

Sherlock: Monitoring sensor broadcasted data to optimize mobile environment

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Abstract— Rich-sensor Smartphones have made possible the recent birth of the mobile sensing research area as part of ubiquitous sensing which integrates other areas such as wireless sensor networks and web sensing. The object of sensing can be people-centered or environment-centered. The sensing domain can be home, urban, vehicular etc. Now there are barriers that limit the social acceptance of mobile sensing systems. Several technical barriers are phone energy savings and the variety of sensors and software for their management. In this article, we design and implement Sherlock technology, which captures a micro-environment through sensors and automatically records sensor hints and optimize the micro-environment of smartphones. We refer to such immediate surroundings as micro-environment, usually several to a dozen of centimeters, around a phone. The platform runs as a daemon process on a smartphone 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. The main objective is to save battery in mobile sensing systems and provides security.

Key words: Sherlock, broadcasted data, Proximity Sensor, web sensing, micro-environment of smartphones

I. INTRODUCTION

Now days the use of mobile phone is increasing rapidly. According to the version of mobile different sensors are inbuilt. The smartphone has many inbuilt sensors like GPS, Proximity, Accelerometer, Gyroscope, Magnetic etc. using this sensors we develop many applications for different purpose. In Smartphone sensors continuously broadcasted data. We will be developing various applications using that data for security as well as for saving the battery of mobile. Sherlock is a unified framework covering the major cases of phone usage, placement, attitude, and interaction in practical uses with complicated user habits. We prototype Sherlock on Android OS and systematically evaluate its performance with data collected. Sherlock achieves low energy cost, rapid system deployment, and competitive sensing accuracy. Sherlock runs as a daemon process. Most context-sensible applications are human-centric, recognizing contexts from users point of view e.g., indoor/outdoor, at home/in office, driving/walking. Such information provide services according to user situation. For example, 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. when a mobile phone detects if its user is holding it in hand for safety. When a user enters a building, it is unnecessary to keep his phone's GPS working to save energy.

II. INTRODUCTION TO SMART PHONE

Smartphone has open operating systems, such as Palm OS, Windows Mobile, Symbian, and Linux and scalable hardware-software multi-function. Mobile phones and other wireless devices are becoming increasingly popular and that world expanded tremendously. With the development of information technology, smartphones have become the mainstream in the mobile market and have gradually occupied the market steadily. For getting new features traditional phones are replaced by Smart phones.

Smartphone has several advantages over the traditional mobile phones:

- Keep full functionality of the traditional mobile phones (e.g. phone conversation, text message and so on).
- With the ability of plugging into the Internet.
- It is a kind of cell phone which includes personal information manager, schedule control, multimedia application and internet connection.

A. Android features

- Reuse and replacement of components
- Dalvik virtual machine
- Integrated browser
- Optimized graphics
- Media support
- GSM Telephony
- Bluetooth, EDGE, 3G, and WiFi.

III. PROPOSED SYSTEM

A. System Overview:

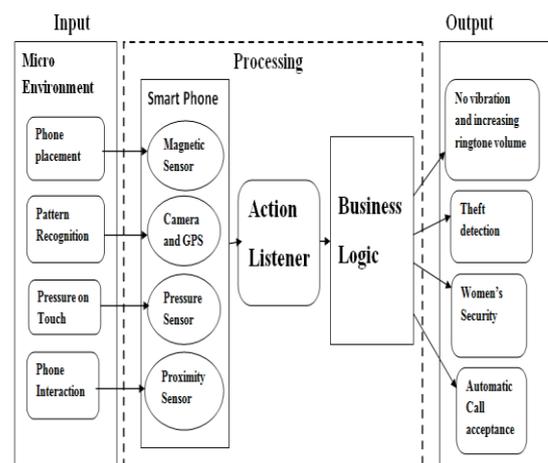


Fig 1: Block Diagram

1) Input:

Microenvironment also known as a microhabitat, a very small, specific area in a habitat, distinguished from its immediate surroundings by factors such as the amount of incident light, the degree of moisture, and the range of

temperatures. In our system there are different micro-environments such as phone placement, pattern recognition, pressure on touch screen, phone interaction etc. are sensing by sensors.

2) *Processing:*

There are 3 steps

- Smart phone sensors
- Action listener
- Business Logic

Smart phone which contains many built in sensors these sensors are Magnetic sensor, Camera and GPS, Pressure sensor, Proximity sensor etc. These sensors sense the provided input environment and sends sensing data to Action listener which triggers actions. These actions are processing in Business Logic. Applications extract data from business logic and generate output according to applications.

3) *Output:*

From the input and processing blocks various applications will be generated such as No vibration and increasing ringtone volume, Theft detection, Women's security and Automatic call acceptance.

