ECE 1778:
Creative Applications for Mobile Devices

Lecture 3

January 23, 2013

Today

1. Logistics/Organization of Course & Project
2. **Project Group Forming**
3. Assignment P2
4. Assignment A2
5. Idea Brainstorming and Creativity Inspiring: Case Studies of Apps

Logistics

Why We're Here

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

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

Assignments: Bringing you Up To Speed

- A1 and P1 were due last night
- A2 and P2 are out today, due next Tuesday at 6pm

- Will be two more assignments after that, one each week

Project Stages

1. **Forming Groups**
   - Soon!
2. **One-Page Proposal**
   - Due January 30th; Must receive approval to proceed; oral too
3. **Project Plan**
   - Due Feb 6th
4. **Proposal & Plan Presentations**
   - February 11 & 13
   - **NOTE EXTRA LECTURE Monday Feb 11, 6-8pm, MP 137**
5. **Spiral 2 & Spiral 4 Presentations**
   - 2: March 6/13 4: March 20/27
6. **Final Presentations**
   - Weeks of April 3 & 10
7. **Final Report Due April 12th**

Groups Need to be Formed Now!

- 80 students registered in course; not everyone has succeeded in registering yet

- 19 groups 'formed' as of Wednesday January 23rd, 8:30am
  - At least two are looking for second programmer
  - 4 appers seeking partners; no programmer-only groups!
  - 9 programmers
  - Some extra senior undergraduate programmers seeking to enter course

Send Me Your Group Info once formed

- Send email to:
  - Me (jayar@eecg.utoronto.ca)
- Provide:
  - Names, **emails**, Student numbers
  - Department & Field of each group member
  - Degree being pursued by each group member (M.A., Ph.D., M.A.Sc., M.H.Sc. etc)
  - Indicate who is Programmer, who is Apper and if someone is serving as both
  - Mobile platform you plan to do the project on
    - one of Android, iPhone (others require a special discussion)
    - if thinking about using Tablet
    - if you have your own device(s) you can use

Phones Available for Loan

- We have 18 Google Nexus S phones available for loan, for those who need them for assignments and the Project
  - Running Android 4.1.2

- Contact course TA to borrow:
  - Braiden Brousseau braiden.brousseau@utoronto.ca
  - Day-long loans till ascertain demand

Many thanks to Google for the donation of these phones!

Proposal: Due Next Week, January 30

- 1 Page Proposal for Project, max 300 words

Should contain:

- What & Why
  - Describe the idea, and its motivation
  - **Make clear how this app fits within the field of the Apper**
    - and the contribution app makes to that field
- Scope
  - Give a good sense of functionality – what is involved
  - Show that you've thought about the pieces
- **Name** your Project
  - Always good to call a project like this something

Project Proposals

- Must be approved before proceeding

- Should have:
  - Sufficient Technical Depth to warrant 2 graduate-level programmers working for 2.5 months on it in a course
  - **Must have a reason to be mobile**
  - Apper projects must be driven by Apper's expertise
- Worth 5% of grade
- To Submit:
  - Send email to me, jayar@eecg.utoronto.ca
    - 1 page max, 300 words max
    - Make sure you get a confirmation of receipt

Plan Due Following Week: Feb 5 @ 6pm

1. Reprise Goal, make more precise
   - Worth 10% of grade (including presentation done following week)
2. Rough design of what the user sees
   - Mock-ups of screens
   - https://gomockingbird.com
   - Any drawing package will do
3. Block Diagrams overview of planned code
   - Top down
   - With short prose description of each
   - Should be linked to the screens

Plan, continued

4. Statement of Risks/Issues
   - What roadblocks/issues/challenges do you foresee?
   - App-wise, programming-wise, hardware-wise, ethics-wise
5. What do you need to learn that you don't know
   - all members
6. **Important:** Appers
   - Submit a separate essay on how App relates to field of Apper, and how the Apper will contribute to project
   - 500 words

Plan Document

- Plan length: 1500 words max
  - not including Apper essay (#6)
  - include word count, penalty for overage.
- Seeking clarity, not quantity of words
  - Omit needles words
- Submit to Portal, look for ‘Assignment’ Plan
- Due Tuesday February 5th at 6pm

Intermission & Group Forming

Un-formed groups please come to the front of the room.

Assignment P2 – for Programmers

Containers, Select, Lists and Files

Available on Course Website and Blackboard

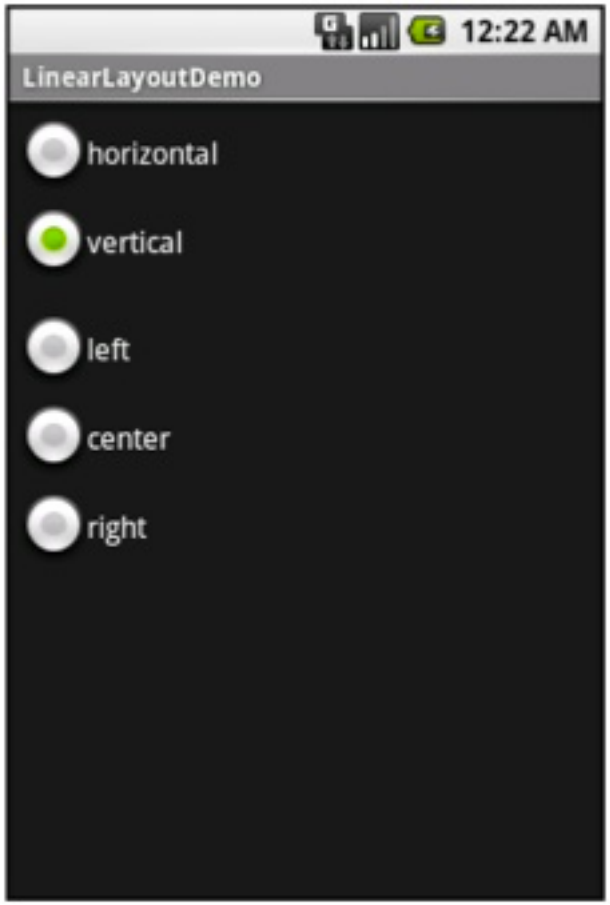
Assignment P2

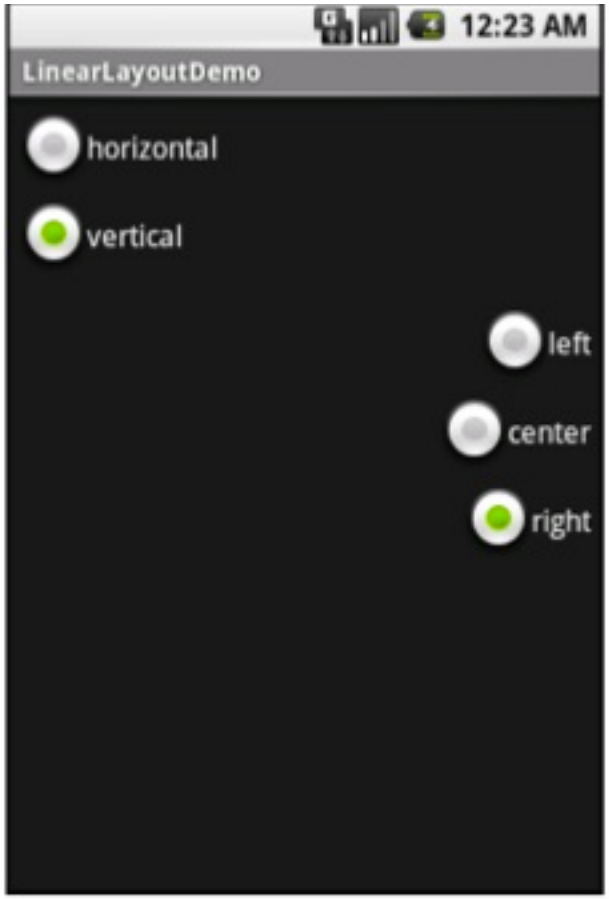
- Goal is to learn about
  - More complex containers of widgets
  - Lists – a very common way to display information
  - Files – persistent storage

- App for recording people's age and favourite games
  - Create a list of people
    - Record age and game preference from specific list of games
    - Store List in a File
    - Be able to retrieve previously stored files & Display
- **Due next week, Tuesday January 29th at 6pm.**

Containers

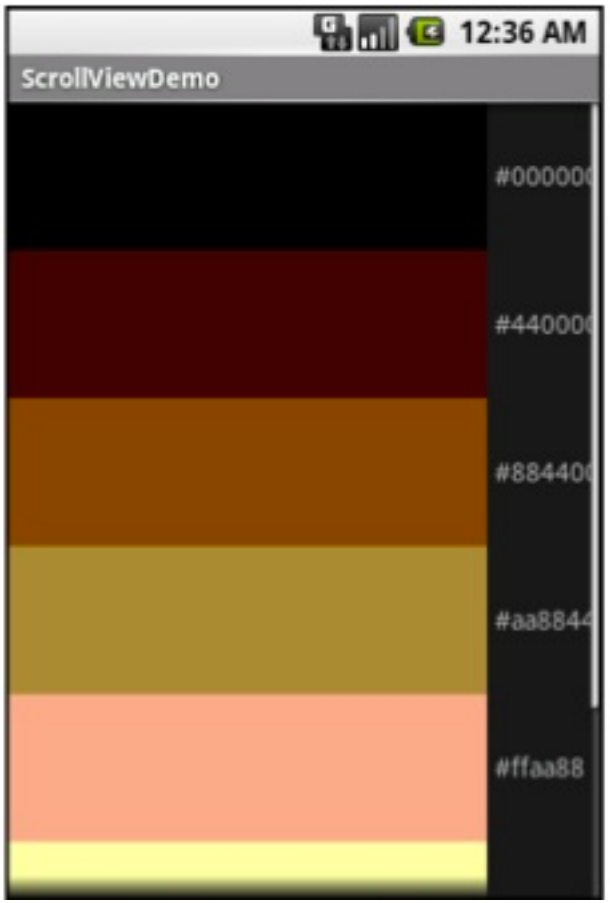
- How to use XML files to describe what you want to





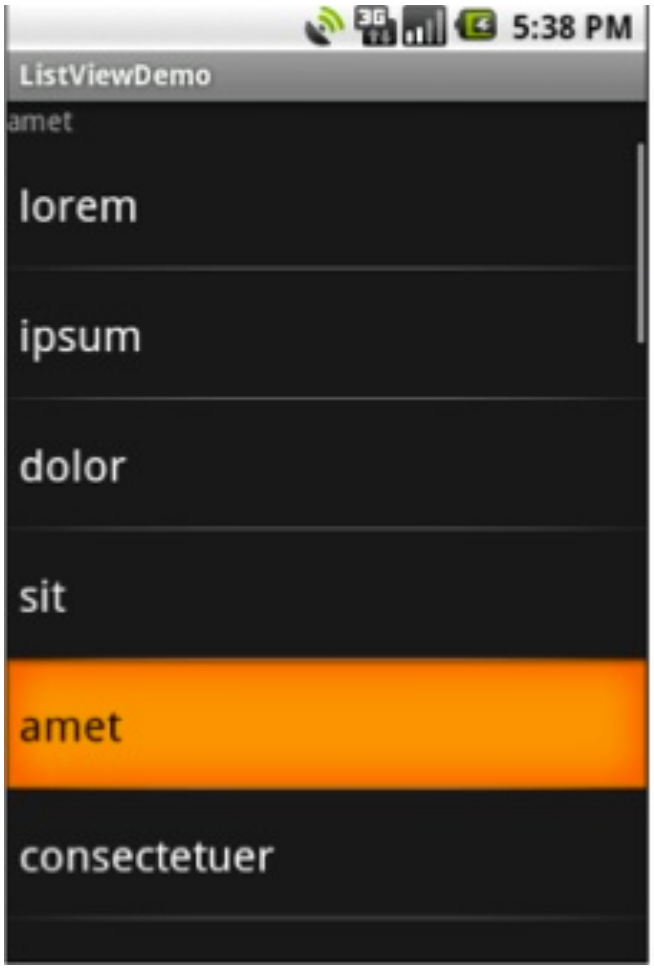
Containers

- Relative vs. Linear Layouts



Lists:

- Very commonly used in all applications
  - Different ways to select, fill in



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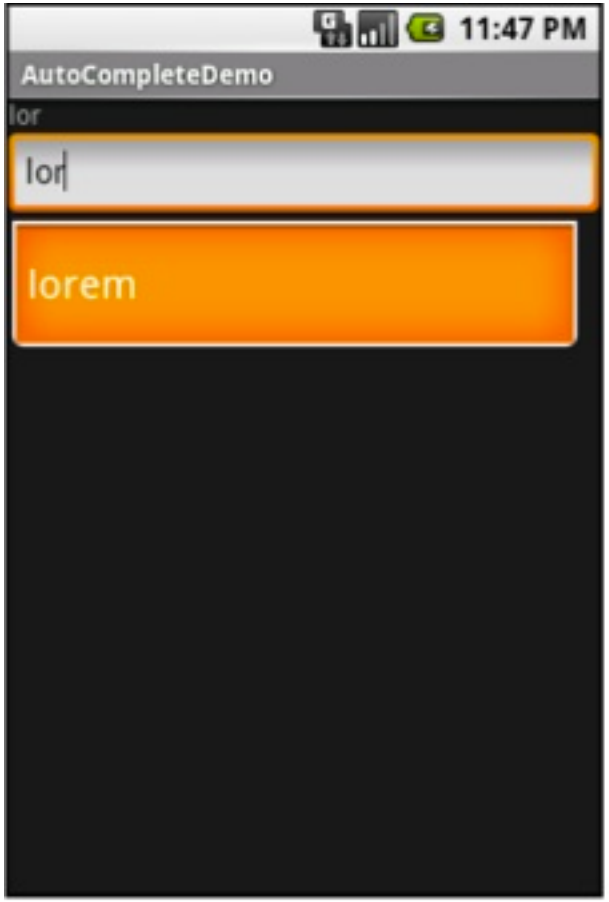
Autocomplete

- For text fields, based on contents of list



Files

- There are several places to put files
- Anything that you place in res/raw project folder is shipped with the application
  - Can read it as described in on page 387
  - Static files, application can't change
- Can read/write files using basic Java I/O
  - See example; note '**on resume**' is in mobile context
  - Limited size ~ 70 Mbyte total
- Larger files can go on SD card

iPhone Developers

- Assignment points to relevant chapters from iPhone iOS 6 development book

Assignment A2 – for Appers

Mockingbird Mockups

Available on Course Website and Blackboard

Design of Apps from UI Perspective

1. Learn Mockingbird basics by going to website and reading help (look also for youtube instructional videos)
   - Demo: https://gomockingbird.com/

2. Learn some user/app design basics:
   - Android
   - Apple

3. Design a New App That Diarizes

- Diarization: measuring the fraction of conversation that each person takes up.

- Given that you have software that can do this, invent and interesting app that makes use of this.

- Design the app, and mock it up using Mockingbird
- Describe the design principles you're using in the decisions you make to the design the app (from Part 2)

- **Due Next week, Tuesday Jan 29th at 6pm.**

Previous Projects and Applications

To Provide some context for your Upcoming Project Proposals and Plans

ECE 1778
iAnkle

Lyndon Carvalho
Nirtal Shah
Ivan So

April 2011

Physiotherapy for Injured Ankles

- If your ankle is injured (broken, sprained) it loses something called ‘proprieoception’
  - A sense of balance
- You need physiotherapy to get it back
- A physiotherapist has to watch you do exercises to see how well you’re doing
  - Expensive, time-consuming

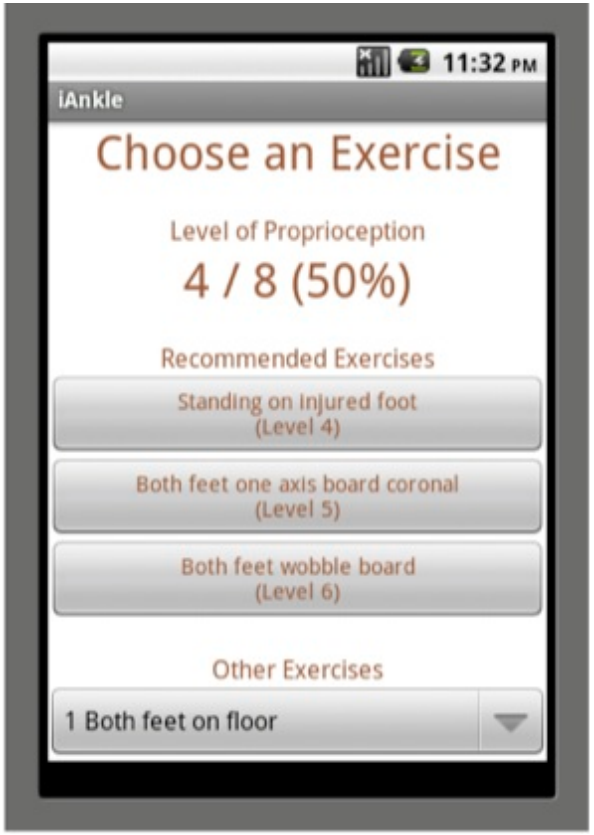
- Instead: **iAnkle** an app that replaces the physiotherapist

