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Micro-Environment Sensing for Smartphones

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Abstract — *Context-awareness is getting progressively important for a range of mobile and pervasive applications on nowadays smartphones. Though human-driven settings (e.g., indoor/outdoor, at home/in office, driving/walking) have been widely researched, few attempts have studied from phones' point of view (e.g., on table/couch, in pocket/hand/bag). We refer to such immediate surroundings as micro-environment, normally a few to a dozen of centimeters, around a phone. In this study, we designed and implemented Micro-Environment Sensing for Smartphones, a micro-environment sensing platform that automatically records sensor hints and describes the micro-environment of smartphones. The podium has seriatim as a demigod evolution on a smartphones and gives finer-grained atmosphere material to upper layer applications by means of programming interfaces. Micro-Environment Sensing for Smartphones is a brought together structure covering the significant instances of phone use, situation, disposition, and cooperation in down to earth utilizes with entangled client propensities. As a long-term running middleware, Micro-Environment Sensing for Smartphones considers both vitality utilization and client friendship. We model Micro-Environment Sensing for Smartphones on Android OS and efficiently assess its execution with data gathered on fifteen scenarios amid three weeks. The opening outcomes reveal that Micro-Environment Sensing for Smartphones realizes stumpy liveliness charge, fast system distribution and inexpensive sensing exactness.*

I. INTRODUCTION

The system is completely Base on sensors. It is micro-Environment sensing system built for Android application in which we used number of sensors i.e. Proximity, Microphone, Wi-Fi, Camera, Touch, GPS etc. We used these sensors and developed an android application.

We are living in 21st century which is the century of technology and innovations. Smartphone is one of the examples of innovation made in this century. Today Smartphone's having wide ranges of sensing computation and storage resources. There are several types of sensors as Proximity, Microphone, Wi-Fi, Camera, Touch, GPS etc. We used these sensors and developed an android application.

The notion of micro-environment identifying is erected on both background identifying and context-awareness submissions, yet differs in its importance on noticing instantaneous settings from the Smartphone's outlook. In mobile systems, context-awareness is a totaling knowledge that integrates information about the current environment of a mobile user to provide more relevant services to the user. It is a key component of pervasive or pervasive computing and has attracted many research efforts in the past decade. Most context-aware applications (via mobile phone sensing) are human-centric, recognizing contexts from users' perspective (e.g., indoor/outdoor, at home/in office, driving/walking. Such information supports services according to users' situation.

II. PROBLEM STATEMENT

Now day's mobile phones comes with different sensor. Those sensor provide different output for different scenario. There is absence of application which utilize multiple sensor data and provide better result.

III. LITERATURE REVIEW

1. Touch Sensor Application of Spray Deposited ZnO Films

Author: Shrawan Jha, Xu-Hua Wang, Hendrik Faber

We demonstrate touch sensor application of spray coated Zinc Oxide (ZnO) thin-films with submicron thickness (50-200 nm). The prepared ZnO films are characteristic with a wide optical transmittance window (80% ~ 97%) and a sheet resistance over 1500 ohm/square. The touch sensor was formed using a ZnO thin-film as an electrode attached to an oscillator circuit. The prepared touch sensors produce a significant change of the oscillation frequency in response to touch by human figure to ZnO electrodes. Thus feasibility of touch sensor application of spray deposited ZnO films is demonstrated. Thus, ZnO films may have an advantage over the conventional ITO electrodes due to a low cost and large area manufacturing by spray-coating technique.

