Introduction to Mobile Application with On-Body Sensing Design: Why Desktop Emulators are not enough

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Abstract

This tutorial teaches design principles and implementation techniques for the development of mobile applications involving on-body sensors. The tutorial will focus on four main areas:

- The challenges of designing and prototyping applications for wearable devices

- Using wearable sensors in applications

- Evaluating the application with participants in situ

- Exploring applications of wearable sensors.

Participants will be introduced to Python development on the Motorola *[TLW: E860i]* phone via interactive exercises. The purpose of the exercises is not to teach Python development, but rather to demonstrate the tradeoffs between developing on a mobile device and developing on a desktop emulator or environment. Participants will be exposed to a variety of on body sensors including ones common to mobile devices (GPS, cameras, 3-axis accelerometers, capacitive sensors). Rapid prototyping of mobile games will be used to illustrate design and implementations considerations such as: power consumption, sensor placement, display real-estate, and mobile interaction techniques. Upon completing the tutorial participants will have a better understanding of design considerations, development methods, and evaluation techniques for the development of on-body sensing based applications.

TLW

1 Tutorial Content

- **Objective:** Provide skills to design mobile, on-body sensor applications for wearable devices

- **Audience:** Intermediates/Novices of mobile application development and/or on-body sensing; Python programming skills are not required

- **Outline:**

    – Basics of Application Design and Development for Mobile Platforms

- * Pitfalls of Desktop-Only development
- * Input methods and the impact of mobility/mobile hardware
- * Recognition methods and Accuracy Impedance Matching
- * Output methods and the impact of mobility/mobile hardware
- * Power consumption implications and other hardware limitations
- * Interactive Exercises
- – On-Body Sensing and Mobile Applications
  - * selecting sensors well suited to the application
  - * integration sensors with limited hardware platforms
  - * sensor-body placement
  - * sensor resolution
  - * sensor power consumption and impact on hardware platform
  - * Interactive Exercises
- – Evaluation of the Application, Hardware, and Usability
  - * In Situ evaluations
  - * Overcoming sensor problems with good design
  - * Using multiple hardware platforms for evaluation purposes
  - * Laboratory and "real world" experimental techniques
  - * Interactive Exercises
- – On-Body Sensing Applications
  - * Mobile Gaming
  - * Assistive Technology
  - * Information Capture and analysis

2 Qualifications

Nirmal Patel is currently a Ph.D. student at the Georgia Institute of Technology. His primary research area is rapid prototyping of mobile phone interfaces. Currently, he is working on an introductory course for undergraduates interested in designing applications for mobile phones.

Tracy Westeyn is a Ph.D. student at the Georgia Institute of Technology. Her primary research areas are on-body sensing, wearable computing, and machine learning. Currently, she is researching the use of on-body sensors to support the early diagnosis of children with autism. She has published papers, co-organized a workshop, and co-organized a tutorial pertaining to On-Body sensing at past ISWC conferences. Westeyn is also is a primary author of the Georgia Tech Gesture Toolkit (GT2K), which supports gesture-based research applications.

Valerie Henderson-Summet is currently a Ph.D. student in the College of Computing at the Georgia Institute of Technology. Her areas of specialty are Human-Computer Interaction and Assistive Technology. Her research deals primarily with mobile applications for the Deaf community.