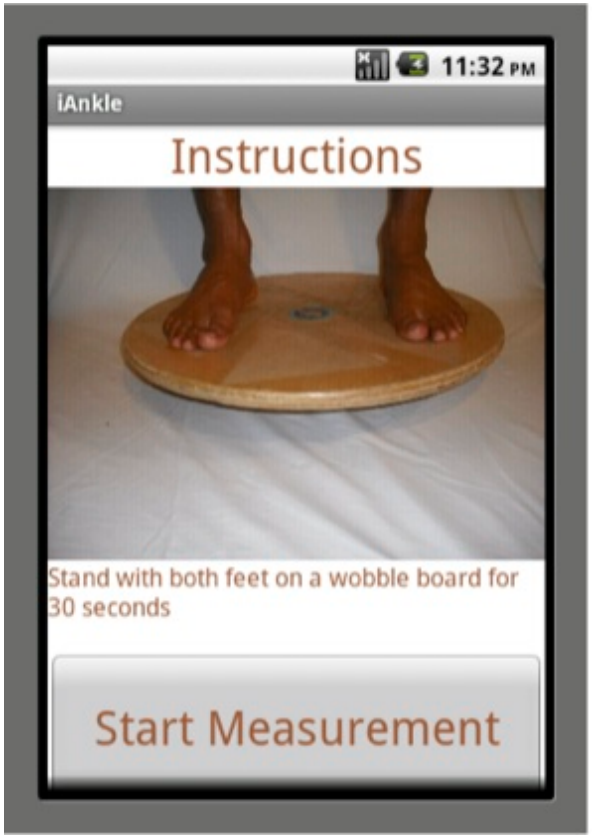
How It Works

- Phone tells you what exercise to try
  - .e.g. standing on one foot

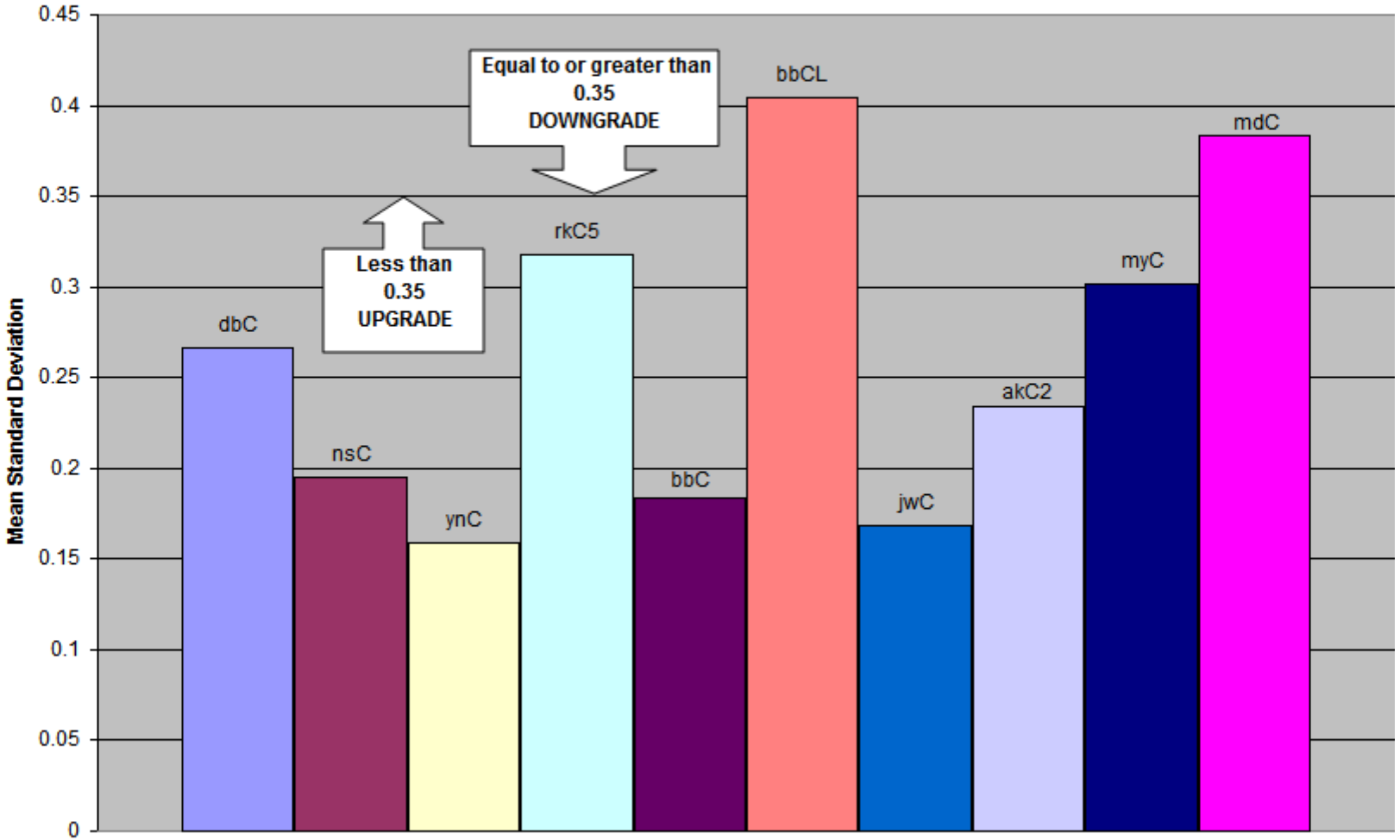
- Strap phone to your ankle
- The accelerometer measures how well you're balancing in the exercise

Screen Sequence:





Single Leg Stance – C



EncountAR

Interacting with Museum Exhibits

Scott Pollock
Sheng Xu
Tony Zhou

April 2012

Museums & Art Gallerys

- 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

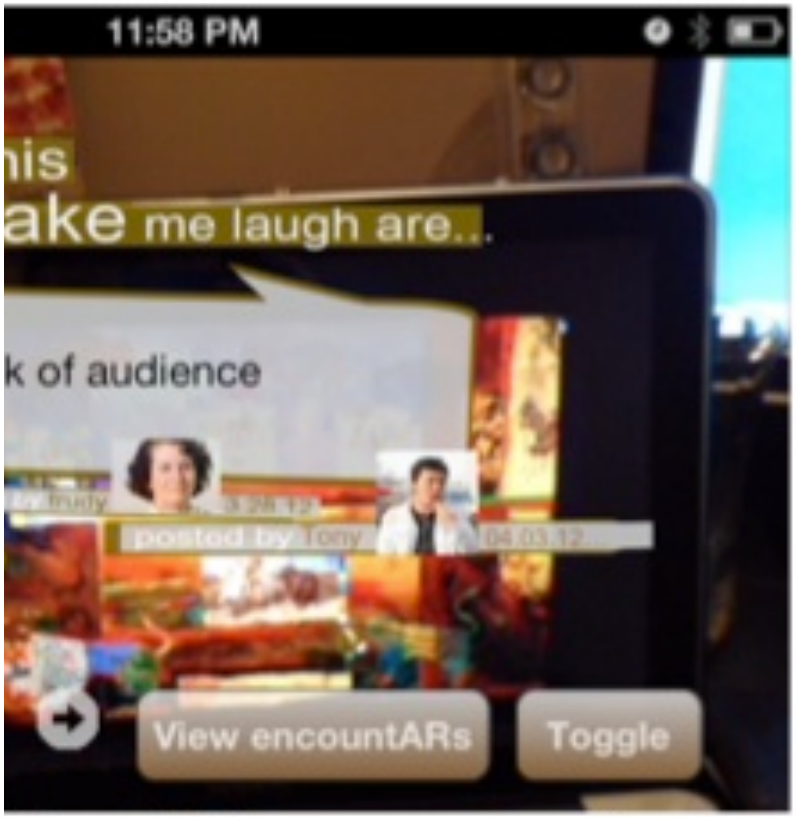
- View the world through the camera/screen
- Add in extra things on top

- Add picture from somewhere else?

For Example


encountAR
found
i
want to ask
the photographer who took these…
Why do we choose to ignore genocide?
posted by Anne
2.13.12
hung by Scott
2.13.12

User Annotation of Exhibits



(LEFT) AUGMENTED REALITY VIEW, (RIGHT) ENCOUNTAR R

Discussions

(Left) EncountARs View, (Right) EncountAR Thread

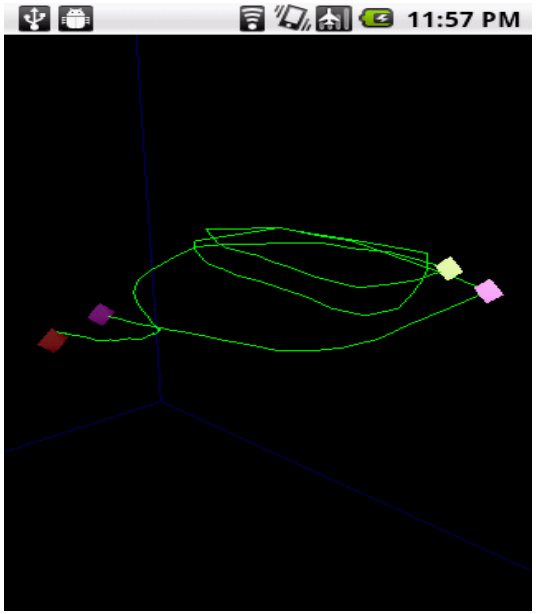
ECE 1778
Aerospace Sensor Suite

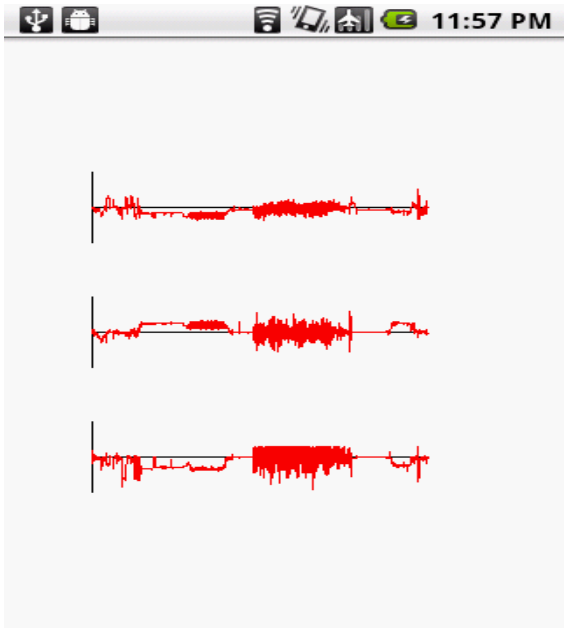
Jin Choi
Mathew Leonard
Vincent Tarantini

April 2011

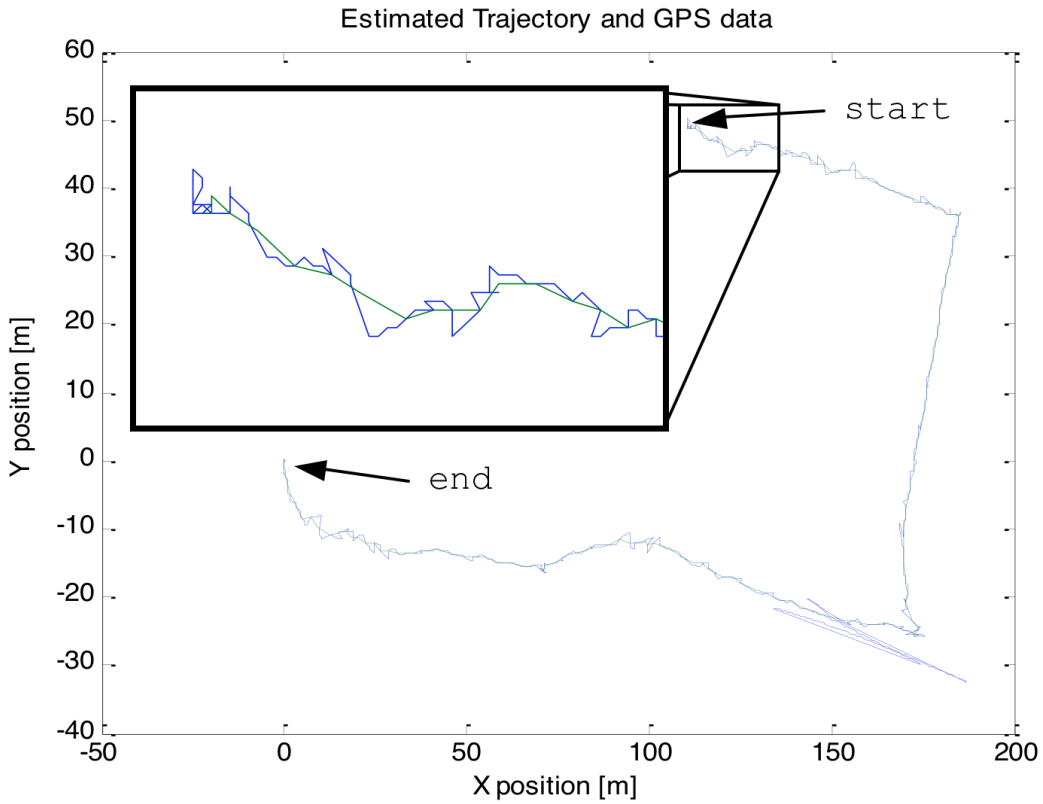
Aerospace Sensor Suite

- Sensor Suite: use phone to track the flight of small (or large airplanes)
  - Record the path of the radio-controller flyer in 3D and 2D





Estimated Position using State Estimator



State estimator solution and GPS recorded trajectory overlaid

ECE 1778
Shoptimus Prime

Michael Kipper
Bryce Leung

April 2011

The Idea

- A mobile grocery shopping application
- Helps you find the things you want at the lowest cost to you, including the cost of travel.

- “Crowd-sourced” price gathering.
- Prices are entered using barcode scan and manual price entry.

- This information will then be looked up either on our own database or third-party UPC databases available on the Internet to figure out what that item is, and then entered into our database along with a timestamp and location information.

The Long-Term Idea

- Over time, this will create an aggregated crowd-sourced snapshot of where grocery items can be purchased and for how much.

- Using the crowd-sourced grocery database, we can then find the lowest possible price of the total basket of goods and then advise the user where to go to buy everything.

Search Screen

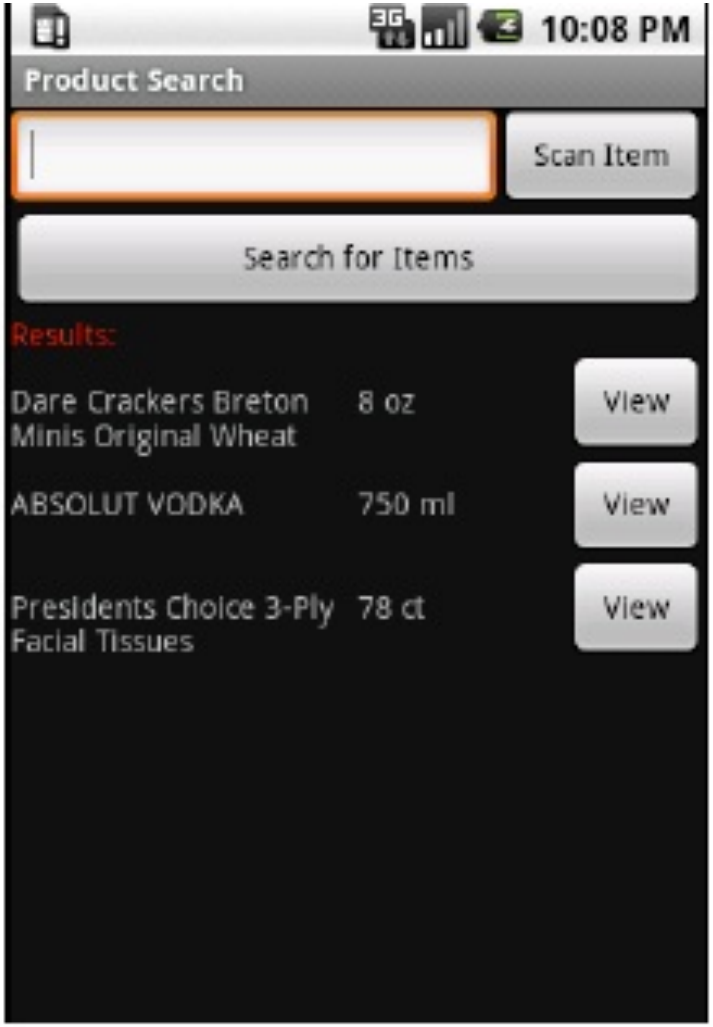
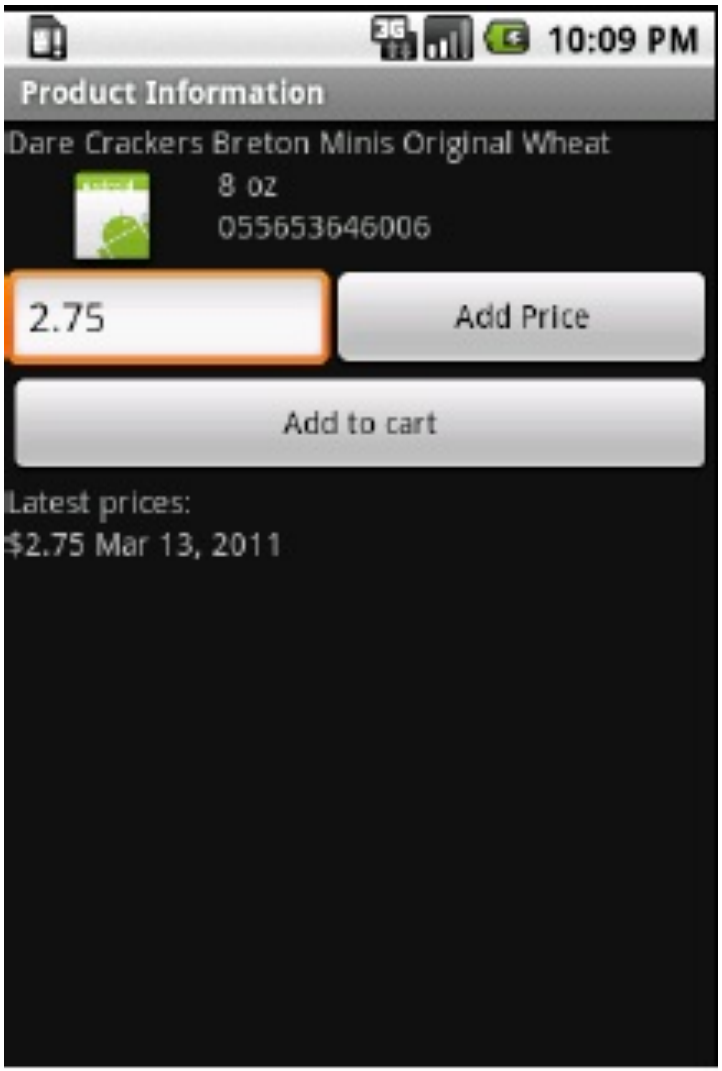
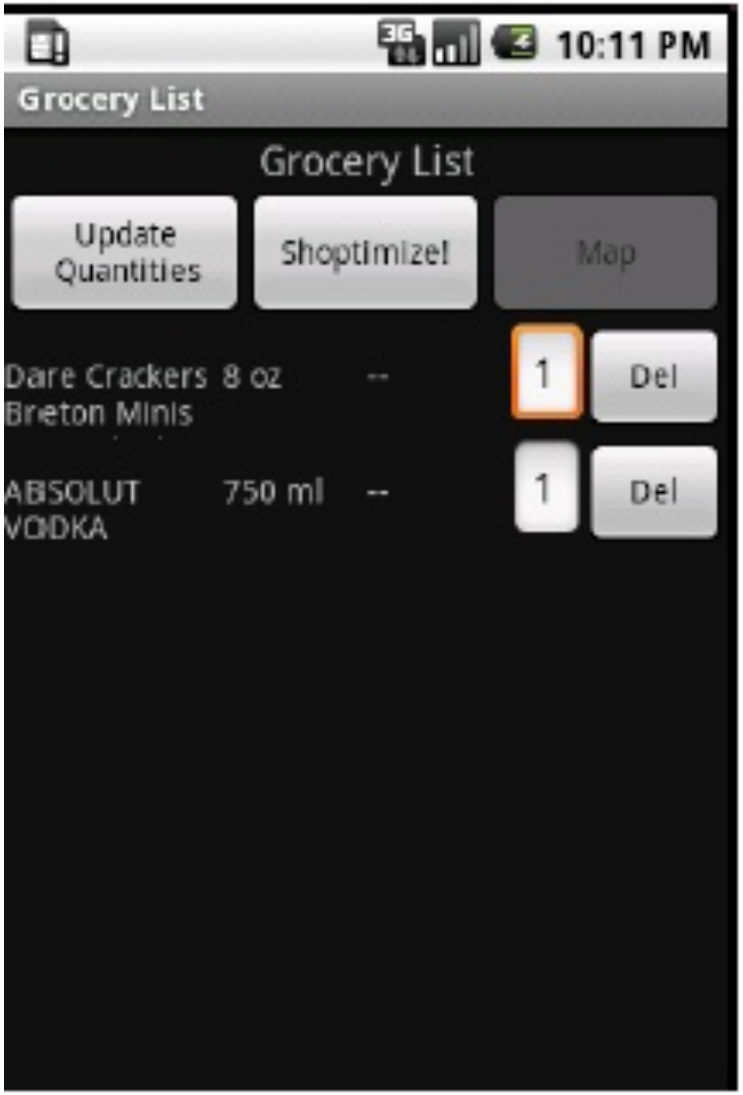


Figure 3. Search Screen.

