DroidSense - Micro Environment Sensing for Smartphones

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Abstract— Smartphones with embedded sensors have provided a new platform for activity monitoring. These sensors are not only used for smartphone feature enhancement but now are being used for various other applications. This approach takes into consideration the Micro environment of the smartphone and the possibilities of enhancing the use of the embedded sensors in order to reduce human interaction with the smartphone. Micro environment of a smartphone can be referred to attributes from several inches around the smartphone such as light, sound, touch, etc. In this work, we created a smartphone application which records sensor hints from the smartphone's sensor array and provide feedback without requiring any human interaction. We have implemented various classifiers in the app performing at an average true positive rates of greater than 85%. We have taken into consideration smartphone energy consumption and user friendliness.
Keywords- *Context awareness, micro-environment, off hook, RAM, GPS.*

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I. INTRODUCTION

In mobile systems, context-awareness is a computing technology that incorporates information about the current environment of a mobile user to provide more relevant services to the user. It is a key component of ubiquitous or pervasive computing and has attracted many research efforts in the past decade. Most context-aware applications are human-centric, recognizing contexts from users perspective (e.g., indoor/outdoor, at home/in office, driving/walking). Such information supports services according to user's situation. For example, when a mobile phone detects that its user is driving, it automatically blocks phone calls 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. Similarly, Wi-Fi is usually unavailable in the open countryside and should be turned off there. While human-centric contexts have been extensively utilized, few works study from phones perspective. We refer the immediate surroundings (i.e., several to a dozen of centimeters around a phone) as micro-environment. Similar to human-centric environments, being aware of micro-environments is directly beneficial to a broad range of phone applications. 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. So, we design a micro-environment sensing platform that automatically records sensor values and the micro-environment of smart phones The system runs as service to Smartphone and provides environment information to applications via programming interfaces.

II. METHODOLOGY

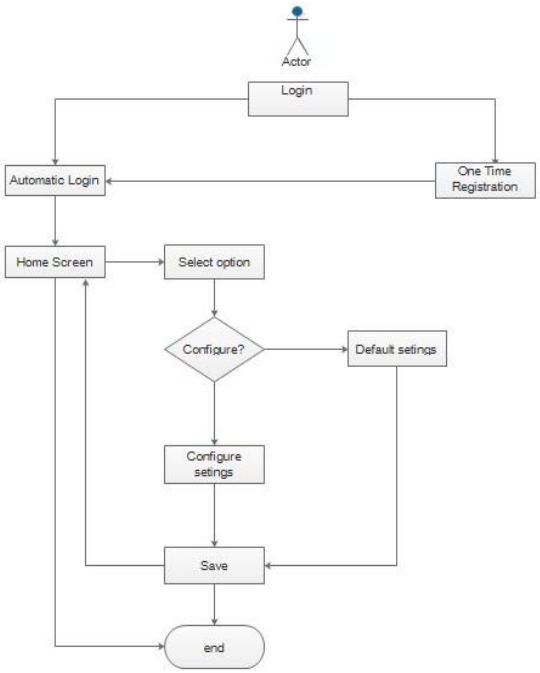

Figure. 1. System Overview

In the DroidSense System you have to first configure all setting. Mobile number for emergency contact ,threshold value for notify system action and touch time for emergency message notification.

If your newly install the system then you have to configure those things otherwise predefined configuration is used by the system, in the system we provided following modules as

Automatic Call Picker-First we check the values of Proximity Sensor. If the change sequence in the value of sensor from Far to near occurs, then the incoming call is automatically picked.

Close Environment Sensor-The screen is set ON or OFF depending on the value of the proximity sensor. The proximity sensor senses whether the Smartphone is in a bag or pocket. If the Smartphone is in the bag or pocket, the battery is being saved.

Noise Alert- The Microphone sensor senses the noise in the surrounding depending on which if the noise crosses a particular threshold value, an SMS is sent to the configured mobile Number with the predefined message.

Process Kill1-When this service is activated, all the background process running is terminated to save Battery.

UnAuthentication Alert-On activating this service, if the screen unlock pattern is entered incorrect, the front camera is activated and a photo is taken. This photo is saved in the internal memory.

III. OUR APPROACH

A. *Automatic call picker*

Automatic call picker featured given to user for providing convenience to pick call in emergency ,rush or where touch screen of phone is not work properly while sticky fingers. Check "near-far-near" sequence it match shows now the right time to pick the call.