2. Deep Learning of Semi-supervised Process Data with Hierarchical Extreme Learning Machine and Soft Sensor Application

Author: Le Yao, Zhiqiang Ge

Data-driven soft sensors have been widely utilized in indus-trial processes to estimate the critical quality variables which are intractable to directly measure online through physical devices. Due to the low sampling-rate of quality variables, most of the soft sensors are developed on small number of labeled samples and the large number of unlabeled process data are discarded. The loss of information greatly limits the improvement of quality prediction accuracy. One of the main issues of data-driven soft sensor is to furthest exploit the information contained in all available process data. This paper proposes a semi-supervised deep learning model for soft sensor development based on the hierarchical extreme learning machine (HELM). Firstly, the deep network struc-ture of auto-encoders (AE) is implemented for unsupervised feature extraction with all the process samples. Then extreme learning machine (ELM) is utilized for regression through appending the quality variable. Meanwhile, the manifold regularization method is introduced for semi-supervised model training. The new method can not only deeply extract the information that the data contains, but learn more from the extra unlabeled samples as well. The proposed semi-supervised HELM method is applied in a High-low Transformer to estimate the CO content, which shows a significant improvement of the prediction accuracy, com-pared to traditional methods

3. Weighted linear dynamic system for feature representation and soft sensor application in nonlinear dynamic industrial processes

Author: Xiaofeng Yuan; Yalin Wang; Chunhua Yang; Zhiqiang Ge; Zhihuan Song; Weihua Gui

Industrial process plants are instrumented with a large number of redundant sensors and the measured variables are often contaminated by random noises. Thus, it is significant to discover the general trends of data by latent variable models in the probabilistic framework before soft sensor modeling. However, traditional probabilistic latent variable models like probabilistic principal component analysis (PPCA) are mostly static linear approaches. The process dynamics and nonlinearities have not been well considered. In this paper, a novel weighted linear dynamic system (WLDS) is proposed for nonlinear dynamic feature extraction. In WLDS, two kinds of weights are proposed for local linearization of the nonlinear state evolution and state emission relationships. In this way, a weighted log-likelihood function is designed and expectation-maximization algorithm is then used for parameter estimation. The feasibility and effectiveness of the proposed method is demonstrated on a numerical example and an industrial process application.

4. Microphone-Based Vibration Sensor for UGS Applications

Author: Qianwei Zhou; Baoqing Li; Huawei Liu; Shengyong Chen; Jingchang Huang

To be an ideal candidate, seismic sensor for wireless unattended ground sensor (UGSs) applications should have lightweight, low noise, high sensitivity, and energy efficiency. Typically, to cover regions far from source, the best choice will be the coil-over-magnet geophone. Because it is usually heavier than batteries, a lighter one should replace it to further cut the weight of sensor nodes. However, currently available seismic sensors, such as micro-electro mechanical systems (MEMS) accelerometers and molecular-electronic transducers, cannot do the job since they usually consume too much energy to achieve low noise level as well as high sensitivity. This work has designed and tested a new kind of vibration sensor, the vibration-to-sound geophone, which can convert seismic waves into sound physically that can then be detected by an MEMS microphone. By using a battery as its proof mass, the vibration-to-sound geophone has better sensibility than the coil-over-magnet geophone from 20 to 500 Hz and is about 58 times more sensitive at 70 Hz which is more than 60 dBV/m; is very light, half the weight of the coil one; and consumes no more than 726 μW which is more energy-efficient than MEMS accelerometers and molecular-electronic transducers.

5. Microwave characterization of graphene films for sensor applications

Author: Patrizia Savi; Krishna Naishadham; Simone Quaranta; Mauro Giorcelli; A. Bayat

Graphene is a monolayer of carbon atoms with remarkable electronic and mechanical properties amenable to sensor applications. While the plasmonic nature of graphene at terahertz frequency has been widely reported, investigations on the practical utility of graphene at the microwave frequencies used in wireless sensor nodes are sparse. In this paper, graphene films with different amounts of graphene (12.5 wt%, 25 wt%) are characterized at the microwave frequencies. Dielectric spectroscopy is used to study variation in surface impedance of the film. A simple circuit model of the film based on lumped elements is obtained by fitting the measured scattering parameters with the ADS simulations on graphene loaded microstrip lines.

from -20 to 80 °C. Then, beyond 80 °C, the trend seemed to be reversed. Over the considered temperature range, and at typical bias field of H = 35 A/m, the intrinsic sensitivity varied with a temperature coefficient of 0.4%/°C, while the temperature coefficient of the offset was about 200 nT/K.