View Item Screen

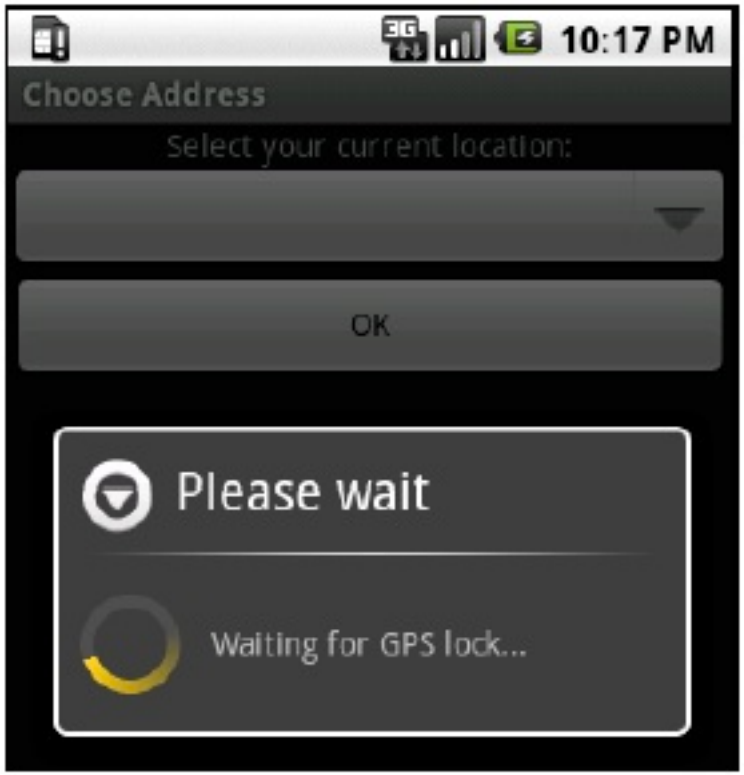


Grocery List Screen



Location Screen Shot

- Use GPS to determine location of stores.



Shoptimize!

- Given
  - the cost of gas – the cost to travel
  - The grocery list
  - The set of locations that sell those groceries

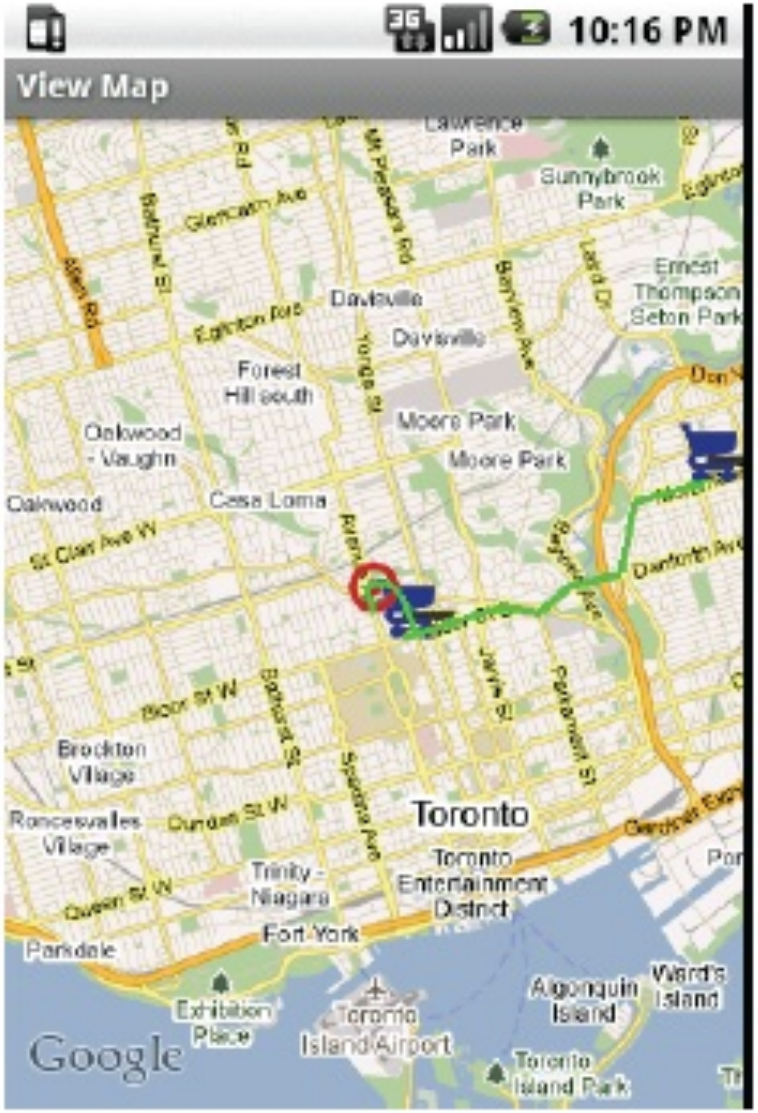
- Find:
  - The set of stores to travel to, using the car, so as to minimize the overall cost

$$Cost = \sum_{i=0}^{N} C_i + D * C_D$$

Where C_i is the cost of each individual item at that location, D is the total distance to travel from the user's current location to each location, and C_D is the cost of covering that distance. The nice thing about this algorithm is that it's simple, and is guaranteed to find the

Map View

- Used exhaustive search, guaranteed ‘optimal’
- Result of ‘shoptimize’ is the route that minimizes cost
  - of purchase and of transportation costs



ECE 1778
WhimPer – A Noise Mapping App

Yeliny Bonilla

Ali Sabti

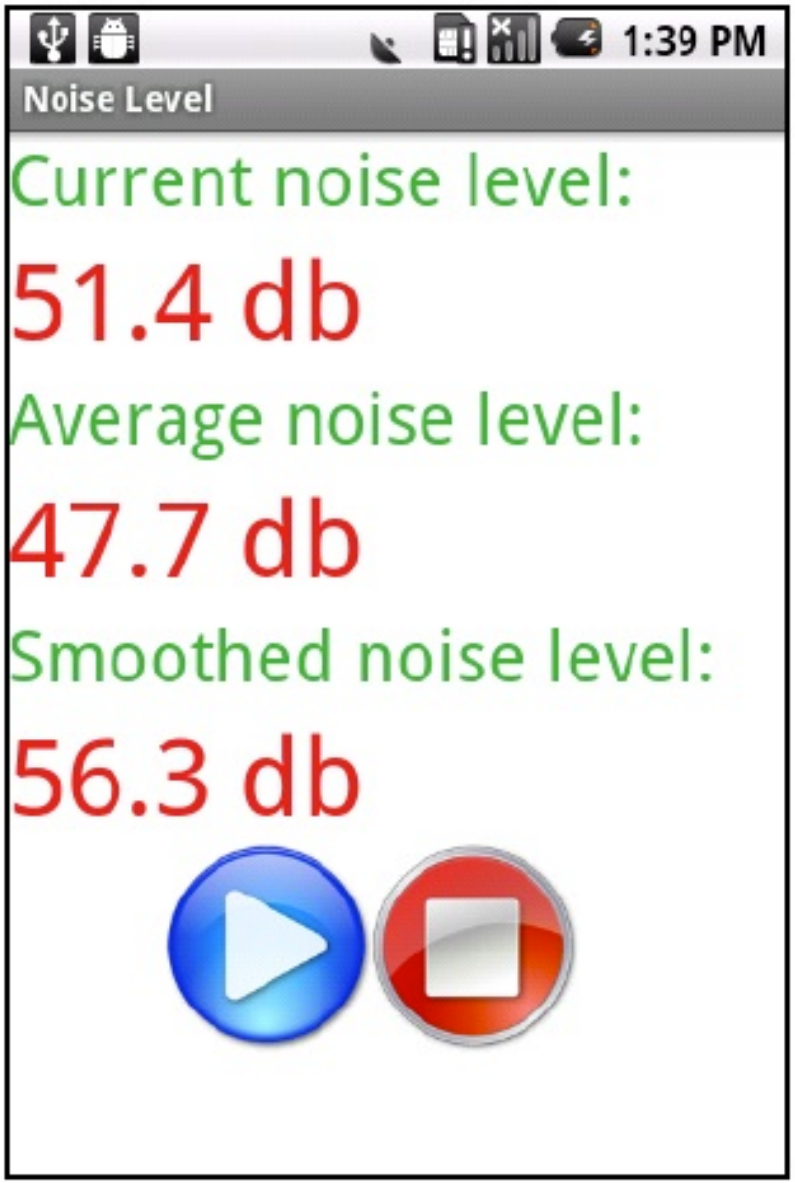
Sajad Shirali-Shareza

April 2011

Whimper – Noise Mapping

- 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



Daily Noise Measurement v. Time

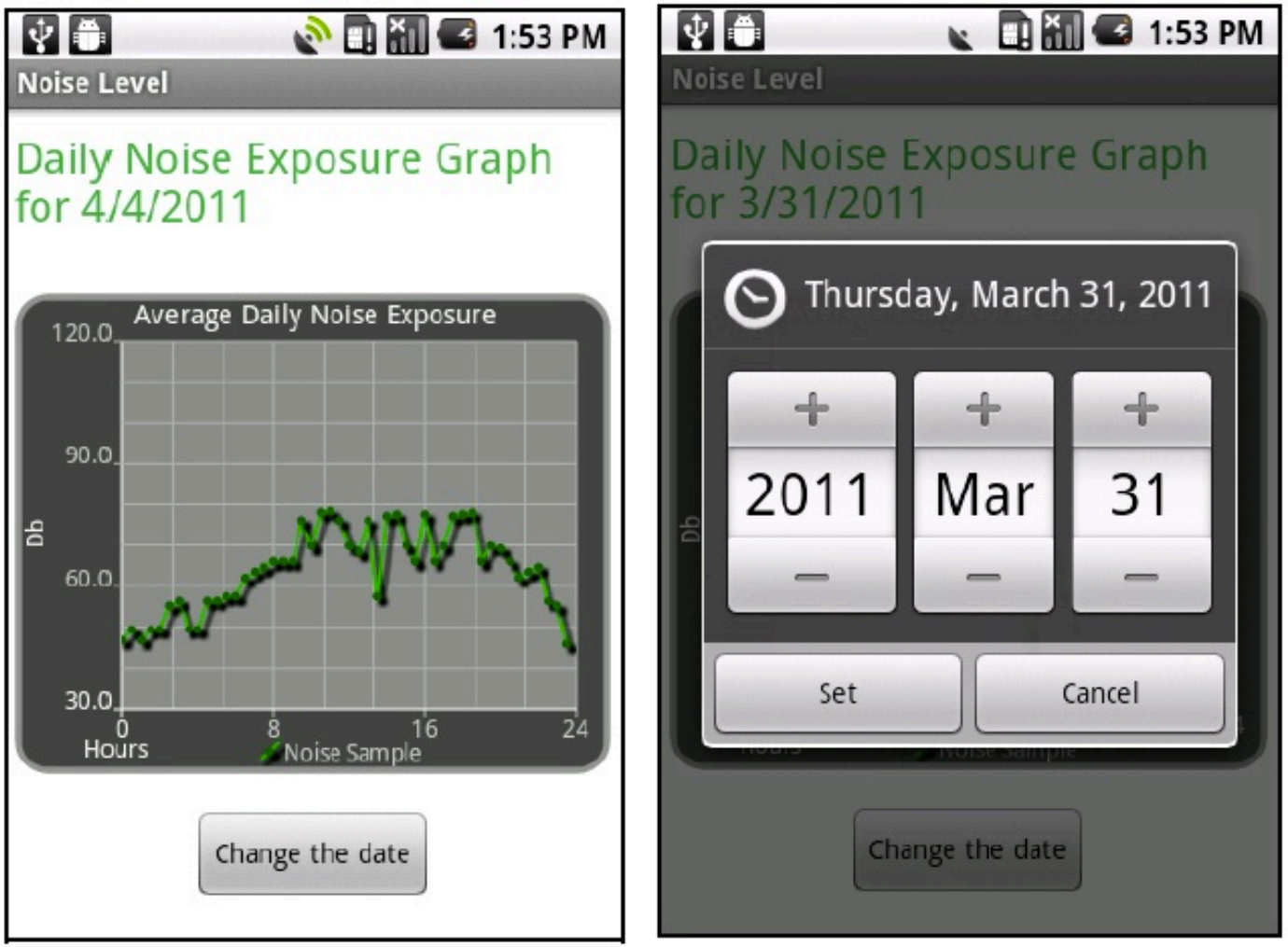


Figure 4. Noise exposure feature of the WhIMPeR application. The figure on the rights shows the ability to change the date for which the data is displayed

Noise Map

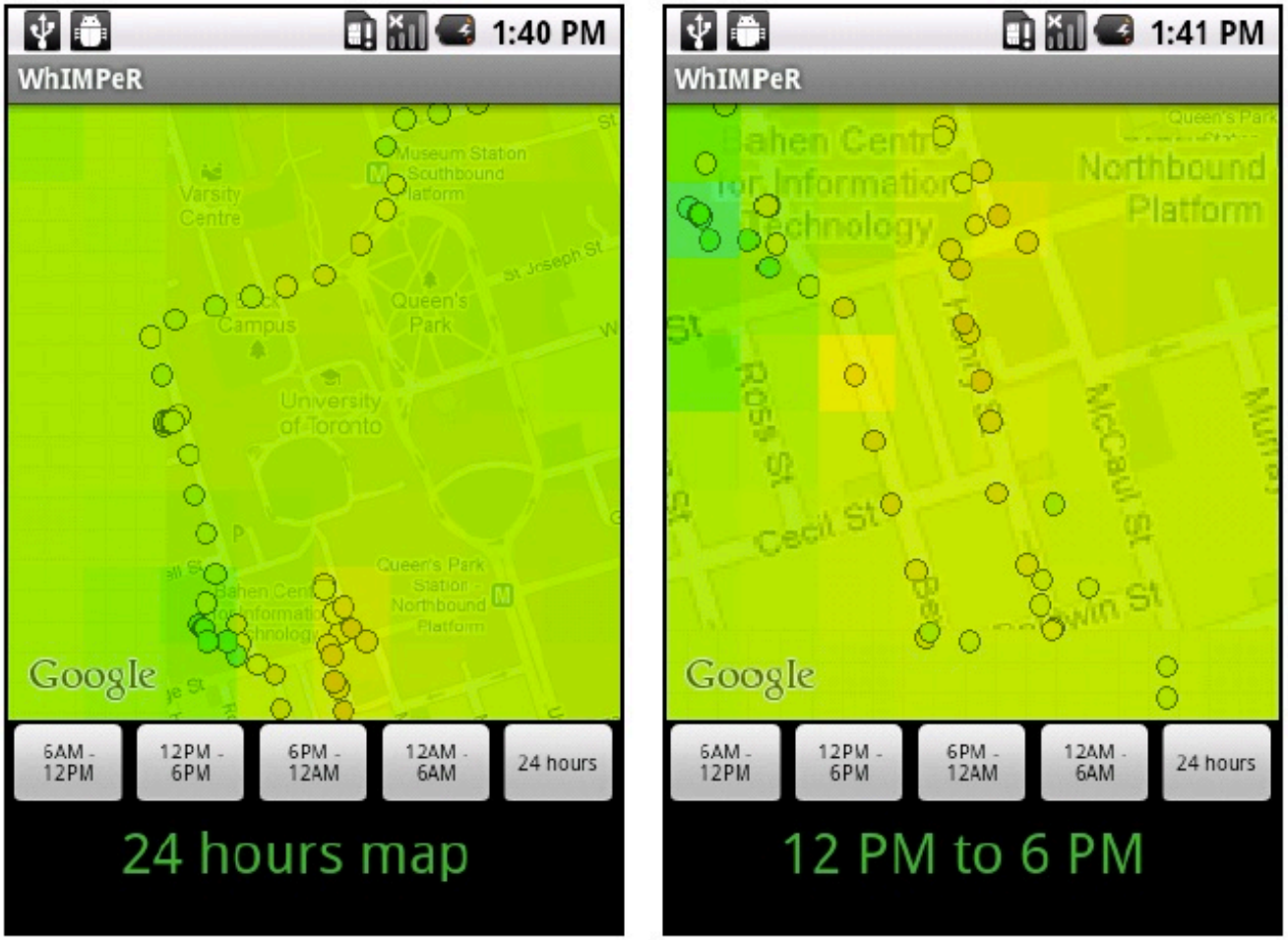
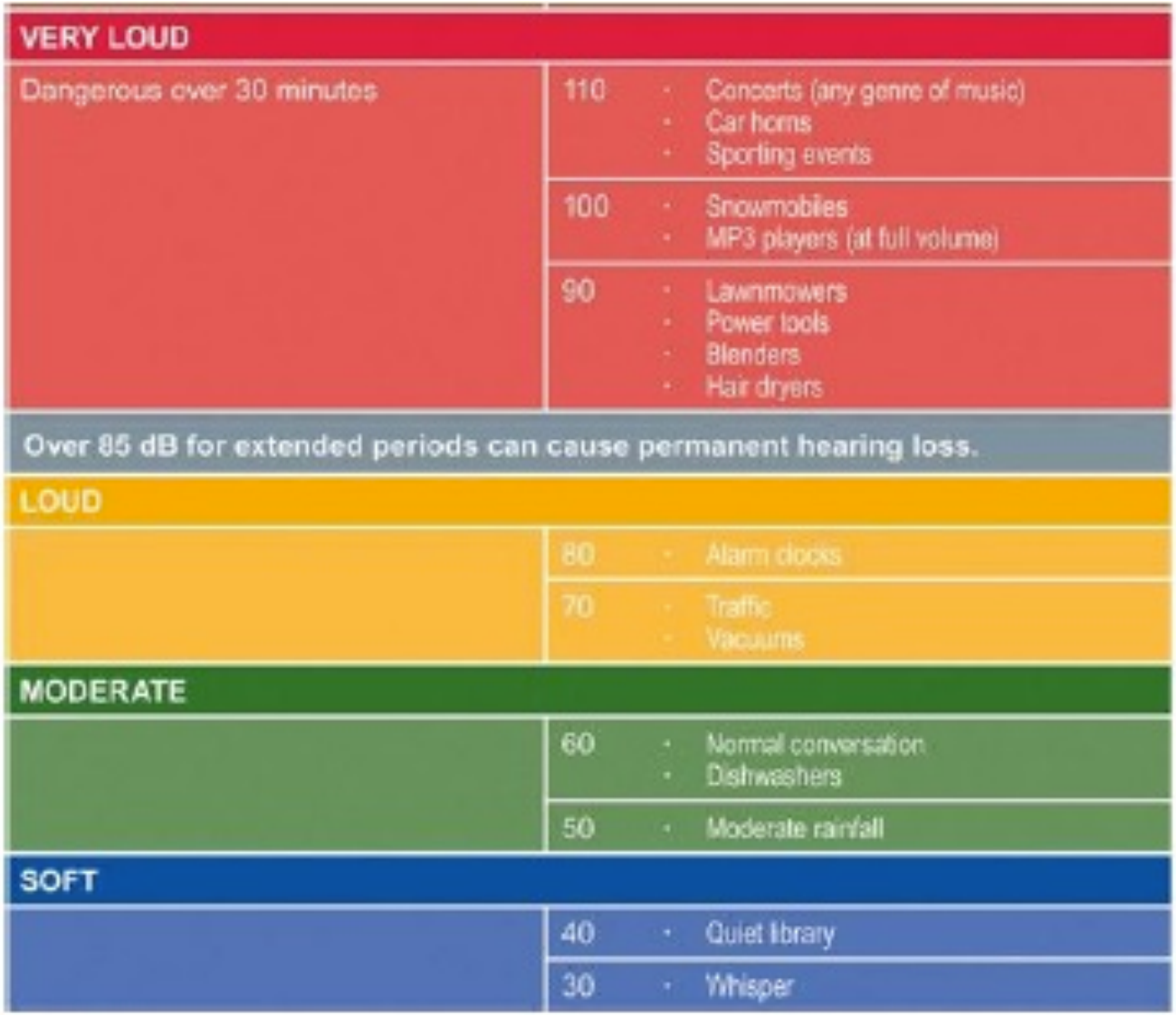