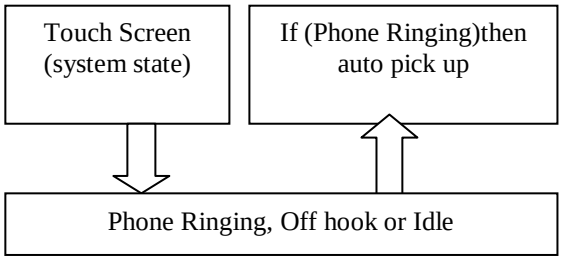

Figure 2. Automatic call picker Control flow

B. *Close environment*

Close environment functionality is mostly focused on battery saving, while phone get call or notification its screen wake up for provide notification received poke to user ,its very good functionality but think about if your phone in your pocket, bag or any close environment where no requirement of lightning the phone screen, there is unnecessarily battery drainage is perform, to reduce such high battery consumption in close environment we just put screen in off state itself.

For detecting close environment just use proximity sensor and most of phone has proximity sensor, "sensor manager "provide sensor value like near and far, so just check near condition if you phone in bag or pocket and call arrived then proximity sensor provide near value because mobile and open environment has in-between obstacle i.e. bag and that instance put phone screen in off state.

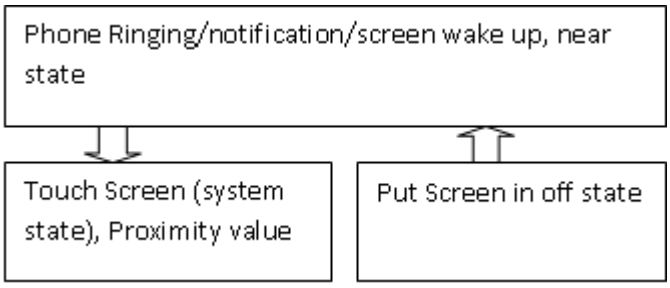

Figure 3. .Close environment Control flow

C. *Noise alert*

Noise alert required where multiple place monitoring is not possible by limited manpower like ICU. In this we use "micro phone" provided in phone, if noise intensity cross the predefined threshold value then just send the required message to predefined phone number. Android Telephony/SMS manager provide you all required operation want to perform by setting permissions.

D. *Process kil*

Process kill is also one of feature provided for increase mobile performance and reduced battery consumption drastically. Hear accelerometer and magnetometer are used. When mobile in steady state and come In more magnetic field than defined value it automatically kill all the running process, as smart phone provide multiple functionality but there is unnecessary app and process place in RAM/system memory which degrade the performance and user experience, by process kill functionality increase performance of Smartphone.

E. *Un-Authentication Alert*

Un-Authentication Alert is functionality mainly provided when your mobile stolen or lost and stranger access your mobile while entering password it fails to enter into mobile that time if he fails more than defined time failure then front camera captures the picture of user and send the current location by using GPS system to the authenticate users linked Account.

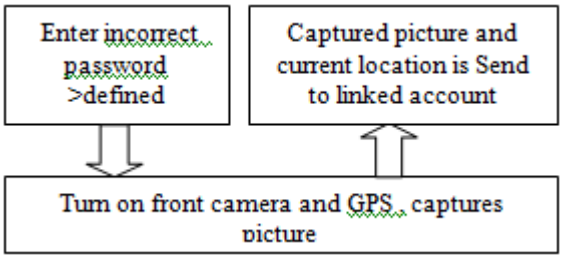

Figure 4. Un-Authentication Alert Control flow

F. *Touch Pressure Emergency Alert*

Touch Pressure Emergency Alert- On activating this service, a panel is shown on the screen. If this panel is touched for a period of time, an emergency is created. The GPS is turned on and the Lat, Long of the place is sent to configured number after regular interval of times.

ISSN: 2321-8169
2954 - 2957

G. Back Surface Detection

Back Surface Detection- Depending on the type of surface the mobile is kept on, the Ringer mode is modified.

H. Wi-fi Webcam

If the two or more devices are connected to the same Network, then the Camera of one device can be used for live streaming and can be seen on other devices.

IV. EXPERIMENTAL RESULTS

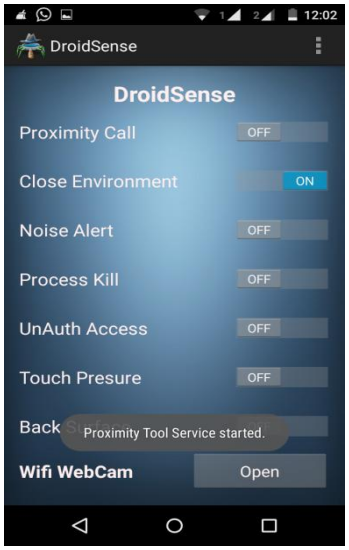

Figure 5. Functional Screen

For required function press activate/on button. As this is services provide, you do not get GUI for the operation at some function.