IV. SYSTEM ARCHITECTURE

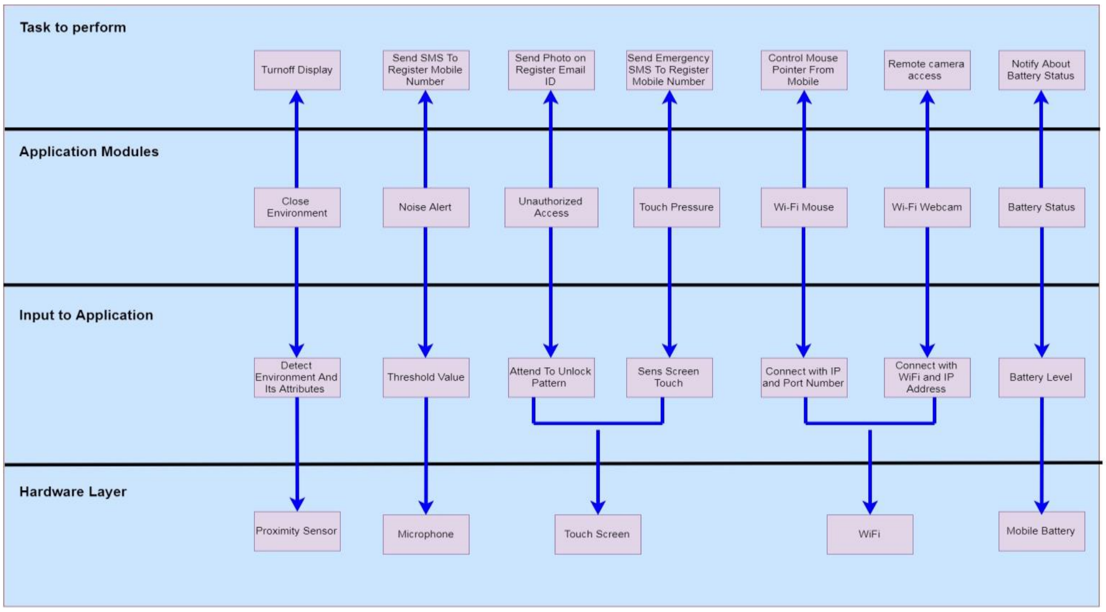

Fig: System Architecture

V. ACHITECTURE EXPLANATION

In close environment mobile screen get off at the time of phone is ringing and phone in pocket or in bag, this is done to saving battery. System use microphone to get sound as input then system automatically check input sound is greater than threshold value or not if input sound is grater then send message to the registered mobile number. When unauthorized user draw wrong pattern or type wrong password greater than 3 times then system take photo and send email with photo and location to registered mail-id. When the user feel unsafe or in danger then user can be immediately inform to preregister mobile number via SMS. User just need to press screen for few seconds. In this module, user can control laptop mouse pointer by using our application. In this module, user can view live camera stream on laptop by using our application. The battery saving module is used to give beep sound when battery charging is completed.

VI. MODULES

- **Close environment**
- **Noise alert**
- **Unauthorized access**
- **Touch pressure**
- **Wi-Fi Mouse**
- **Wi-Fi web cam**
- **Battery status**

Close Environment:
In close environment mobile screen get off at the time of phone is ringing and phone in pocket or in bag, this is done to saving battery.
Noise Alert:
System use microphone to get sound as input then system automatically check input sound is greater than threshold value or not if input sound is greater then send message to the registered mobile number.
Unauthorized Access:
When unauthorized user draw wrong pattern or type wrong password greater than 3 times then system take photo and send email with photo and location to registered mail-id.
Touch Pressure:
When the user feel unsafe or in danger then user can be immediately inform to preregister mobile number via SMS. User just need to press screen for few seconds.
Wi-Fi Mouse:
In this module, user can control laptop mouse pointer by using our application.
Wi-Fi web cam:
In this module, user can view live camera stream on laptop by using our application.
Battery Status:
The battery saving module is used to give beep sound when battery charging is completed.