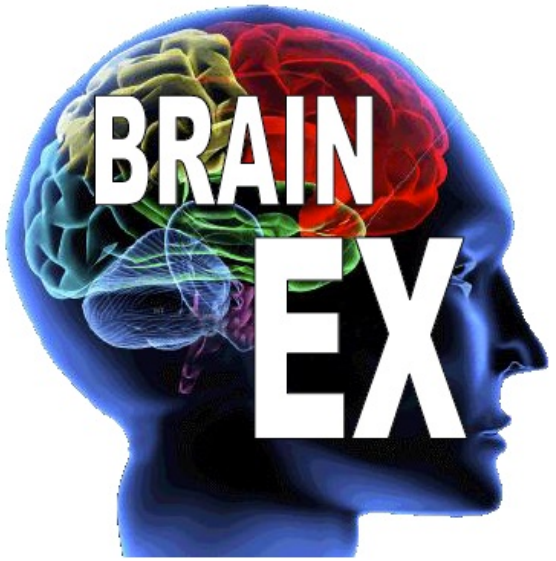
Figure 5. Noise map showing selected points of the noise data as well as a noise intensity overlay. The figure on the right shows the feature of time interval selection.

Noise Colour Code for Map



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.

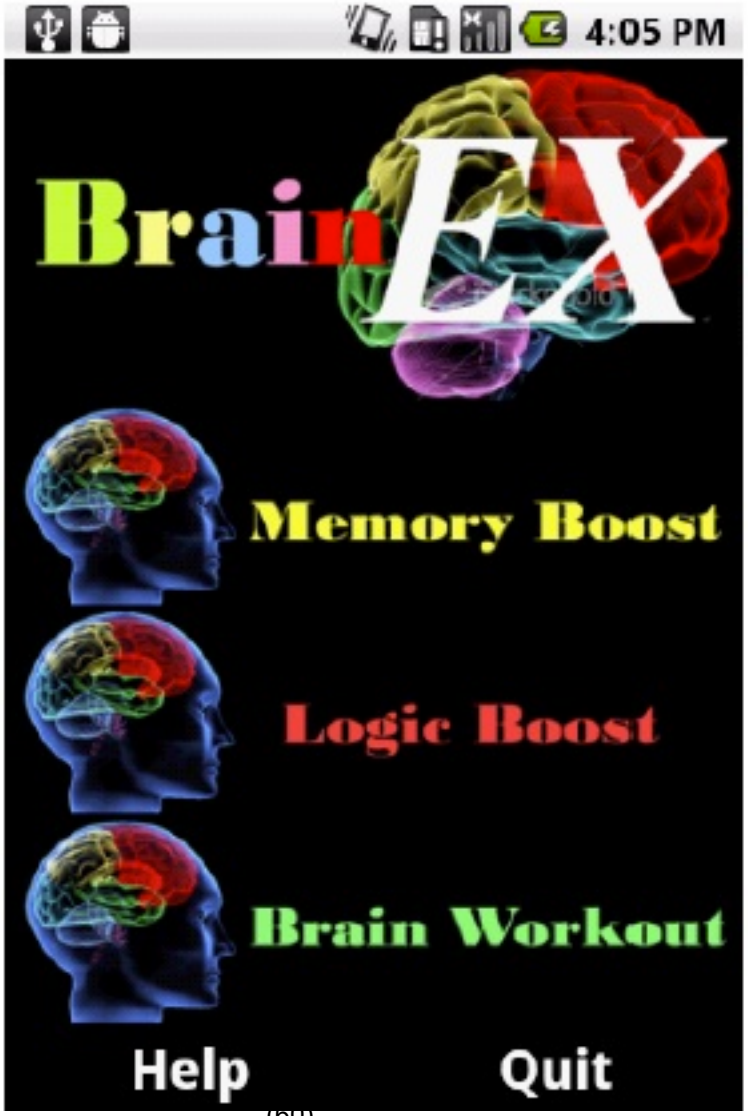
The Games

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

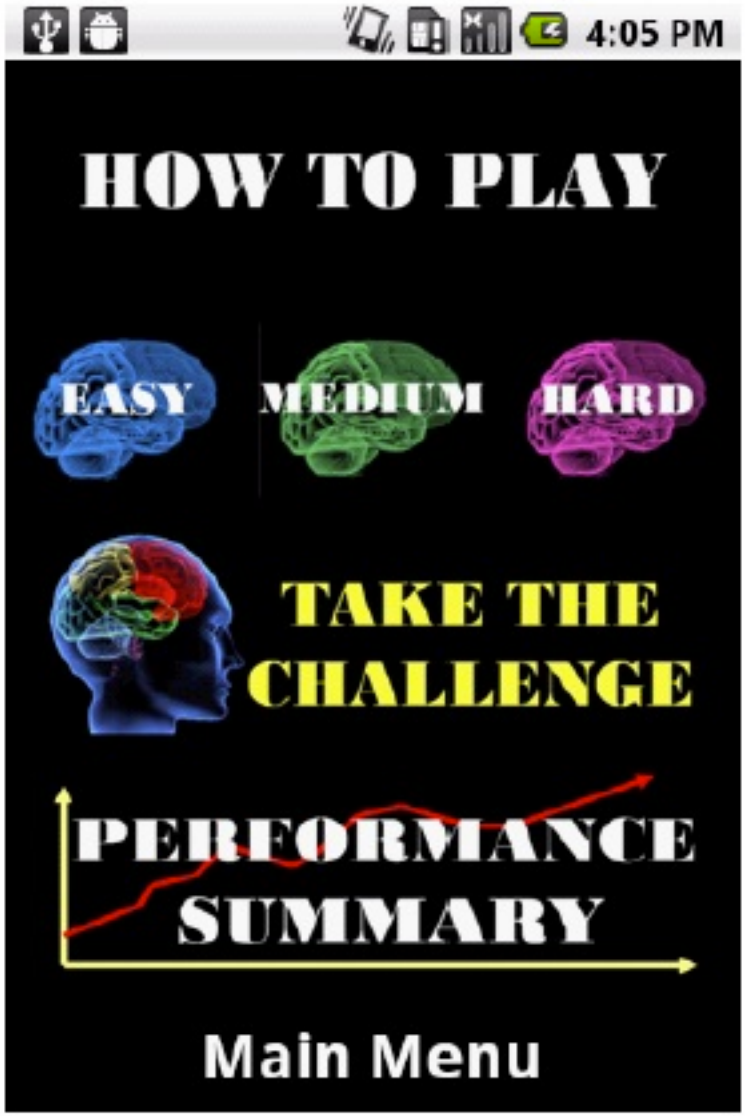
1. Game 1: designed to stimulate the user's memory,
2. Game 2: target the user's problem solving skills,
3. Game 3: targeting both memory and problem solving skills.

- Each game assesses the user's performance and speed and advances the game to increase the stimulation of the brain.

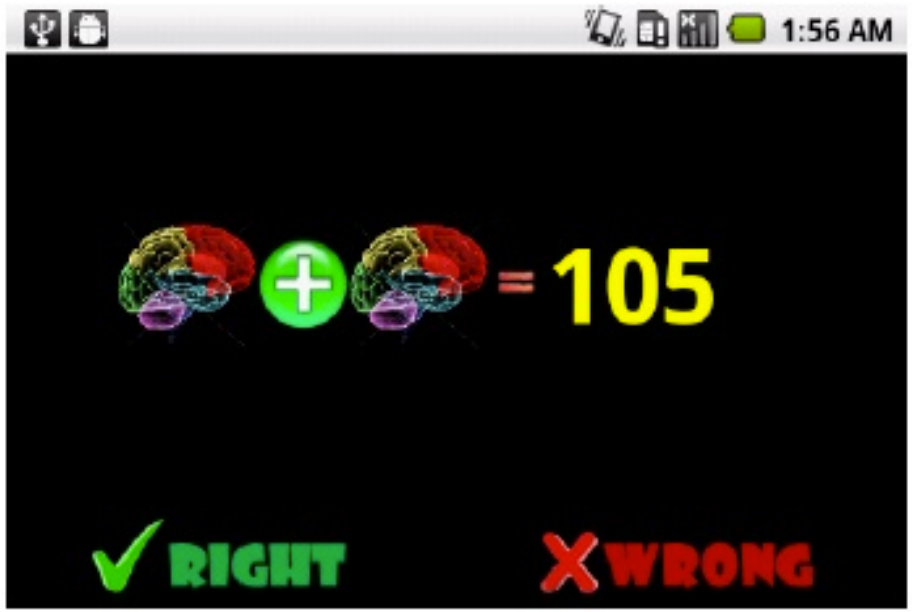
Starting Screen – Choose Game

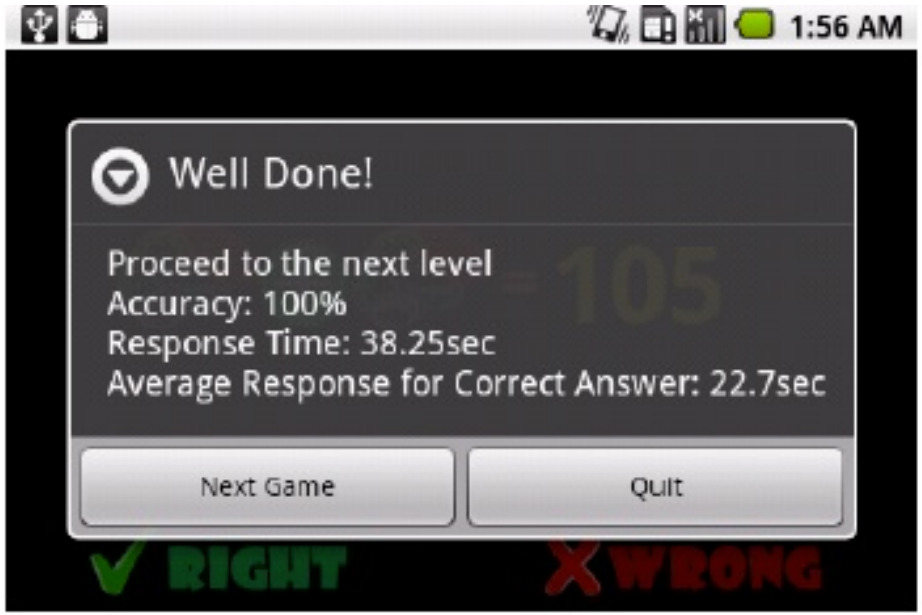


How To Play


4:05 PM
HOW TO PLAY
EASY
MEDIUM
HARD
TAKE THE CHALLENGE
PERFORMANCE SUMMARY
Main Menu

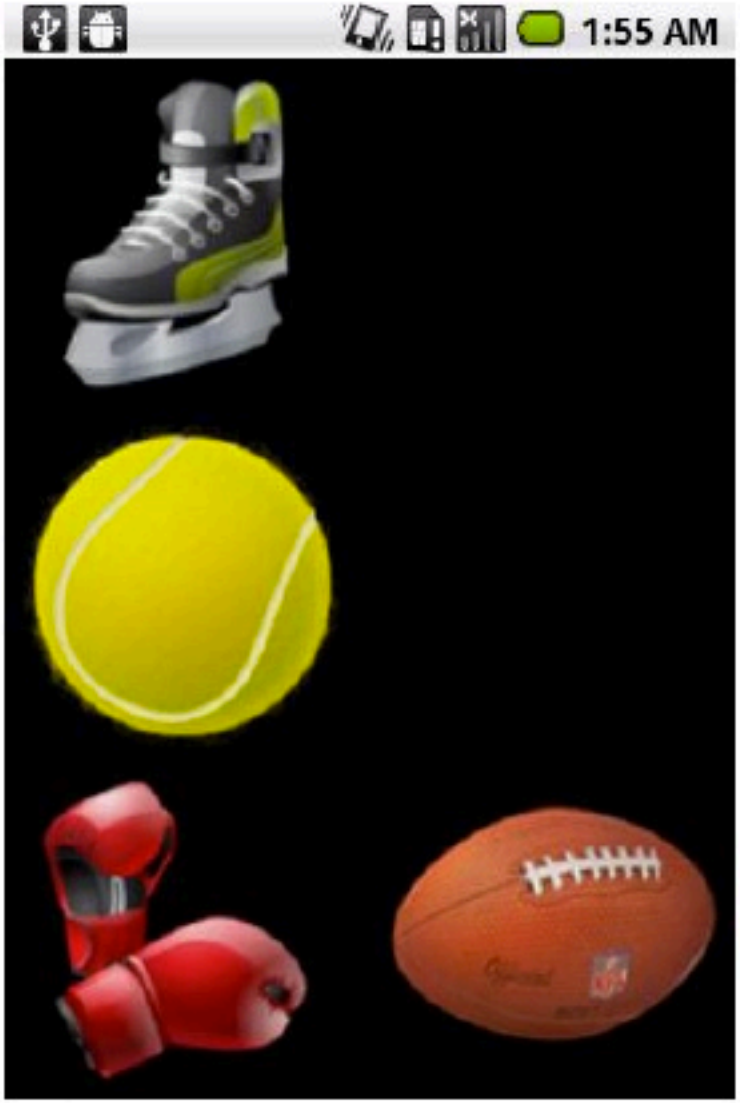
The Result

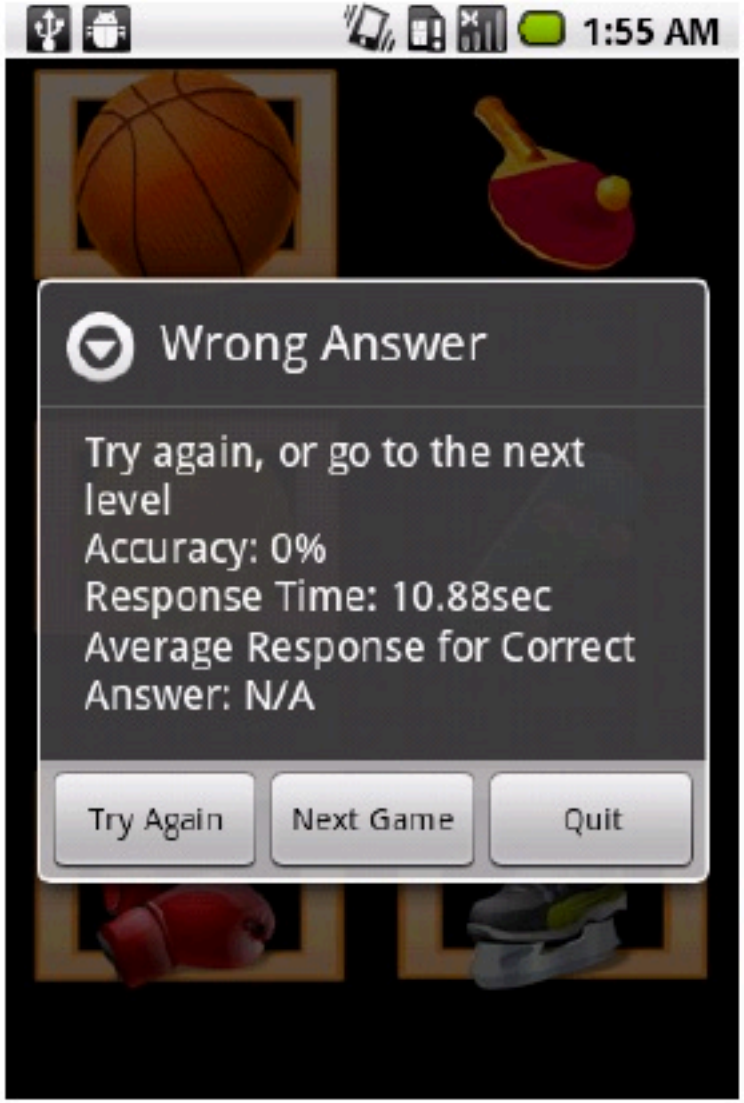

1:56 AM
=105
RIGHT
WRONG


1:56 AM
Well Done!
Proceed to the next level
Accuracy: 100%
Response Time: 38.25sec
Average Response for Correct Answer: 22.7sec
Next Game
Quit
RIGHT
WRONG