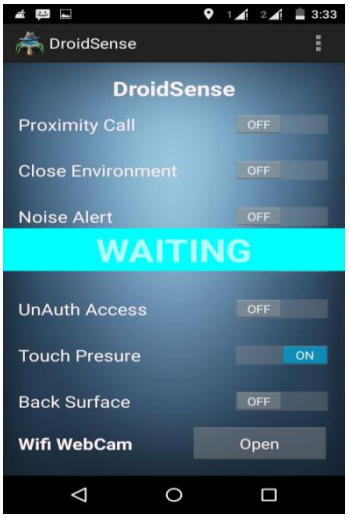

Figure 6 Emergency Screen

You have to press screen at define time interval for perform further operation.

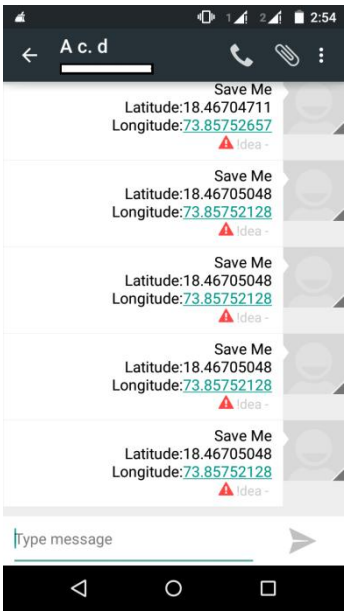

Figure 7 Message delivery screen to reciever

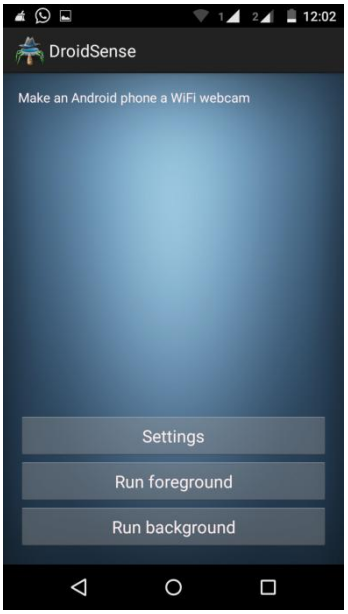

Figure 8 Wi-Fi webcam Screen

In this you can set framerate,camera etc.Foreground option for sender can also view the sending video.Background option perform behind the active screen and visible to reciever only.

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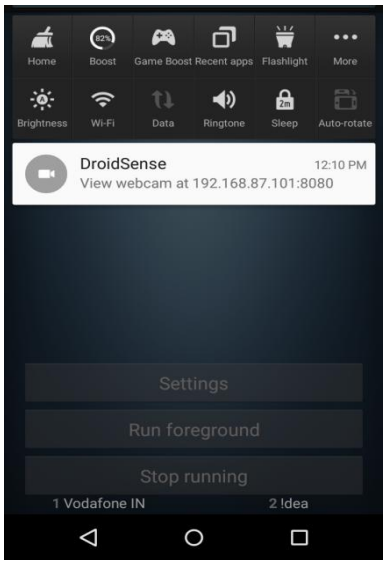

Figure 9 IP assignment Screen

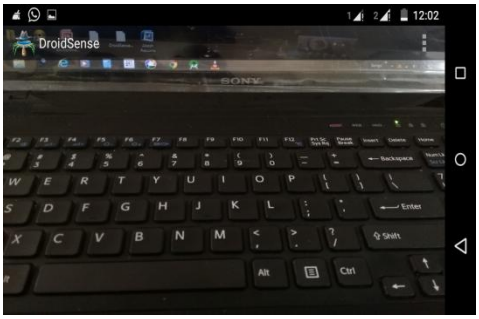

Figure 10 Sender foreground view

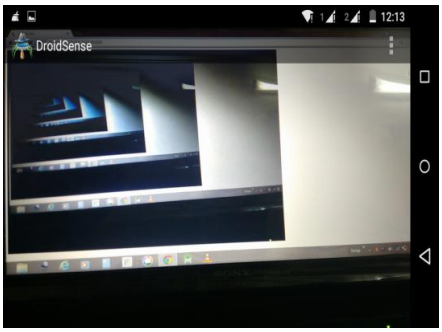

Figure 11 Recevier browser view

Here reciever have to http request by entering ip address and port number provided by sender's in browser.

V. CONCLUSION

In this paper, we present the design and implement the DroidSense, a implemented system for micro-environment sensing for Smartphone by using built-in sensors. The system automatically collects sensor values and detects the environment of Smartphone at good accuracy, providing environment information to applications. We perform near about all possibilities to evaluate our system through a prototype implementation on Android platform. Preliminary experiment results show that DroidSense achieves low energy consumption, rapid system deployment, and better sensing accuracy.

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