ECE 1778: Creative Applications for Mobile Devices

Lecture 3
January 27, 2021
Why We’re Here

- To bring together people from different disciplines to build an interesting & creative mobile/wearable application

- To learn how to do this & actually do it!
Today

1. Logistics/Organization of Course & Project
2. Assignments P2 & S2
3. Idea Brainstorming and Creativity Inspiring:
   – Case Studies of Apps
4. Project Group Forming
Logistics
Assignments: Bringing you Up To Speed

- S1 and P1 were due last night
- S2 is due next Tuesday (Feb 2\textsuperscript{nd}) at 6pm
- P2 is due Tuesday February 9\textsuperscript{th} at 6pm
  - Are posted on the main course website and Quercus

- There will be one more programming assignment
- There will be two more Specialist assignments
Project Stages

1. Forming Groups
   - Form group by tomorrow Jan 28; SEND EMAIL as DESCRIBED

2. Project Topic Approval-in-Principle
   - Done via email – send short description to me; will respond fast
   - Due February 3rd prior to class; must have approval to proceed

3. Project Proposal/Plan
   - Document Due February 15th [Changed/had it wrong]

4. Proposal & Plan Presentations
   - February 17th
   - NOTE EXTRA LECTURE Wed February 17th, 6-8pm

5. Spiral 2 & Spiral 4 Presentations
   - 2: March 10/17 4: March 24/31

6. Final Presentations
   - Weeks of April 7/14

7. Final Report Due April 21st
Meet Tonight to Form Groups/Discuss ideas

- Wed January 27th, 6:30pm-8:00pm
  - On same class Zoom Link

- We will help make matches, similar to today
  - Will use breakout rooms as necessary

- Can also be there to kick around ideas to help with direction/scope
  - Will make use of having everyone there
Group Forming Status

- Counts comes from assignments [P1 and S1] also including 3 external specialists
- 61 total students/specialist
  - 10 more still registered in course, but didn’t hand in P1 or S1
- Groups: 1 Specialist + 2 Programmers
- 14 groups formed as of this morning
  - Must send me email to ‘form’
- Will provide time today to help form groups

<table>
<thead>
<tr>
<th>Programmers</th>
<th>Specialists</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>19</td>
</tr>
</tbody>
</table>
More Hot-off-the-press Data

- There are 6 available specialists
  - Need to find a programming pair

- There are 14 Programmers available
  - Need to pair
  - Then find a specialist

- We will work on this today, in this class, and tonight
  - Need to give priority to people in far time zones during this class
Send Me Group Info When Formed

- Send email to me:
  - Jonathan.Rose@ece.utoronto.ca
  - Copy email to all group members
  - this a formal commitment

- The email **must** contain (**please do this**):
  - Names of all students and student numbers
  - UofT email address of all members (or otherwise if external)
  - Department & Field of each group member
  - Degree being pursued by each group member (M.A., Ph.D.,
    M.A.Sc., M.H.Sc., M.Eng, M.S.A.C. etc.)
  - **Indicate who is a Programmer, who is Specialist/External
    Specialist**
  - Mobile platform: Android or iOS?
Next Project Step:

Approval-in-Principle
Once your group is formed, you must fairly quickly come to a rough idea of what you’re going to do for project.

This week you should be kicking around ideas between yourselves, myself and TAs.
- We will go back and forth as necessary.

Your group must have my approval of the general idea of your Project by end of day Wednesday February 3rd.
- Start now! Will be able to use part of this class to have informal discussion of topic with team and myself & TAs.
What to Send for Approval

1. **What & Why:** A few sentences describe what the project is and how it is motivated.

2. **Expertise Link:** Make clear how this app fits within the expertise of the Specialist and what the contribution the project makes to the Specialist’s field or research.

3. **Name:** Give your App a Name
   - name should convey the essence
How to Describe Your Topic?

Key is to say **what & why**
- engineers tend to think about **how** too soon, be warned
- You will need to think about how to make the **what feasible**, but not in first description for someone else to understand

Should be the completion of this sentence:

“The goal of our app is to …”
Good Example Description

- **What:** The goal of our App is to help train surgeons to gain fine motor skills by measuring their movements and providing feedback on the movement quality.

- **Why:** Surgical training is difficult, and lacks quantitative feedback.