Number Calculation

Sport/Pictures





Summary of Results

APPnea: A Sleep Apnea Detection Android App

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

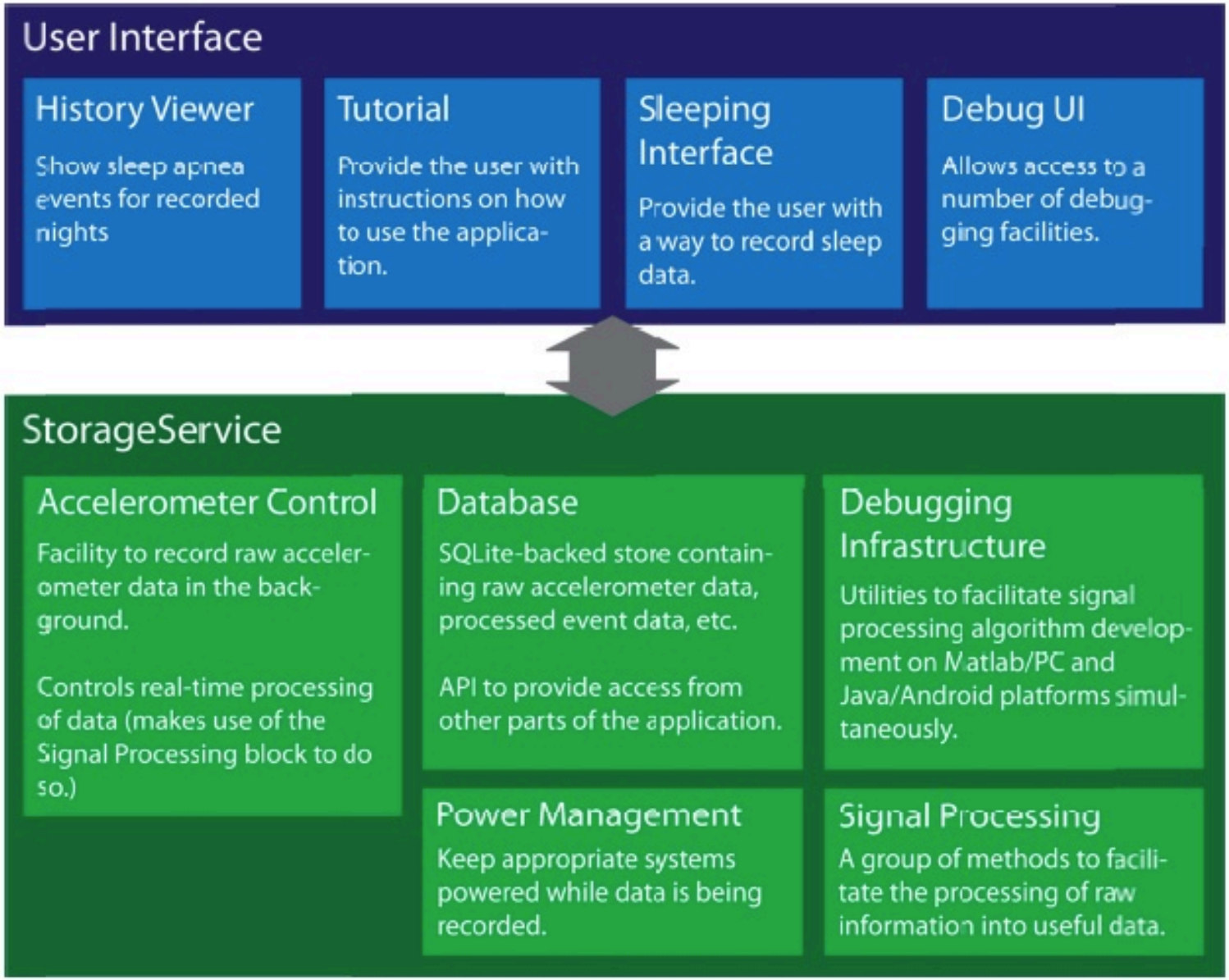
- Key issues in Apnea detection and treatment:

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.

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.

