. We are going to make use of that data by reading and converting it into ASCII format. We will develop various applications using that data for security as well as for saving the battery of mobile. The sensors which we are going to use in our project are Accelerometer, Light, Pressure, Proximity etc. For example, if we keep our mobile phone in a bag or pocket, it is useless to light up the screen when a phone call is coming. In addition, if a phone is kept on a sofa rather than on a desk, it is better to turn up ring volume to avoid missing calls. We will be developing different applications using mobile sensors data:

1. Automatic Call Acceptance
2. Security using pressure sensor
3. Mobile location and thief detection using GPS sensor
4. Process Killer using environment sensor to save battery
5. No light when in closed environment
6. No vibrations when on soft surface
7. Morse code message sensing using flash sensor

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II. LITERATURE REVIEW

In previous papers studied, we can clearly see that all the papers target application on a single sensor. They are making one application by making the use of data broadcasted by sensor. This application will consume more battery as it has to run continuously. They have not made any supportive application to save the battery. In our paper, we are developing many applications which come under security and optimization domain. Our project consists of different modules like automatic call picker, pressure sensor used for security, GPS sensor to trace the location when wrong pattern entered, Soft surface detection in order to activate the ringer mode, Closed environment identification for battery saving purpose etc. We are using multiple sensors in this project so we need to write different parsers for each sensor we are using. We are taking care of battery optimization also in this project to make it more efficient.

Sherlock, a micro-environment sensing platform that automatically records sensor hints and characterizes the micro-environment of smart phones. The platform runs as a daemon process on a smart phone and provides finer-grained environment information to upper layer applications via programming interfaces. Sherlock is a unified framework covering the major cases of phone usage, placement, attitude, and interaction in practical uses with complicated user habits. As a long-term running middleware, Sherlock considers both energy consumption and user friendship. We prototype Sherlock on Android OS and systematically evaluate its performance with data collected on fifteen scenarios during three weeks. The preliminary results show that Sherlock achieves low energy cost, rapid system deployment, and competitive sensing accuracy.

The sensors which we are going to use in our application are Accelerometer, Vibrator, Touch Screen, Camera, Gyroscope, Proximity etc. If a mobile phone is in a bag or pocket, it is useless to light up the screen when a phone call is coming. In addition, if a phone is placed on a sofa rather than on a desk, it is better to turn up ring volume to avoid missing calls. Given accurate micro-environment information, a phone can adapt its behavior automatically and properly.

Local Placement Recognition: This module determines daily on-body phone placements such as in-hand, in-pocket, in-bag, etc. Sherlock provides a simple yet effective classification scheme with light and inertial sensors. Specifically, the system first detects whether the phone is in hand by referring ambient illuminative conditions around the phone. If not, then, Sherlock characterizes the unique moving patterns of phones in different local placements with in-built accelerometer, by exploiting a Dynamic Time Warping (DTW) based time series matching scheme to recognize the specific local placement.

Phone Interaction Detection: This module identifies whether the user is actually using the phone, like browsing. Although such interaction often occurs when the phone is in-hand, the phone interaction detection module emphasizes more on the semantic perspective. Sherlock exploits common screen-lock on smart phones and process transition on OS to identify whether the user is actually interacting with his phone.

Backing Material Detection: This module differentiates hard/soft material via smart phone-generated vibration patterns. Sherlock focuses on two aspects of the vibration patterns: 1) the phone's mechanical motion and 2) the acoustical features, which can be captured by embedded accelerometer and microphone, respectively. To this end, Sherlock extracts a series of lightweight features from acceleration/acoustic traces in both time and frequency domain, and classifies backing materials like leather chair, wood desk or glass table.

We develop a simple yet effective local placement classification scheme with light and inertial sensors. The key insights are twofold.

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- When carried by a user, the phone is mostly placed in either semi-closed/open environments like in-hand, or closed environments such as in-pocket and in-bag. The extent of covering leads to different illuminative conditions for the phone, which can be captured by its built-in camera.
- Different local surroundings offer distinctive spatial degree of freedom, which is magnified when the user is moving. For instance, a phone is likely to experience fiercer movements when put in pants than inside a handbag. These unique movement patterns can be perceived by the accelerometer.

Intuitively, the 'in-hand' state differs from on-body placements in that the phone is not completely covered by surrounding objects. Although the front-mounted proximity sensor can perceive sheltering in front, the phone is unaware of that backwards. Thus with proximity sensor alone, it is likely to miss some 'in-hand' cases, e.g., when the user is making a phone call with his ear covers the front end of the phone. Therefore we also employ the back-mounted camera for proximity perception backwards. The rationale is that the global contrast of a photo taken in a closed environment is usually low, which is reflected in the grayscale histogram of the photo.

Hence, our paper is better than other papers as it combines the data from multiple sensors and makes applications based on them. We also took care of battery life of mobile in our application.

IV. CONCLUSION

We present the design, implementation and evaluation of Sherlock, a simple yet practical platform for micro-environment sensing for smartphones via collaboration among built-in sensors. The platform automatically collects sensor hints and characterizes the immediate surroundings of smartphones at centimeter level accuracy, providing fine-grained environment information to upper layer applications. We conduct comprehensive experiments to evaluate our system through a prototype implementation on Android platform. Preliminary experiment results show that by using Sherlock we can achieve low energy cost, rapid system deployment, and competitive sensing accuracy.

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