- **Specialist Expertise:** Training to be Surgeon, currently taking 1 year off to do M.Ed.

- **Name:** STAN “Surgical Trainer and Navigator”

- **… How:** accelerometer attached to hands to measure fine motion quantitatively
That was a Little Misleading

- This is the description as it stood at the end of the project
- It didn’t start out this way, it needed refinement
- This refinement process is an essential part of learning
It's a customizable cloud-based student/teacher homework and dynamic scheduling app that learns how and when students do their homework, rewards task completion, pushes reminders and adjusts scheduling according to need. It also allows teachers to create ubiquitous learning exercises and to push AR enhanced homework to students. We also hope to build in a GPS-based study group and knowledge building capability. It sounds like a lot but my coders believe they can pull it off. We have prioritized elements and are confident that the core elements can be coded. I will send you the required Specialist summary later this week.
What is Wrong with it?

1. Hard to say **what** it is – it is many things, and lacks focus.

2. Doesn’t say **why** (e.g. What problem is being solved, why a specific capability is needed/worthy).

3. No name! (This group had real trouble with names)

4. No connection to what the Specialist’s expertise is.
   – Last part in italics was the specialist saying he would get around to this **next week**!
How To Send in Approval-in-Principle

- Send an email to me – Jonathan.Rose@ece.utoronto.ca
  - Just one per group
- Send as soon as ready

- Need to get statement back from me: “Your Project has Approval-in-Principal”
  - There may be some back and forth between us
  - Over these years, there has been a fair amount of revision
Step After Approval-in-Principle:

Proposal/Plan
1. Reprise Goal, make more precise
   - What & Why

2. Rough design of what the user of the App sees
   - Screen designs
   - Use Marvel App - https://marvelapp.com
     - From Specialist Assignment 2
     - Any drawing package will do

3. Block Diagram overview of planned code
   - Top down description of the major pieces & communication
   - With short description of each
   - Should be linked to the screens
   - I will discuss creation of block diagrams next week
Plan, continued

4. Statement of Risks/Issues
   – What roadblocks/issues/challenges do you foresee?
   – Software, Hardware, Data …. 

5. What do you need to learn that you don’t know
   – all members 

6. **Important:** Specialists
   – Submit a 500 word essay on
     1. How App relates to field of Specialist, and
     2. How the Specialist will contribute to project
        – Need to be an active participant throughout 
        – How will you do that?
        – **Issue Tracking** on Github
Proposal/Plan Document

- length: 1500 words max
  - not including Specialist essay (#6)
  - include word count, penalty for overage
- Seeking clarity, not quantity of words
  - Omit needles words
- One member of group should submit for group
  - Under “Proposal Plan” for your group, under its name
- Worth 10% of grade
  - including in-class presentation done following week
- Document Due Monday February 15th at 6pm
That Same Week: Prop/Plan Presentation

- Proposal/Plan Presentation
  - Concise, clear presentation by all groups of proposal/plan
  - 5 minute presentations
  - followed by discussion/questions

- Will take place in Two Lectures on February 17
  - Regular lecture in morning
  - Extra one in evening, from 6-8pm
  - put in your calendar now!
  - Required to come to both:
    - you will either be presenting or peer-reviewing in both
Assignment P2 – for Programmers

Advanced UI, Authentication, Database, File Storage

Available on Quercus and Public Course Website
Assignment P2

- Goals
  - learn more complex UI
  - use additional capabilities of Google Firebase as backend

- Augmentation of Instagram-type app
  - Store user info in online Firebase database
  - Store pictures in online storage
  - Display basic ‘feed’ of this user’s pictures
  - + more (see specification)

- Due in 2 weeks, Tuesday February 9th at 6pm
Note & Demo

- 8/10 of grade is for functionality
- 2/10 of grade is for quality of User Interface/Experience

- Here is a demo of *one way* this assignment can look
  - There are other ways that are fine too

[Link to P2 Demo]
Assignment S2 – for Specialists

Practicing Creativity, App Design Principles, Marvel App, Critical Feedback and Thinking

Posted on both Quercus and Public Course Website
Design of Apps from UI Perspective