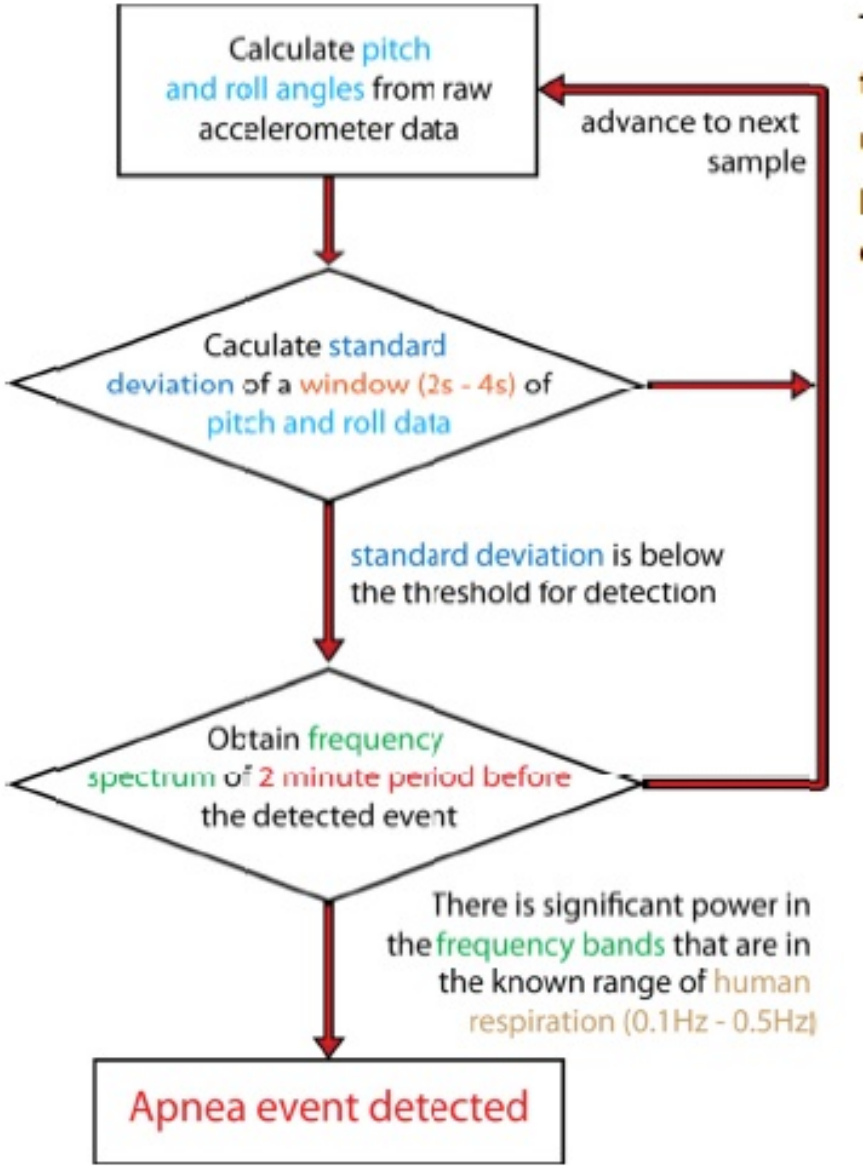
Application Software Architecture



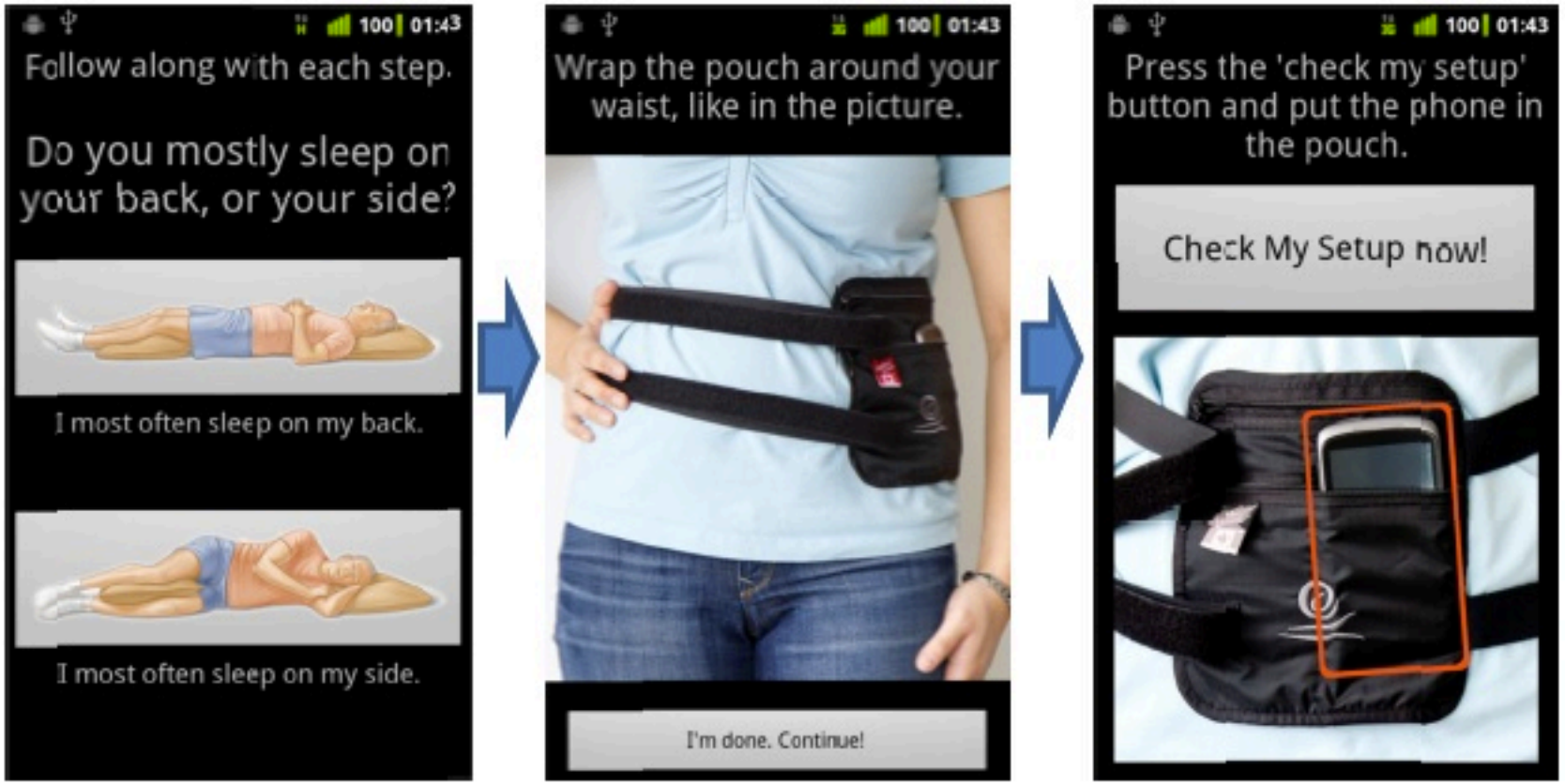
Detecting an Apnea Event

- 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

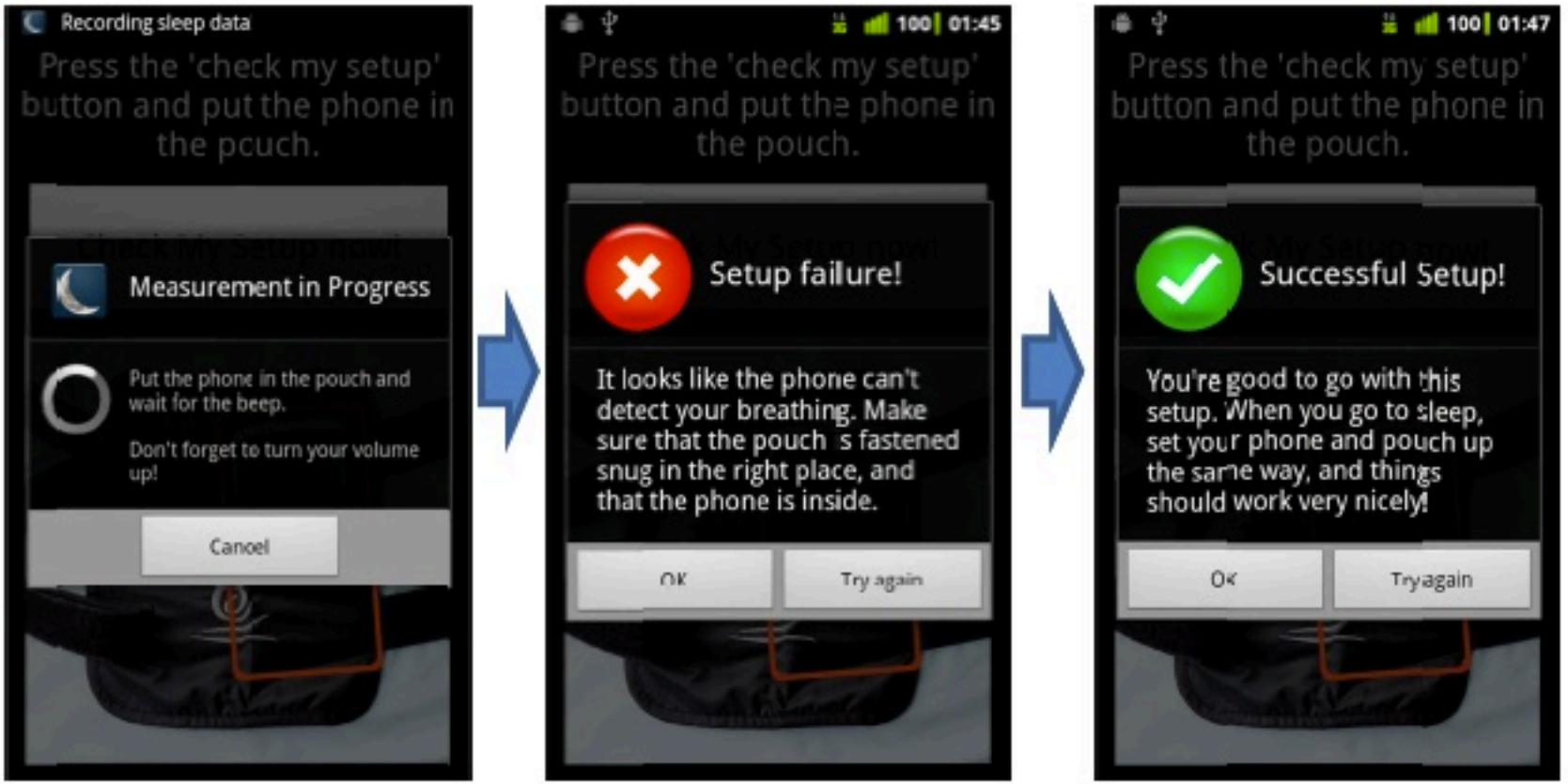
Detection Flow



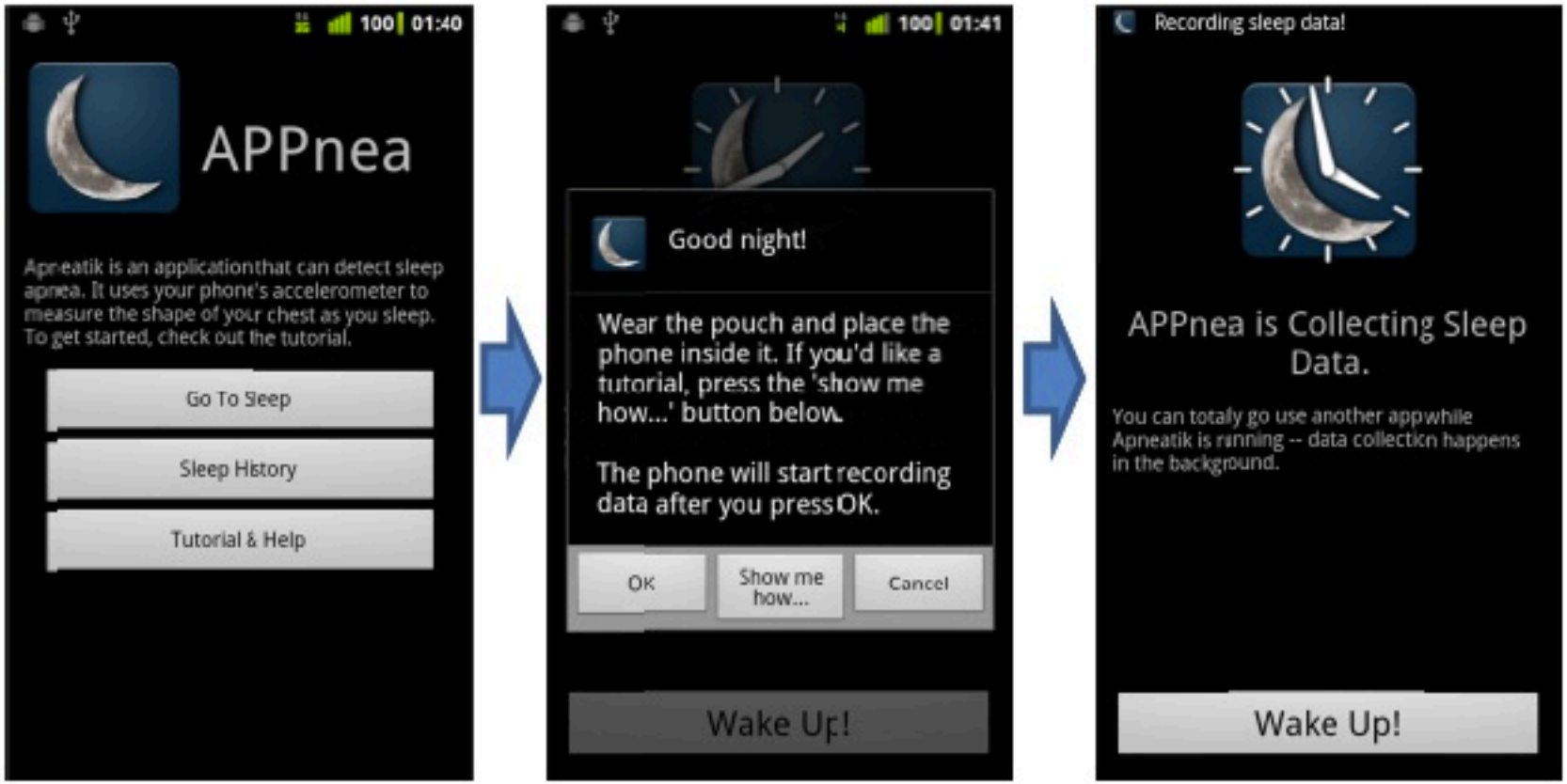
User Tutorial 1



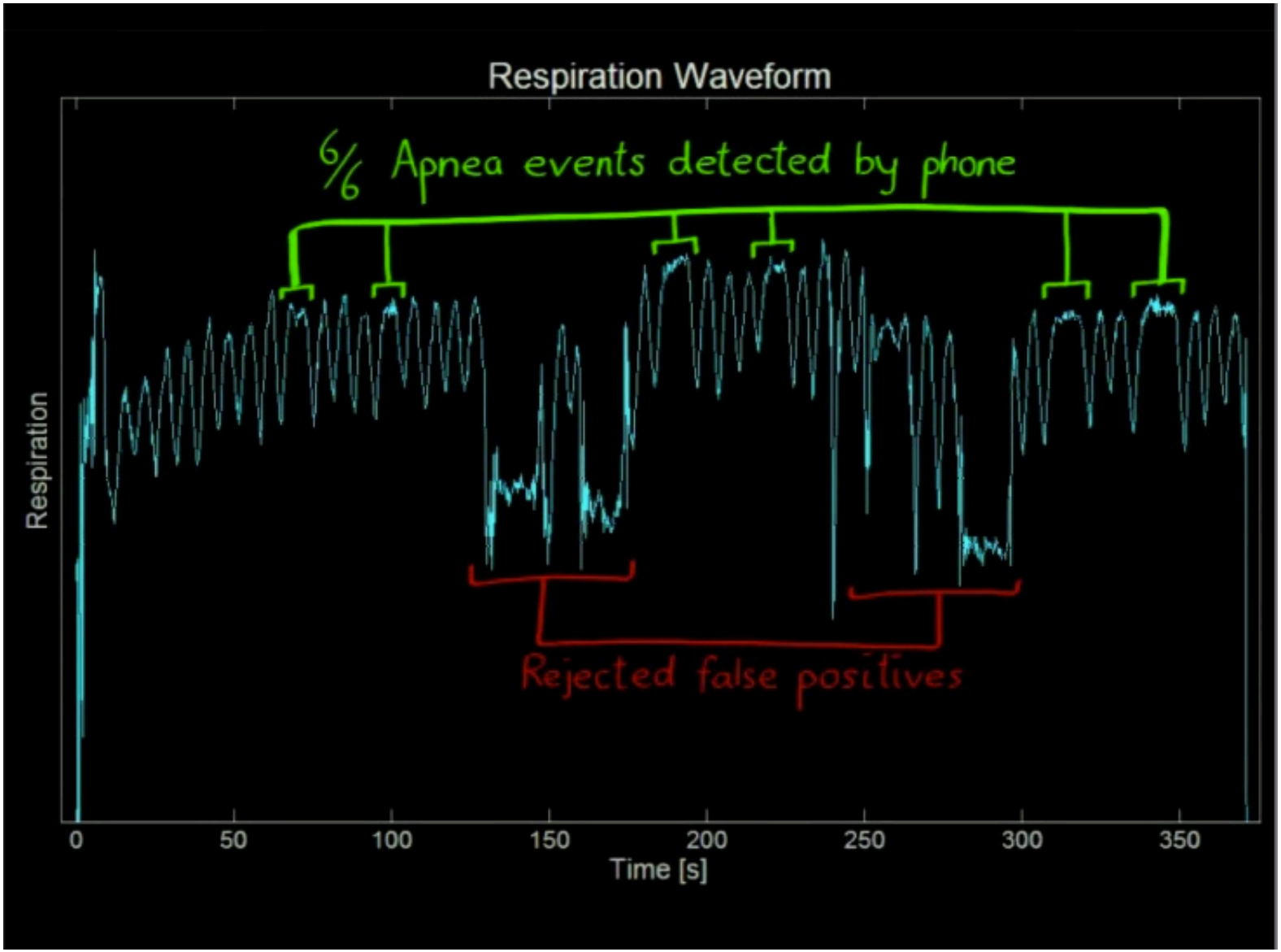
User Tutorial 2



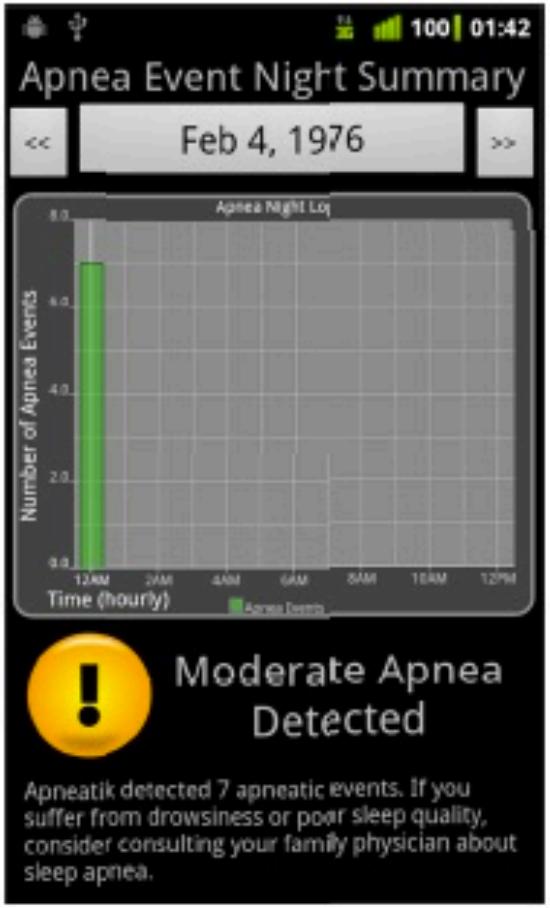
App Controls

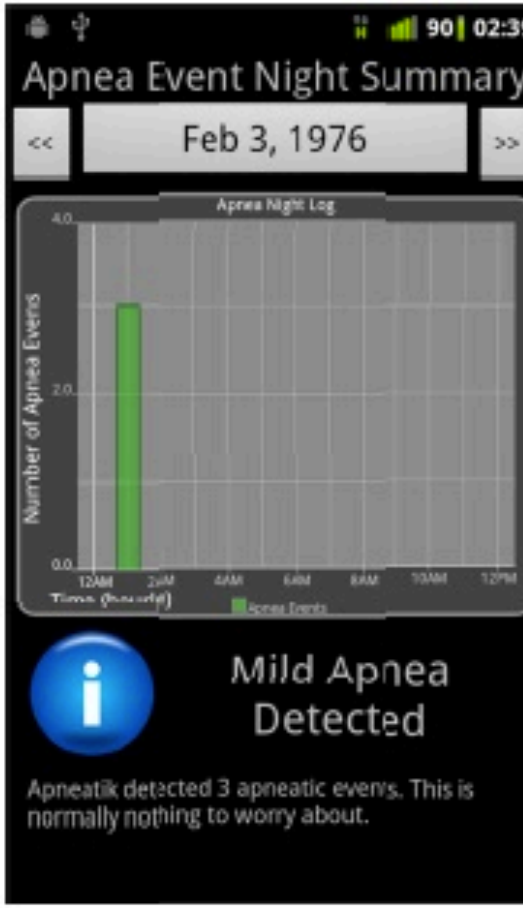


Example Collected Data



Output From App





Surgical Black Box

Reviewing Surgery & Detecting Errors

Ted Avery
Jill Cates
Eddie He

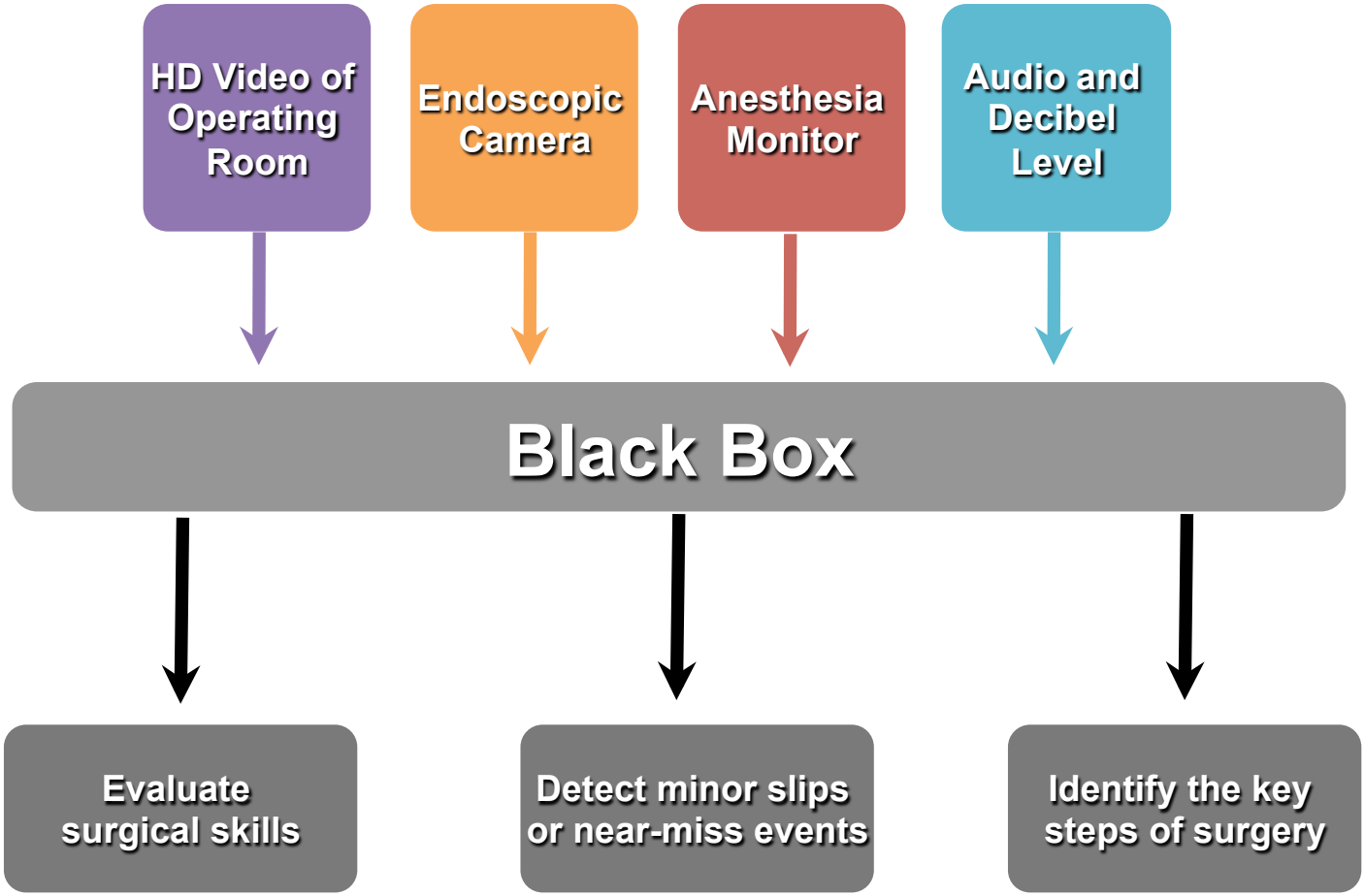
April 2012

Surgical Errors

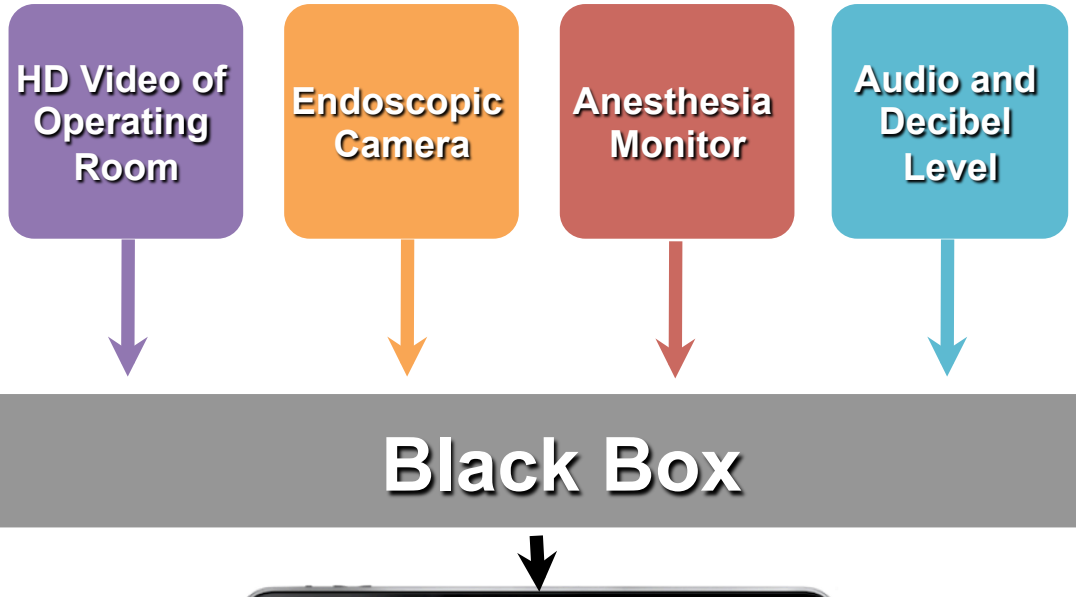
- In 2004, it was estimated that 9,000 to 24,000 Canadians die each year as a result of preventable medical errors
- Studies have shown that at least half of all surgical complications are avoidable

Baker GR et al. *CMAJ* 2004:170:1678-85 ; Haynes et al. *NEJM* 2009:360:491-9.