B. *System Architecture:*

Hardware layer is lower layer. It consists of all sensors which are used in Smartphone. There are different types of sensors like Accelerometer, Camera, Proximity, Gyroscope etc. The sensor continuously broadcast the data and captures the mobile environment and gives captured data as input to upper layer i.e. middleware layer. According to the data received from the hardware layer it detects the behavior of the user and performs action accordingly.

There are two types of detection.

- Phone Placement:- This detection detects the placement of the mobile. It detects where the mobile is placed in hand, in pocket, on desk etc.
- Phone interaction detection:- This detection detects whether the user is interacting or not. The interaction can be receiving call, browsing.
- Backing material detection:-This detection detects the backing material of the phone where it is placed. The material can be glass, wood, leather.

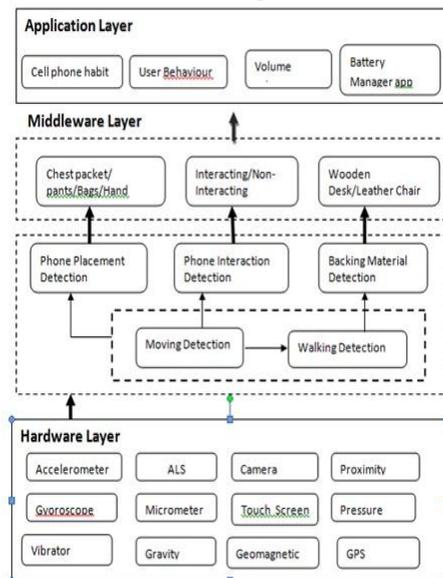


Fig 2: System Architecture

According to detection pattern output from the middleware layer is given as input to upper layer i.e. application layer. From the input the application layer performs the actions.

C. *Sensors:*

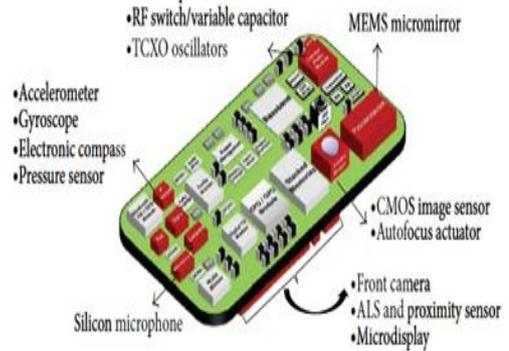


Fig 3: Sensors inside smartphone

D. *Introduction to Sensors:*

Since the beginning of race in mobile communication, a new model is being launched every day into the world with different features. These new features and specifications gain enough fame of users to survive in the competition of mobile technology. Today different manufacturers like Samsung, Apple, Sony, HTC and many more manufactures of smartphones and became competitors. One of the features that attract the mobile phone buyer is the smart work it does. Different types of sensors like accelerometer, ambient light sensor, GPS sensor, compass, proximity sensor, pressure sensor, gyroscope etc are behind these smartphones. Let us understand how each sensor works with respect to its operating principle.

1) *Proximity Sensor:*

The main function of this proximity sensor is to detect how close your smartphone's screen is to your body. When you use your smartphone, it detects the position of ear with respect to screen and turns off the light of screen and saves battery. Also proximity sensor stops the accidental touch, unwanted input during talk. These sensors also detect the signal strength, interference sources and amplify or filter by use of Beam Forming Technique.

2) *GPS (Global Positioning System) sensor:*

GPS short form of Global Positioning System, originally developed and setup for military operations and was made available for everyone in 1980s by Government. GPS is a system which tracks the target or 'navigate' the things by map or picture with the help of GPS satellites. Nowadays smartphones come with assisted GPS or A-GPS which does the same work with the help of intermediate server in case of disconnection with main GPS satellite.

3) *Ambient Light Sensor:*

This sensor optimizes the light of screen when it exposed to normal light with different intensity. Ultimate function of ambient light sensor is to adjust the display brightness, which at the end saves the battery power and life too.

4) *Accelerometer*

The main function of *accelerometer* is to sense the changes in the orientation of *smartphone* with respect to datum and adjust the orientation to suits the viewing angle of operator. For example, when you are looking for web-page with

increased width, you can get this landscape view from changing the orientation of phone to horizontal.

5) *Gyros or Gyroscope:*

This *sensor's* function is to maintain and control the position, level or orientation based on the principle of angular momentum. When '*Gyros*' used along with *accelerometer* senses motion from six axes i.e. right, left, up, down, forward and backward. It also detects the roll, pitch and yaw motions. Yaw, Roll and Pitch are the angular moments seen from three axes i.e. X, Y and Z.

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