UI = User Interface

– How the app looks to a human

1. Learn **Marvel** tool basics by going to website and reading help (look also for youtube instructional videos)

2. Learn user/app visual design concepts:
   – **Android**: (on *material* design)
   – **Apple**: [Here](#) and [Here](#)

3. Create an App (next slide)

4. Interview Potential Users & Get Feedback

5. Engage Your Own Critical Thinking
Create App that Uses *Emotion Recognition*

- Given the following capability: software that can look at a *video*, identify the faces of the people in the video, and determine the *emotion* they display, one of:
  - neutral
  - happy
  - sad
  - angry
  - fear
  - anticipation
  - surprise

- Given this, invent interesting app that makes uses it
  - Can’t be the simply reporting of emotion
1. Design the app, and mock it up using Marvel App
2. Describe App (500 words, what & why)
3. Also give 400 words on the design
   – Describe the design principles you’re using in the decisions you make to the design the app (from Part 2)
4. Present it to 3 people, and get their feedback on it
5. Do a critical analysis of it

Due next week, Tuesday Feb 2\textsuperscript{nd} at 6pm.

1500 words maximum; -0.1 marks (of 10) for every word over
Previous Projects and Applications

To Provide some context for your project and to Help with Creative Process
EYEdentify

Teaching Emotion Recognition to Autistic Children

Rebecca Dreezer
Cindy Lau
Alexandra Makos

April 2012
Goal

- Help autistic children learn to recognize 4 emotions:
  1. happiness
  2. sadness
  3. confusion
  4. frustration

- A simple matching game
  - With an engaging user experience
Based on Research

- Have 3 classes of “faces” that can be identified by players
Games Screen

I am FRUSTRATED. Who else is FRUSTRATED?

Amazing!
Choices

Wow! You are doing such a good job, Alexandra!! You just earned a new reward!!

Keep Playing  Take a Break  Build My Robot
Accelerometer Detected Frustration

Take a deep breath and count to ten... 1... 2... 3...
. 4... 5... 6... 7... 8...
. 9... 10...

I feel calm!
EncountAR

Interacting with Museum Exhibits

Scott Pollock
Sheng Xu
Tony Zhou

April 2012
Museums & Art Galleries

- Struggling to stay relevant
- Many being put online

- Scott’s idea (from others): be able to interact with an exhibit
  - Leave ‘postings’ on the exhibit itself, in virtual world
AR = Augmented Reality

- View the world through the camera/screen
- Add in extra things on top
- Add picture from somewhere else?
For Example
User Annotation of Exhibits

(Left) Augmented Reality View, (Right) EncountAR
Discussions

(LEFT) ENCOUNTERARS VIEW, (RIGHT) ENCOUNTERAR THREAD VIEW
Mindful Me

Journaling for Addiction and Intervention

Elizabeth Glenn Guy
Shobhit Puri
Yvonne Chen

April 2013
Addictions ruin Lives
One Method in Addiction Treatment

- Is to write down cravings in a diary
  - Identify vulnerable contexts → determine ways to resist/avoid

- **Problems** writing on paper/book:
  - Invasions of privacy
  - Tedious

- **Solution**: use mobile device to aid journaling

- Increase journaling frequency → efficacy:
  - Easy to use interface
  - Automatic location identification/data processing
  - Data visualization & vulnerable location identification
The Big Idea

- With a phone, you can not only record the issues/cravings, but it can record:
  - Where you are
  - How you were moving
  - What you were hearing
  - Perhaps what you were seeing

- It could learn that a certain location is a problem for you (e.g. near a Bar that an Alcoholic frequents)

- It (the phone itself) could then **Intervene!**
  - If it thought you were heading towards a relapse
Interventions?

- Call your Alcoholics Anonymous Sponsor for you
- Play a song
- Send you a text
- Play a game
- Help with breathing exercises

- Many other possible ideas!
Journal Screens

Hello Shobhit, Please rate your mood level.

Your current mood level: 0

- My urges to engage in addictive behaviors are at a level 5
- My ability to resist my craving
  1. Not at all difficult
  2. Very mildly difficult
  3. Mildly difficult
  4. Moderately difficult
  5. Very difficult
  6. Extremely difficult
  7. Not able to resist
Locating & Specifying Activity
Intervention Suggestions

Disengagement Strategies

- **Text a friend**
  Talk to a friend might help you.

