CSS 545

Week 10
Project Presentations

• March 16th and 18th - final project presentation
  • Concept
  • User study
  • Story board
  • Final design
  • Demo of the final app

• Grading
  • Use of mobile technology - Does the app use specific mobile technology elements? 33%
  • Novelty – a scenario different from previous known apps – be creative  33%
  • Richness of the app – How complex is the application, while still maintain a clean, simple feel? 33%

• Bonus – YouTube Video
  • Linked on the course site
  • Link in your resumes

• Submit your source and presentations on the 19th of March
The sensing pipeline

DSPS: Data Stream Processing Systems

Wearable Computing Devices (WCDs)
Wearables (WCDs)

Frequency of wearing WCDs

Figure 2  Frequency of wearing WCDs to which users are accustomed [13] [14]

Pebble

• Customizable, downloadable watchfaces
• Internet-connected apps
• Connects to iPhone and Android using Bluetooth
• Silent vibration to incoming calls, emails and messages.
Features

• Incoming Caller ID
• Email (Gmail or any IMAP email account)
• SMS on both Android and iPhones
• iMessage (iOS only)
• Calendar Alerts
• Facebook Messages
• Twitter
• Weather Alerts
• Silent vibrating alarm and timer

http://getpebble.com/
Microsoft Band

- Microphone
- Touchscreen
- UV sensor
- Action button
- Power button
Features

• Connects over BT/BLE
• HR, exercise, sleep, calorie burn
• Access sensor data on phone
• SMS, email, calendar notifications
• Cortana on your wrist
• AP UI on Band display
• Cross platform

• Sensors
  • Optical heart rate sensor
  • 3-axis accelerometer
  • Gyrometer
  • GPS
  • Ambient light sensor
  • UV sensor
  • Skin temperature sensor
  • Capacitive sensor
  • Galvanic skin response
Smart wrist devices for healthcare
Apple Watch

38mm 18-Karat Yellow Gold Case with Bright Red Modern Buckle

Choose a band size.
Have a sizing question? See the sizing guide

- Small
  135–150mm
- Medium
  145–165mm
- Large
  160–180mm

Requires iPhone 5 or later running the latest version of iOS.

$17,000.00
Add to Cart
Other healthcare technologies

- Smart wheel chair
Smart walker
Smart Shoe
Google Glasses

• Take photos and record 720p HD video
• Touchpad located on the side of Google Glass
• Control device by swiping through a timeline-like interface displayed on the screen
Specs

- Android 4.0.4 and higher
- 640×360 display
- 5-megapixel camera, capable of 720p video recording
- Wi-Fi 802.11b/g
- Bluetooth
- 16GB storage (12 GB available)
- Texas Instruments OMAP 4430 SoC 1.2Ghz Dual(ARMv7)
- 682MB RAM "proc"
- 3 axis gyroscope
- 3 axis accelerometer
- 3 axis magnetometer (compass)
- Ambient light sensing and proximity sensor
- Bone conduction transducer
Privacy Concerns

• Intrusion of privacy

• Recording people without their permission

• Illegal: Legislation in Russia and Ukraine, prohibits use of spy gadgets that can record video, audio or take photographs in an inconspicuous manner

• Some facilities ban use of Google Glass
Microsoft Hololens

Standalone Windows 10 device
Smart Fabrics

• Textiles which allow computers to be embedded into them

• Fibretronics – fiber having properties of conduction and semi-conduction

• Should be washable, flexible, able to weave and sew

• LilyPad - sewable electronic pieces designed to build soft interactive textiles
Musical Pillow
Flexible Screens

• Flexible and touch sensitive
• Similar to paper
• Lighter
• Unbreakable

• Uses
  • On demand newspaper
  • Books which look like books
Making Energy-Harvesting Devices Programmable

Typical tiny computing device

- SRAM (64kb)
- Flash (16-64kb)
- 16-bit RISC core
- Energy Harvester
- 1-10 uF Cap.

1.32 pJ / cyc

7 mW

RF

Photovoltaic

Thermal Gradient

Vibration
Making Energy-Harvesting Devices Programmable

- Flash (16-64kb)
- SRAM (64kb)
- 16-bit RISC core
- Energy Harvester
- Radio

Ocular Monitoring Implant
http://web.eecs.umich.edu/~prabal/

Fujitsu GP body thermal generator

Surveillance using cyborg roaches
http://dx.doi.org/10.1088/0960-1317/21/9/095016
Making Energy-Harvesting Devices Programmable
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~1-10uW at V

Death Line

Time
Making Energy-Harvesting Devices Programmable

Checkpointing

Death Line

Take Checkpoint

Die, Lose State

Recover, Restore Checkpoint

Mementos/MOO

Main Result: With energy-aware checkpointing, can finish some workloads


Research contribution

• When to Checkpoint?
• What to Checkpoint?

Good for short lived tasks, what about long running tasks

References

- Subhas Chandra Mukhopadhyay, Smart Sensors, Measurement and Instrumentation, ISSN: 2194-8402
CSS 545 – Goals

• Provide students with mobile application design knowledge which can be applied to any mobile platform;

• Broaden student’s perspective by immersing into the mobile eco-system comprising of sensors, power management, security and privacy, mobile cloud services, cross platform tools, commercial aspects of developing and selling apps, and future of mobile technologies;

• Enable students to develop mobile apps applying above concepts in the form of hands-on projects on a chosen mobile platform (Windows Phone in this case), and encourage students to experiment with unique ideas and scenarios
CSS 545 – What did we learn?

• What is mobile computing?
• Popular platforms (Android, iOS, Windows)
• Mobile Sensors
• Mobile app design - what works and what does not?
• Performance – tools and tricks
• Power management
• Cloud-enabled mobile computing
• Mobile security
• The cross platform movement
• The future: wearables, connected clothes, smart furniture
Feedback

• Send me email on what
  • worked for you
  • we can improve

• Do take the official evaluation: https://uwb.iasystem.org/survey/11907
No class on Wednesday!

• See you on the 16th and 18th for your final project presentation