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

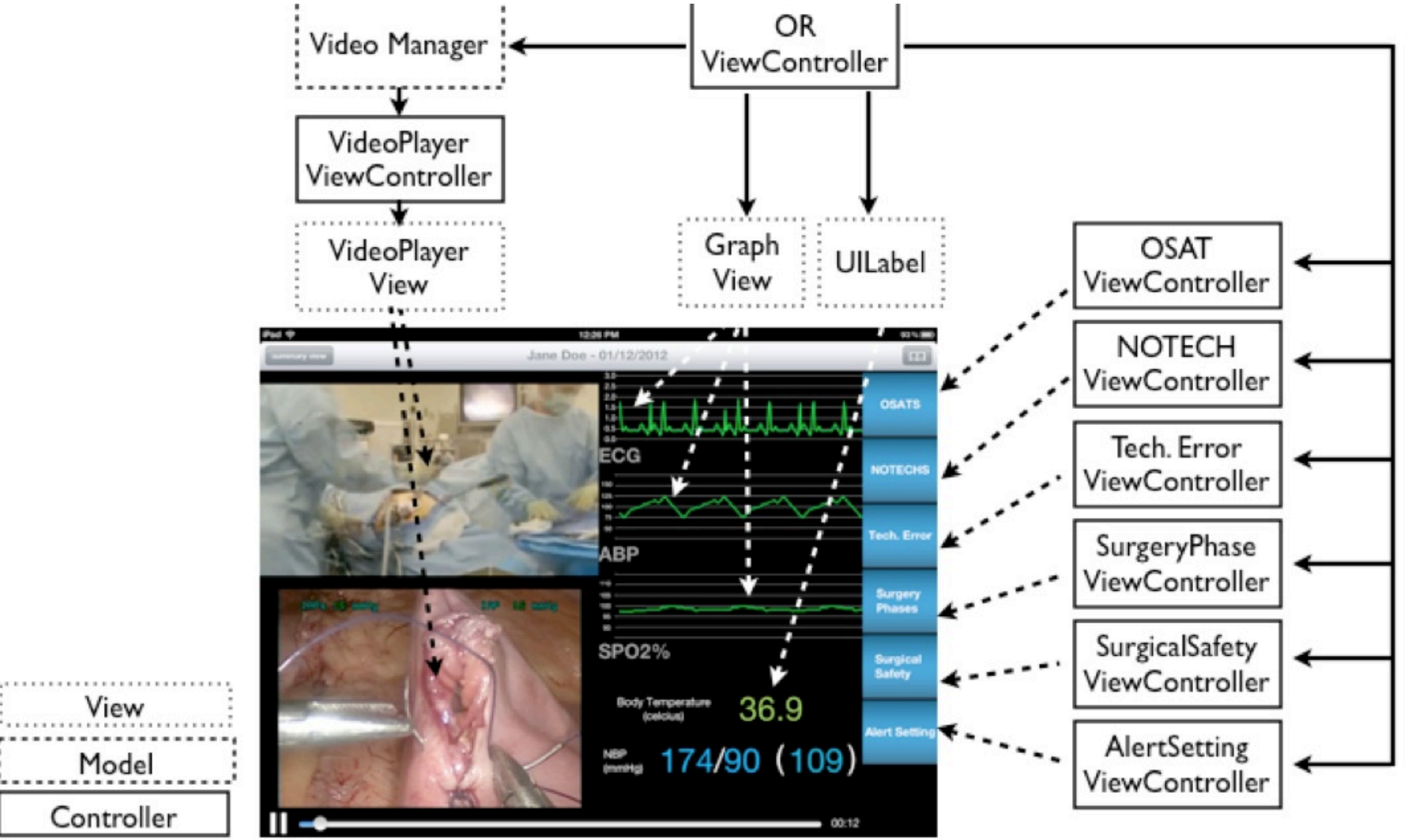


Live Mode
real-time streaming
to a remote location

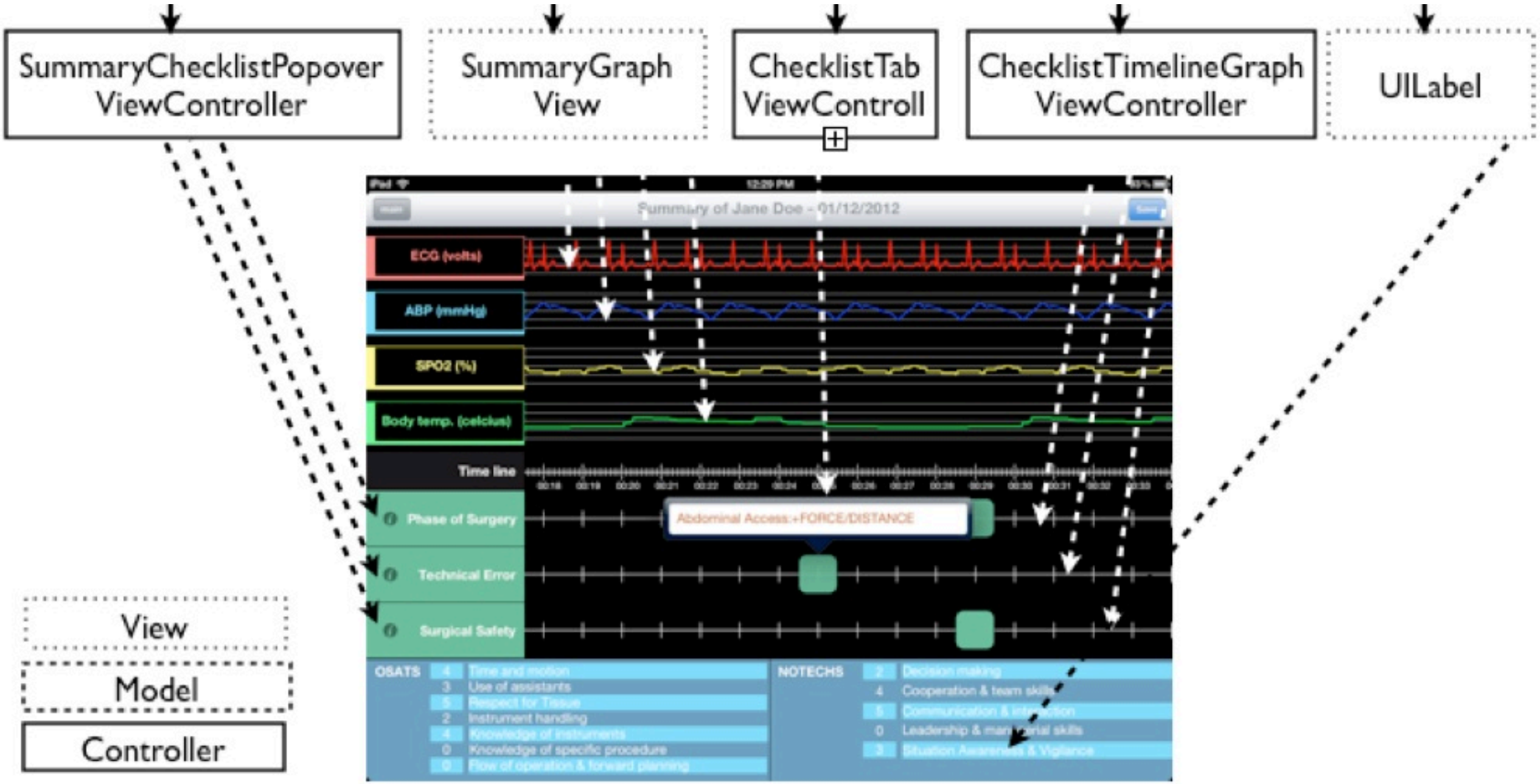
for ECE1778

Review Mode
post-operative analysis of a surgical procedure

Endoscopic Video and Data Views



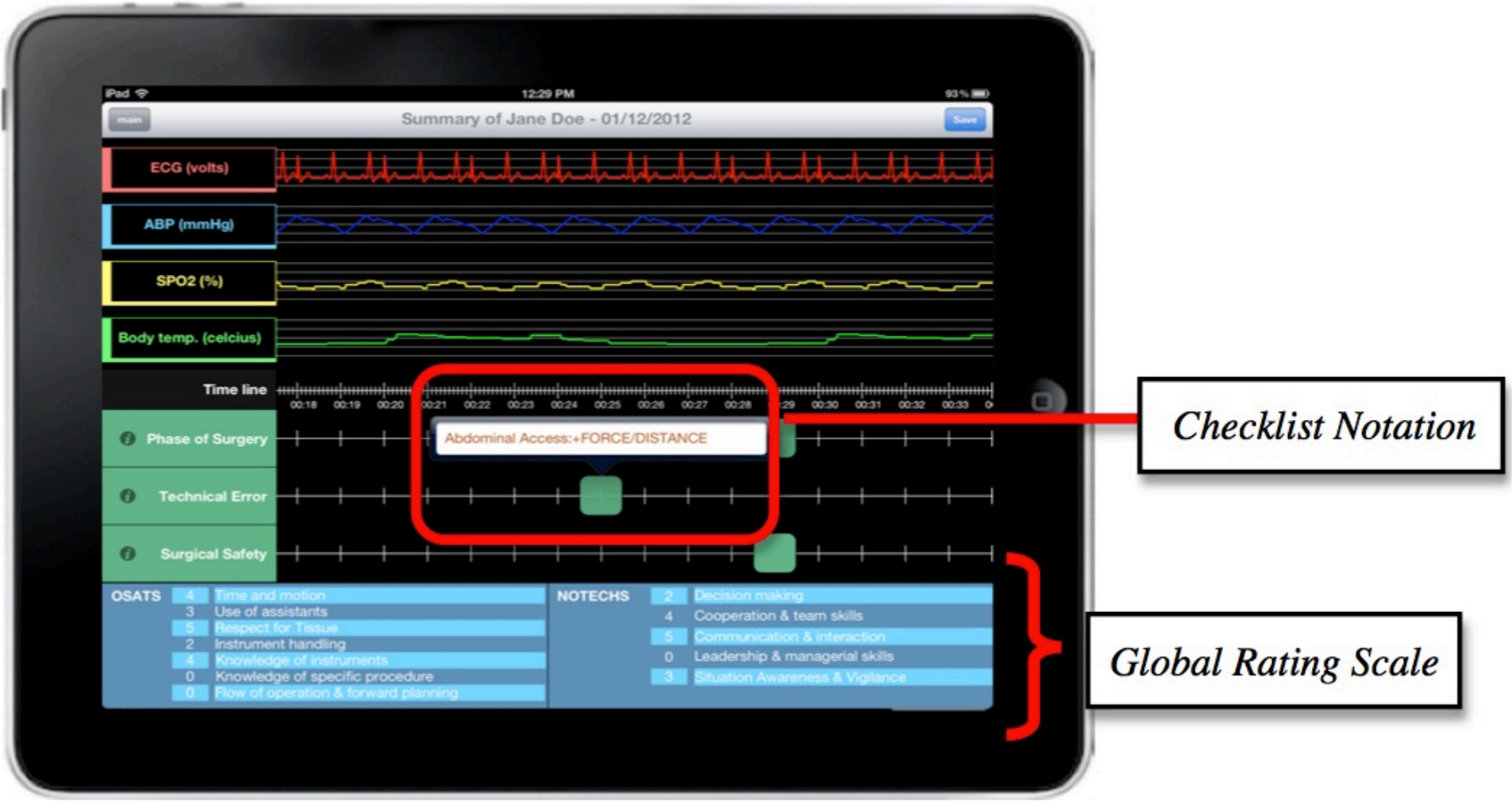
Data Time Line



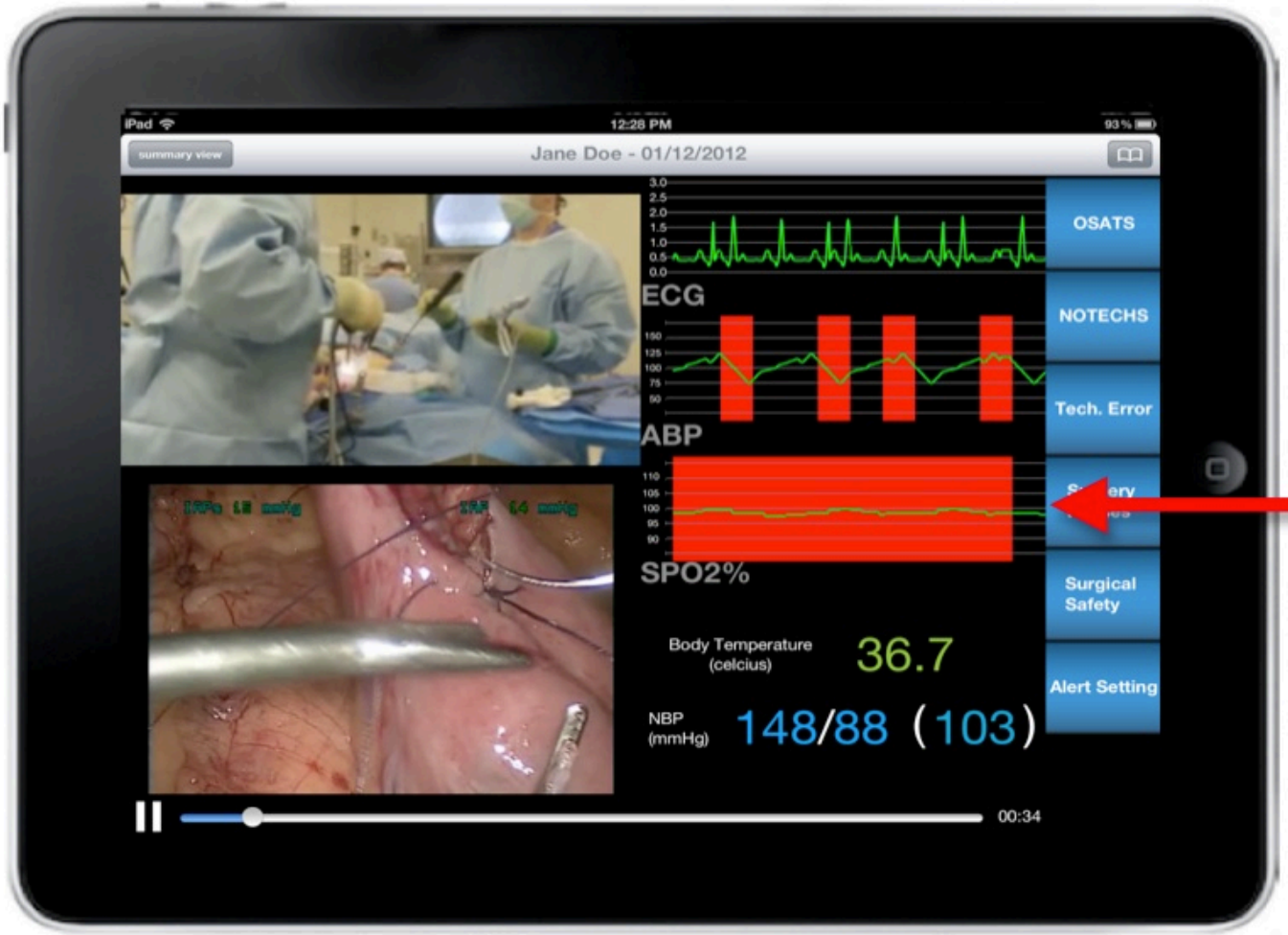
Annotation

Toolbar contains checklists and global rating scales (NOTECHS, OSATS)

Annotation – found mistakes!



Alerts



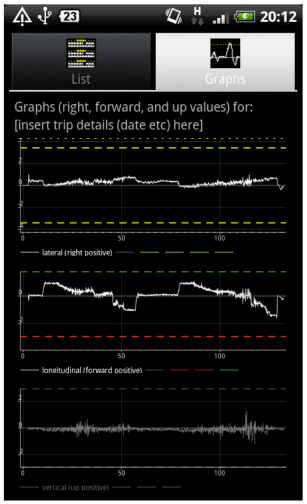
Alert: Arterial blood pressure (ABP) values have exceeded the threshold levels.

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

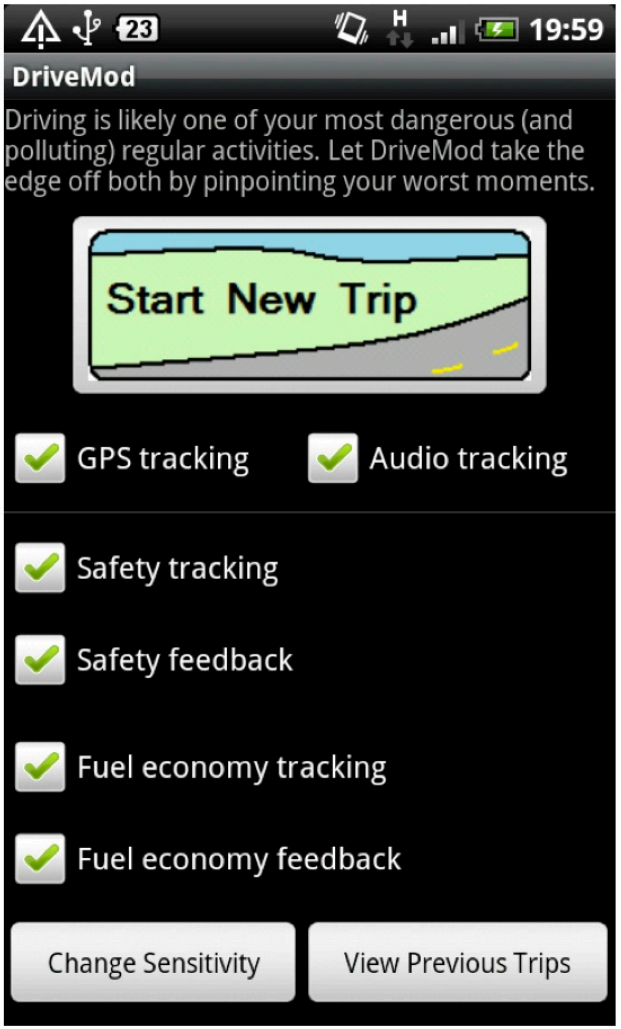
Bad Driving Kills People

- 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)

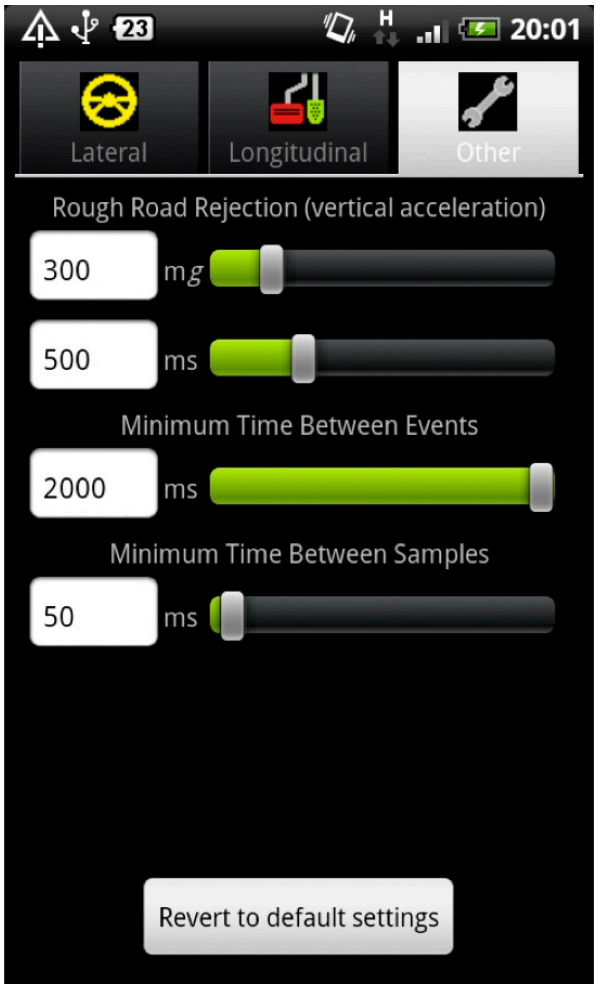
- 2,500 in Canada
- 34,000 in USA

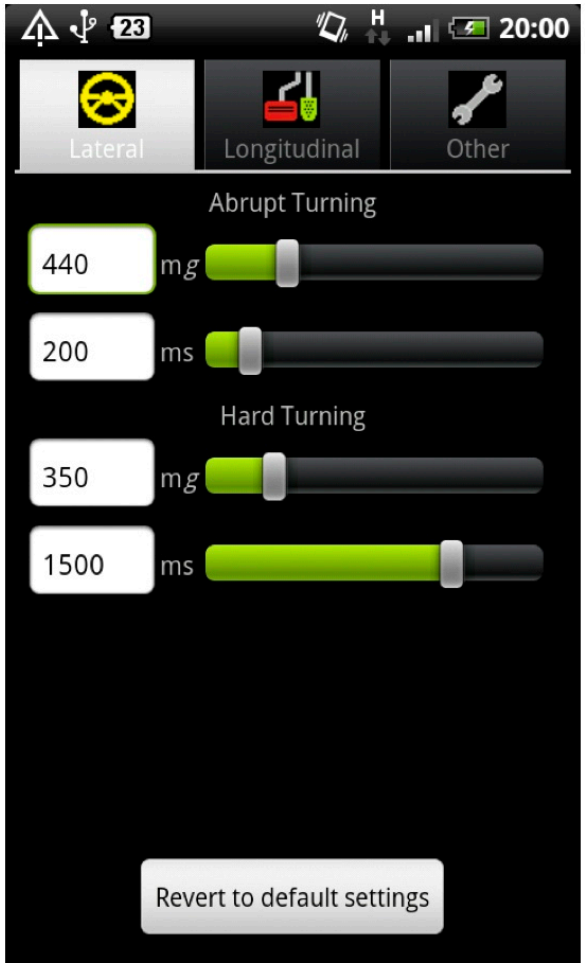
DriveMod Detects Bad Driving Events

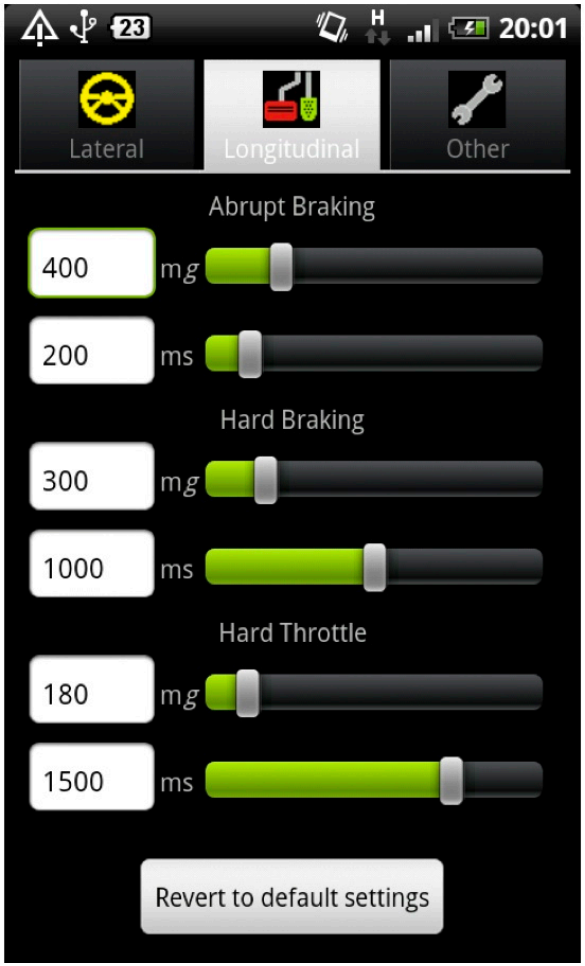
- Steering
  - Abrupt
  - Hard
- Braking
  - Abrupt
  - Hard
- Throttle
  - Hard