- **Read a mindfulness script**
  Tips to help you calm down

- **Call Hotline**
  Talk to some professionals

- **Listen to a song**
  Take some time to get relieved.

Hey, Shobhit. Welcome back!!

Last time you made an entry, your urges to engage in addictive behaviors were at a level 5.

Did the intervention suggestions help?

- [ ] No, I still engaged anyway.
- [x] They postponed my consumption.
- [ ] Yes, they prevented relapse.

Which suggestions you tried to use to restrain your urges?

- [ ] Texting friends
- [x] Listening to music

Done
Data Collection

Please select the date range

4-2-2013 to 4-9-2013

Mood Distribution
Percentage Distribution of your Moods

Urge Pattern
Urge Pattern in chosen range of dates

Urge vs Time of the Day
Urge Pattern Distribution by time of the Day

Urge vs Location
Urge Pattern Location Wise
Data Display
Follow-up Research: Smoking Cessation

- ‘Mindful Me’ was a general addiction app done in the course

- These past 6 years, we launched a specific project in helping people to stop smoking
  - In collaboration with Nicotine Dependence Clinic, part of CAMH

- Has been released on both App stores
  - Still available on iOS
  - CAMH is now taking over.

“Things do not change; we change.”—Henry David Thoreau
Now:
Group Forming Time and/or Topic Discussion
First: Unaffiliated Specialists

- Any specialist who has not yet spoken
  - And does not have a group
Four Kinds of People Now

1. Un-paired Programmers - **Breakout room 1**
   - Form groups of 2 programmers
2. Paired Programmers – **Breakout room 2**
   - Need Specialist
3. Un-grouped Specialists – also **Breakout room 2**
   - Need pair of programmers
4. Already in full Groups -
   - Take this time to discuss your topics
   - Can grab time with me & TAs in other breakout rooms
   - Kia and Imithan will also be co-hosts
5. Will bring class back if settles down; will continue tonight otherwise
Meet Tonight to Form Groups/Discuss ideas

- Wed January 27\textsuperscript{th}, 6:30pm-8:00pm
  - On same class Zoom Link

- We will help make matches, similar to today
  - Will use breakout rooms as necessary

- Can also be there to kick around ideas to help with direction/scope
  - Will make use of having everyone there
Apt To Learn

Using Phones in the Theatre

Arlynda Boyer
Abderahmane Allalou
Zohaib Alam

April 2016
The Problem

• Theatre patrons are not very compliant with turning off their phones when asked before the show

• Plays are interrupted by chimes, buzzes, and beeps, which are disturbing to actors and other audience members and which diminish the experience of the play for everyone

• Theatre audiences tend to be older and theatres need ways to embrace, rather than ban, technology and ways to reach out to new, younger playgoers
Our Solution

• Introduce mobile technology to the theater experience

• Theater goers can bookmark moments of live action, review them after the play, and learn more about the production they just saw and also about the play and about Shakespeare

• Feedback from playgoers is sent to server for researchers to analyze
How it works

Live Demo:

- Users join the play on their phones, which is a recorded production synced by the house manager to that night’s show; users can join at any point
- Users’ phones are given a blank screen and set to silent
- Users bookmark moments in the play using double-tap
- After the show, users can view bookmarks on timeline, which are clickable
- Bookmarks provide detailed explanation of the scene
Why It Works

• Silent phones and dark screens are exactly the behavior theatres need from phones, while still embracing technology’s ability to enrich their show.

• Users do not have to turn off their phones.

• Playgoers can learn more about the play and clear up moments of confusion.

• Theatres can use feedback to better understand how audiences are perceiving the show and what they like or dislike about it.
Surgical Trainer and Navigator (STAN)

Dorotea Mutabdzic
Rorik Henderson
Kyle Tsang

April 2014
Learning to operate is like...
Until...
Currently technical performance is...

1  2  3  4  5
Below expectations  Meets expectations  Exceeds expectations

But:

Intraoperative assessment of technical skills on live patients using economy of hand motion: establishing learning curves of surgical competence

The relationship between motion analysis and surgical technical assessments

Is motion analysis a valid tool for assessing laparoscopic skill?
Tracks surgeons' hand movements

To Improve technical performance
How does it improve performance?