FLOWCHART:

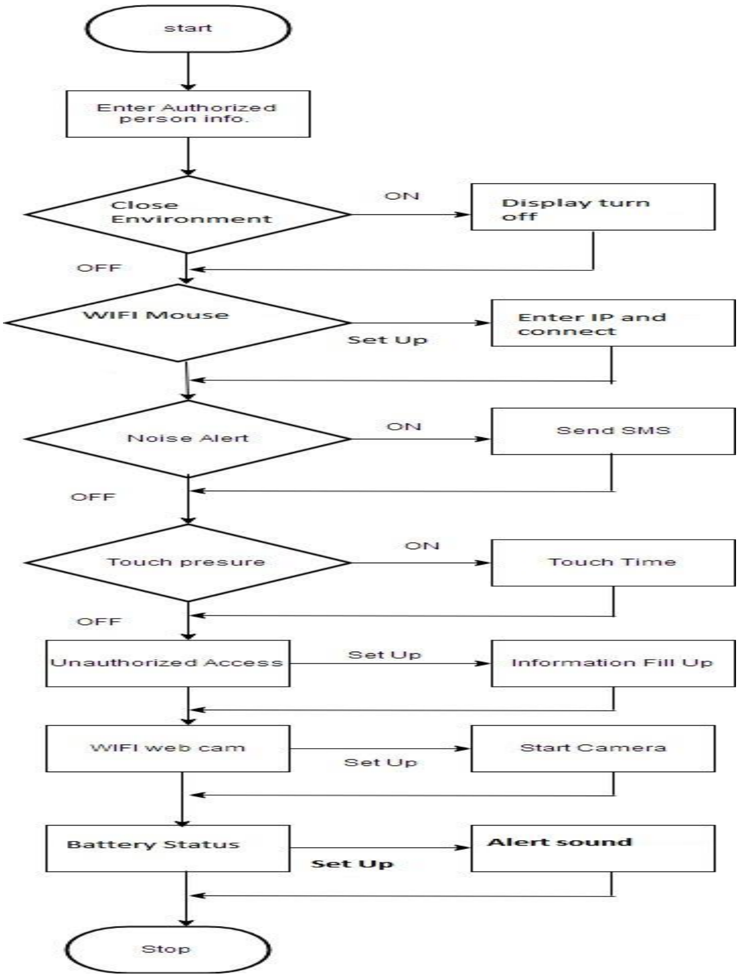

Figure 4.1. Flowchart

C. HARDWARE REQUIREMENT

• System	:	Intel I3 Processor and above.
• Hard Disk	:	20 GB.
• Monitor	:	15 VGA Color.
• Ram	:	4 GB.
• Mobile	:	ANDROID

VII. ADVANTAGES

- Micro-Environment Sensing for Smartphones consumes negligible energy of below 5 percent on average for most sampling periods. With time passing by, the cumulative energy consumption increases gradually and finally ends up with 11.2 percent.

- As we are using multiple sensors in this project so introduced different parsing technique for each sensor we are using on the same time we are taking care of battery optimization.

- The application will result in Competitive Micro-Environment Sensing Accuracy.

- GPS which helps to estimate user's coarse-grained macro-environment but, Sherlock deduces phone's fine-grained micro-environment.

- It serves as a light-weighted middleware for upper layer applications.

VIII. APPLICATION

- To identify sound level in exam hall
- To communicate in emergency situation
- To save battery

IX. CONCLUSION AND FUTURE SCOPE

We present the design, implementation and evaluation based on android, 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 manner broad tryouts to weigh our coordination through a model enactment on Android podium. Maiden experiment results show that Micro-Environment Sensing for Smartphones succeeds low energy cost, rapid system positioning, and inexpensive sensing accuracy.

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