Bluetooth sensors attached to surgeon’s wrists
Track 3-axis accelerometer data to give feedback on speed, precision, and efficiency of movement
How does it give feedback?

- **Speed** derived from time
- **Precision** derived from changes in acceleration
- **Efficiency** derived from number of movements
Precision

“Precision”
• controlled movements
• changes in acceleration
Efficiency

“Movement”
• Cluster of accelerations
Performance Categories

Category-Specific Tips

Junior level speed - “Try picking up the next peg with your free hand while putting down the previous one”
ECE 1778
WhimPer – A Noise Mapping App

Yeliny Bonilla
Ali Sabti
Sajad Shirali-Shareza

April 2011
The issue: the world is full of noise, and noise pollution can reduce hearing

The goal: create an app that can measure the noise at each location the phone ‘walks’ through

Use this to create a Noise Map
  – Assuming more than one person uses it – crowd sourcing – a map of a city can be easily created.
Live Measurement Screen

Current noise level: 51.4 db
Average noise level: 47.7 db
Smoothed noise level: 56.3 db
Daily Noise Measurement v. Time

Figure 4. Noise exposure feature of the WhIMPeR application. The figure on the rights shows the ability to change the date for which the data is displayed.
Figure 5. Noise map showing selected points of the noise data as well as a noise intensity overlay. The figure on the right shows the feature of time interval selection.
# Noise Colour Code for Map

<table>
<thead>
<tr>
<th>Noise Level</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VERY LOUD</strong></td>
<td>Dangerous over 30 minutes</td>
</tr>
<tr>
<td>110</td>
<td>Concerts (any genre of music)</td>
</tr>
<tr>
<td></td>
<td>Car horns</td>
</tr>
<tr>
<td></td>
<td>Sporting events</td>
</tr>
<tr>
<td>100</td>
<td>Snowmobiles</td>
</tr>
<tr>
<td></td>
<td>MP3 players (at full volume)</td>
</tr>
<tr>
<td>90</td>
<td>Lawnmowers</td>
</tr>
<tr>
<td></td>
<td>Power tools</td>
</tr>
<tr>
<td></td>
<td>Blenders</td>
</tr>
<tr>
<td></td>
<td>Hair dryers</td>
</tr>
<tr>
<td><strong>Over 85 dB for extended periods can cause permanent hearing loss.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LOUD</strong></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Alarm clocks</td>
</tr>
<tr>
<td>70</td>
<td>Traffic</td>
</tr>
<tr>
<td></td>
<td>Vacuums</td>
</tr>
<tr>
<td><strong>MODERATE</strong></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Normal conversation</td>
</tr>
<tr>
<td></td>
<td>Dishwashers</td>
</tr>
<tr>
<td>50</td>
<td>Moderate rainfall</td>
</tr>
<tr>
<td><strong>SOFT</strong></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Quiet library</td>
</tr>
<tr>
<td>30</td>
<td>Whisper</td>
</tr>
</tbody>
</table>
ECE 1778
Baton – Helping Teacher-Student Communication

Zak Teitel
Victor Li Chen
Fiona Yi Zhao

April 2014
Putting Up Your Hand In Class

- Doesn’t give the teacher much information about what you want to contribute to a fluid discussion
- What if the teacher could know more about your intent?
A. Main bubble offers a visualization of student wait-time. Student icons start green and the longer a student waits to participate, the redder their icon gets. You can see in image 3.1 that John has been waiting for quite some time. In user consultations, teachers indicated they wanted ambient awareness of wait-time via colour as giving them exact time measurements via a clock or stopwatch would have been “too much” to handle.

B. The upper bubble offers a visualization of “participation intent”.

C. The lower bubble lets teachers know how many times a particular student has participated in class.
Baton Presentation

- See BatonEdit.m4v in this directory.
This Was a Great Project

- Well described, novel
- Sufficiently Technical
- And a very interesting App

But....

- it didn’t start out that way
- Zak, at the beginning, had no idea what was possible, and began with far more complex ideas
- The ideas didn’t make a lot of sense at the beginning
- Through dialogue with programmers and us (myself, TAs) converged to something that worked very well

**Key:** creativity is messy; requires communication, evolution, iteration; kindness, reflection, then action
ECE 1778
BrainEx – Exercise for your Brain

Jinyoung Kim
Rowa Karkokli+

April 2011
Dementia & Brain Exercise

- Dementia is a cognitive disorder resulting in loss of memory, changes in personality, and loss of social ability.
- Prevention is the key since most types of dementia are permanent and cannot be cured.
- Research suggests brain exercise and activities that stimulate the brain may delay memory declines and can also reduce one’s risk of getting dementia and related symptoms.
- The BrainEx application is designed for this specific purpose.
The Games

- Three games that stimulate the brain in different ways
  - allowing the user to choose a game of their interest.

1. Game 1: designed to stimulate the user’s memory,
2. Game 2: target the user’s problem solving skills,
3. Game 3: targeting both memory and problem solving skills.

- Each game assesses the user’s performance and speed and advances the game to increase the stimulation of the brain.
Starting Screen – Choose Game

Brain EX

Memory Boost
Logic Boost
Brain Workout
Help
Quit

(90)
How To Play

HOW TO PLAY

EASY MEDIUM HARD

TAKE THE CHALLENGE

PERFORMANCE SUMMARY

Main Menu
The Result

 leng, 105

 Well Done!

 Proceed to the next level
 Accuracy: 100%
 Response Time: 38.25 sec
 Average Response for Correct Answer: 22.7 sec

 Next Game

 Quit
Sport/Pictures

Wrong Answer

Try again, or go to the next level
Accuracy: 0%
Response Time: 10.88sec
Average Response for Correct Answer: N/A

Try Again  Next Game  Quit

(94)
Summary of Results

PERFORMANCE SUMMARY
LOGIC BOOST

EASY LEVEL
Total Game Played: 7
Accuracy: 57.14 %
Average Response: 4.15 sec

MEDIUM LEVEL
Total Game Played: 20
Accuracy: 95 %
Average Response: 4.44 sec

HARD LEVEL
Total Game Played: 39
Accuracy: 82.05 %
Average Response: 5.07 sec
APPnea: Sleep Apnea Detection

Phil Lam
Regina Leung
Thuva Sivayogan

April 2012
What is Sleep Apnea

- Sleep apnea is a common (and under-diagnosed) sleep disorder
  - characterized by periods of interrupted or shallow breathing during sleep

- Affects the quality of life of individuals
  - extreme fatigue and poor concentration
  - may also lead to other serious medical conditions
    - cardio/cerebrovascular problems with mortality rates as high as 35%.
Sleep Apnea, continued

- Key issues in Apnea detection and treatment:
  1. Limited availability & high cost of clinical sleep Apnea detection method:
     - patient must spend a night under observation by technician and clinician in a “sleep lab.”
  2. Lab test is performed in foreign environments with multiple electrodes attached to the individual
     - may induce stress & cause inaccurate results.
  3. CPAP (Continuously Positive Airway Pressure) is a commonly prescribed treatment for sleep apnea, but offers low rates of patient compliance. This is primarily due to the fact that the required mask over the nose and mouth is uncomfortable.

(98)
The App

- APPnea operates by detecting the rate of respiration with the phone’s accelerometer.
- This is accomplished by using a pouch to attach the phone to the user’s chest.
- Signal processing algorithms involving a combination of time domain and frequency domain techniques are used for the detection of apnea events.
- The number of sleep apnea events per night are recorded, saved in a log, and displayed back to the user in the form of a histogram for daily sleep apnea monitoring.
Detecting an Apnea Event

- **Apnea**: person stops breathing while sleeping
  - Assume this means the chest stops moving

- Strap phone to chest, and use accelerometer to calculate pitch and roll with respect to gravity

- Search for periods of no movement, ranging from 10 seconds to 2 minutes
  - Followed by 2 minutes of breathing
User Tutorial

Follow along with each step.

Do you mostly sleep on your back, or your side?

I most often sleep on my back.

I most often sleep on my side.

Wrap the pouch around your waist, like in the picture.

I'm done. Continue!

Press the 'check my setup' button and put the phone in the pouch.

Check My Setup now!
User Tutorial, cont’d

Press the 'check my setup' button and put the phone in the pouch.

Check My Setup now!
Measurement in Progress

Put the phone in the pouch and wait for the beep.
Don’t forget to turn your volume up!

Cancel

Press the 'check my setup' button and put the phone in the pouch.

My Setup now!
Setup failure!

It looks like the phone can’t detect your breathing. Make sure that the pouch is fastened snug in the right place, and that the phone is inside.

OK  Try again

Press the 'check my setup' button and put the phone in the pouch.

My Setup now!
Successful Setup!

You’re good to go with this setup. When you go to sleep, set your phone and pouch up the same way, and things should work very nicely!

OK  Try again

(102)
App Controls

APPnea

Apneatik is an application that can detect sleep apnea. It uses your phone's accelerometer to measure the shape of your chest as you sleep. To get started, check out the tutorial.

- Go To Sleep
- Sleep History
- Tutorial & Help

Good night!

Wear the pouch and place the phone inside it. If you'd like a tutorial, press the 'show me how...' button below.

The phone will start recording data after you press OK.

Wake Up!

APPnea is Collecting Sleep Data.

You can safely use another app while Apneatik is running -- data collection happens in the background.

Wake Up!

(103)
Example Collected Data

Respiration Waveform

6% Apnea events detected by phone

Rejected false positives
Output From App
Surgical Black Box

Reviewing Surgery & Detecting Errors

Ted Avery
Jill Cates
Eddie He

April 2012
Surgical Errors

- In 2004, it was estimated that 9,000 to 24,000 Canadians die each year as a result of preventable medical errors.
- Studies have shown that at least half of all surgical complications are avoidable.

System

HD Video of Operating Room
Endoscopic Camera
Anesthesia Monitor
Audio and Decibel Level

Black Box

Evaluate surgical skills
Detect minor slips or near-miss events
Identify the key steps of surgery
Interim Goal

HD Video of Operating Room
Endoscopic Camera
Anesthesia Monitor
Audio and Decibel Level

Black Box

Live Mode real-time streaming to a remote location

for ECE1778

Review Mode post-operative analysis of a surgical procedure
Endoscopic Video and Data Views
Data Time Line
Annotation

Toolbar contains checklists and global rating scales (NOTECHS, OSATS)
Annotation – found mistakes!

Checklist Notation

Global Rating Scale
Alerts

Alert: Arterial blood pressure (ABP) values have exceeded the threshold levels.
Testing with Surgeons

- Tested the app with 2 surgeons at St. Michael’s Hospital
- 10-minute segment of a laparoscopic gastric bypass procedure
- Each surgeon produced similar annotations
DriveMod

Driver Behaviour Modification and Data Collection

Frances Awachie
Adrian Matheson
Matthew Thorpe

April 2012
Bad Driving Kills People

- 1.2 million people per year killed globally (UN, 2004)
  - every tenth bed in hospitals is occupied by a victim of a motor vehicle collisions (UN, 2004)

- 2,500 in Canada
- 34,000 in USA
DriveMod Detects Bad Driving Events

- **Steering**
  - Abrupt
  - Hard
- **Braking**
  - Abrupt
  - Hard
- **Throttle**
  - Hard
Set Thresholds to Detect Events

- Rough Road Rejection (vertical acceleration):
  - 300 mg
  - 500 ms

- Minimum Time Between Events:
  - 2000 ms

- Minimum Time Between Samples:
  - 50 ms

- Abrupt Turning:
  - 440 mg
  - 200 ms

- Hard Turning:
  - 350 mg
  - 1500 ms

- Abrupt Braking:
  - 400 mg
  - 200 ms

- Hard Braking:
  - 300 mg
  - 1000 ms

- Hard Throttle:
  - 180 mg
  - 1500 ms

(119)
After Driving – See What Happened!

Event List for:
[insert trip details (date etc) here]

--- Hard Braking -----
Time: 2012-04-10T20'09'27 Event ID: 83
Relative Time: 70.428344755
Location: 0.0E 0.0N

--- Hard Throttle -----
Time: 2012-04-10T20'10'16 Event ID: 84
Relative Time: 118.992492703
Location: 0.0E 0.0N

---------- Abrupt Turning ---------
Time: 2012-04-10T20'10'25 Event ID: 85
Relative Time: 127.771087672
Location: 0.0E 0.0N

--- Hard Turning -----
Time: 2012-04-10T20'10'34 Event ID: 86
Relative Time: 136.967224148
Location: 0.0E 0.0N

---------- Abrupt Braking ---------