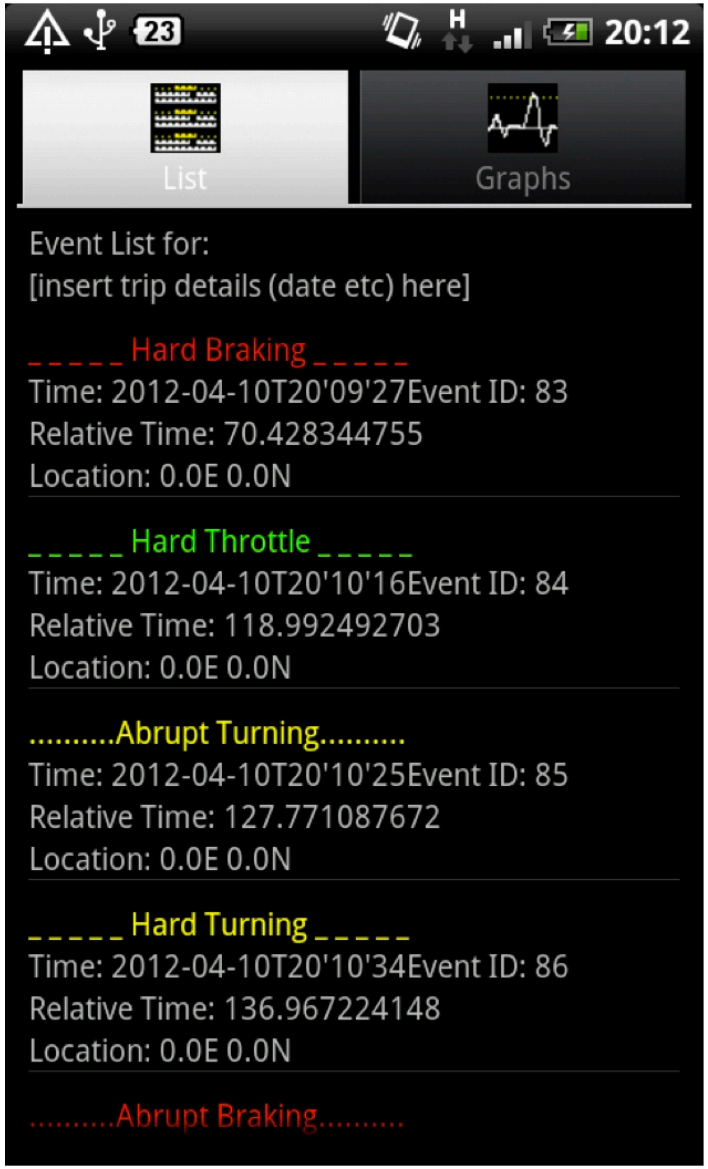
Set Thresholds to Detect Events

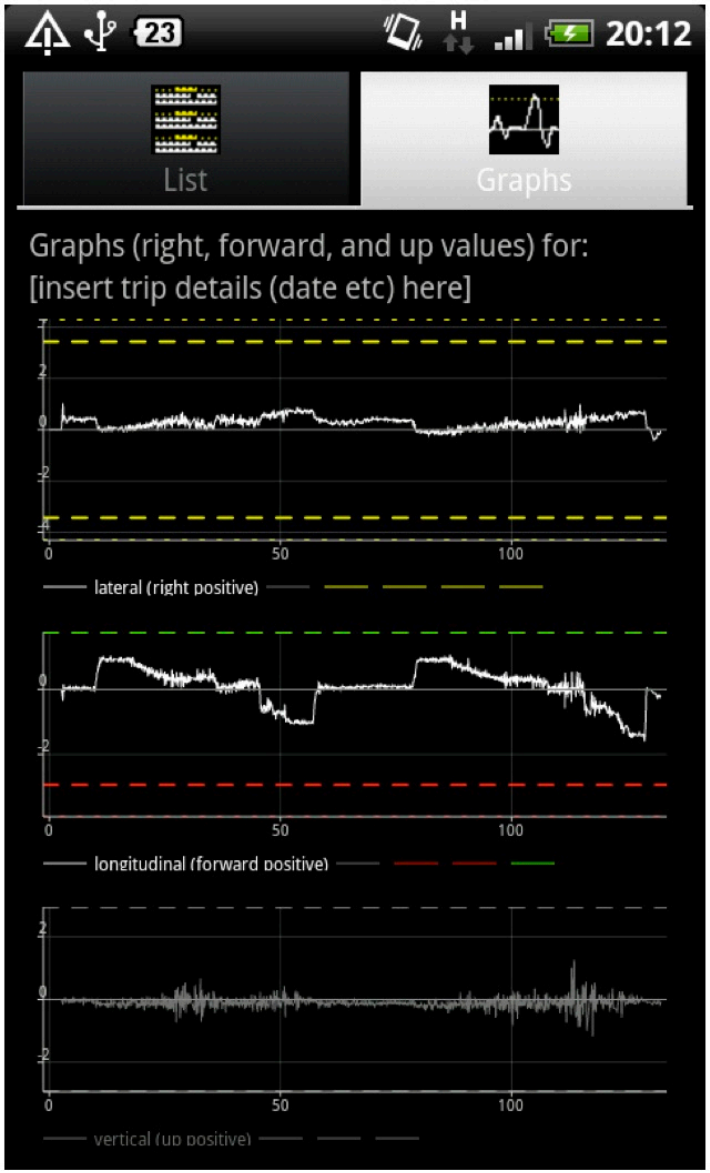






After Driving – See What Happened!





My App: TeamChooser

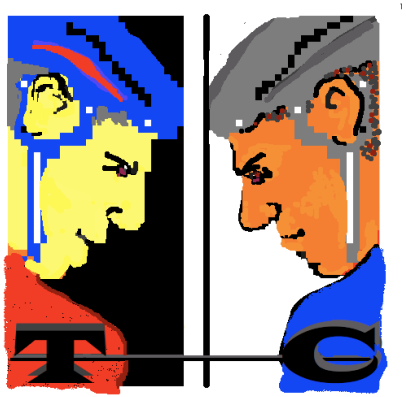
Solving a Problem

The Problem

- In pick-up team sports games, we like to have fun
- It is good if the teams are ‘even’ so that the game is fair
- Someone usually has to pick the teams
  - That is hard to do well
  - People get mad at that person when the game is uneven
- Random teams can be bad
- Using Team Captains to select
  - means someone is selected last ☹

The Solution: TeamChooser

- Wouldn't it be great if an App made the teams?
  - No one to yell at
  - Possibly give better teams



- Who needs this?

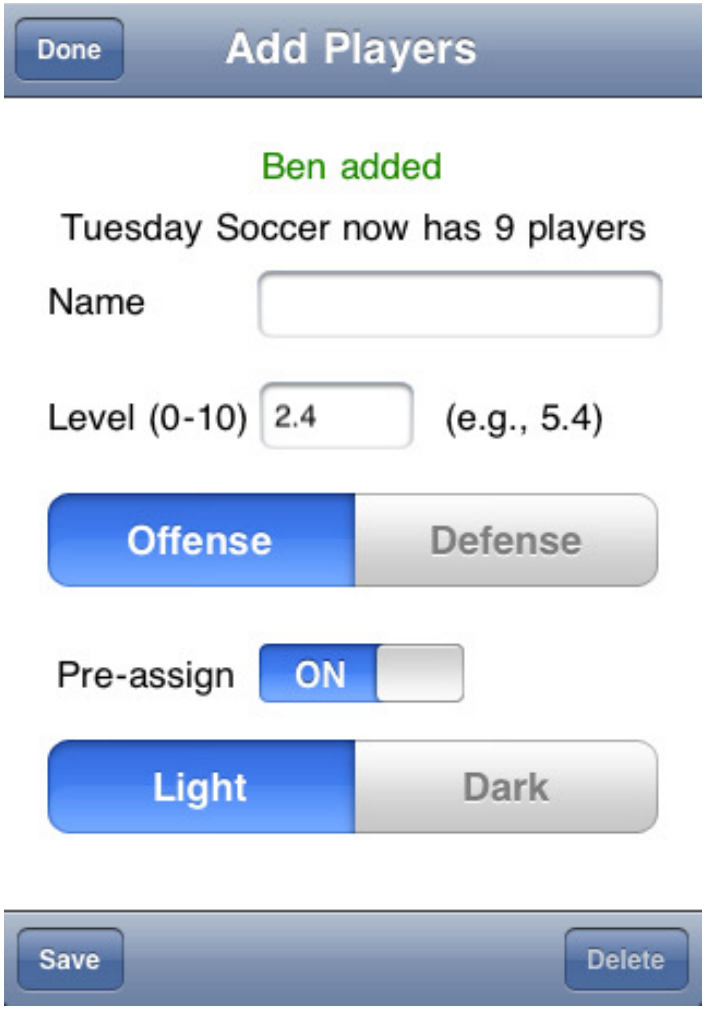
- Every pick-up hockey, soccer, basketball game around!

TeamChooser: How It Works

- Enter every user in advance of game day
  - Player's name
  - Preferred position (offence or defense)
  - **A rating, from 1-10, as to how effective player is**
    - Rating is the trickiest part
    - Key: keep ratings secret from all but a few
    - (apps **are** personal)

- On game day – select all players present
- Push 'Make Teams'
  - And voila, two evenly matched teams

Entering Players



Selecting Present & Making Teams

Team Selection Method

- A good method, used over the years
  - Sort in order
  - Top goes to team A
  - Next 2 to team B
  - Next 2 to team A …
- More complex when dealing with pre-assigns, or making incremental changes to teams when someone shows up late; new release including special ‘odd man’ algorithm
- Many discussions from CS and ECE Professors over algorithms in hockey game

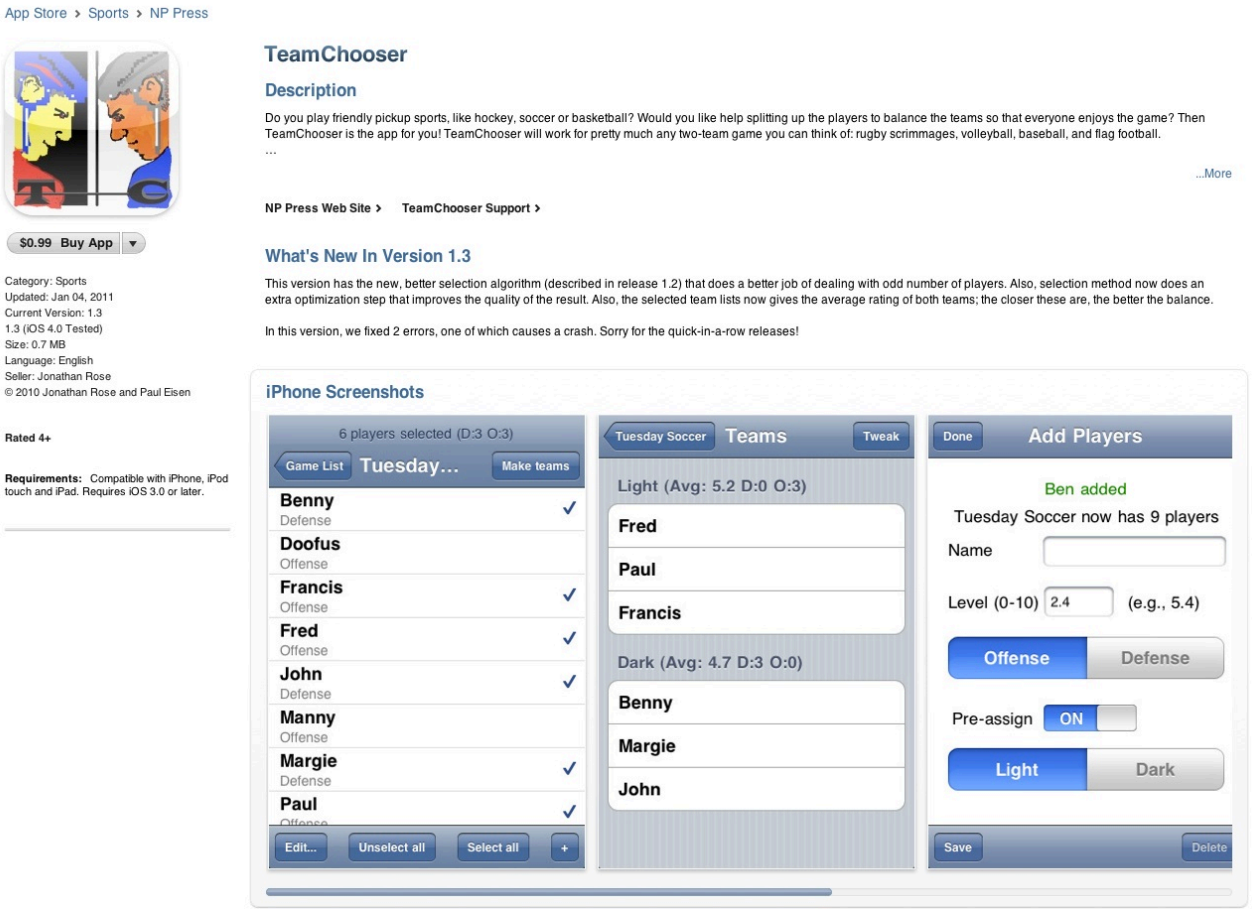
Does it Work?

- Yes!

- I've been using it with friends in roughly 150 hockey games and it has often done a good job.
  - We've tweaked it's algorithms here and there
  - Added some features
  - Occasionally very unbalanced games, bad luck?

- The rating of players gives rise to some unusual issues, sometimes funny, sometimes not.
  - Apps are **personal**

On iPhone App Store Since May 2010



- 250 Sales
- Mostly in US/ Canada, but a few in UK, Ireland, Japan, Norway, Romania, Portugal, Australia, Denmark, Finland

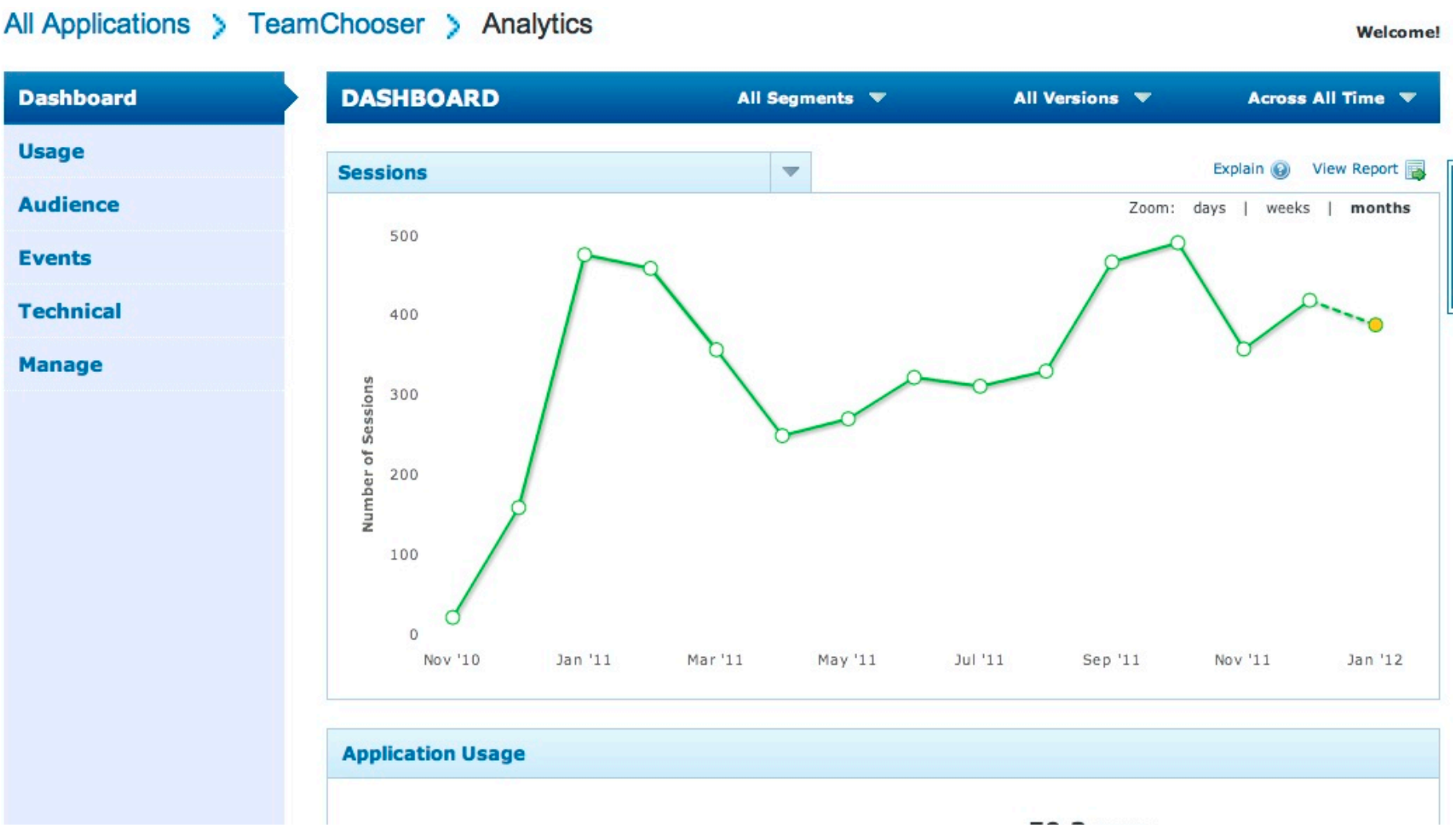
Improvements Needed

- **Really** needs a backing website
  - To support a business model of advertising, promotions related to sports
- Much discussion about using results of games to determine better ratings
  - Rating players is the most difficult part of using

Is Anyone Using it Who Bought It?

- Instrumented Using Flurry.com
  - Analytics for iPhone, Blackberry and Android
  - Very easy to insert into any app
- Reports:
  - # of users sessions, amount of time spent on app
  - Specific pages/events, as you wish from each user
  - Location of user, if already use GPS (no other ID).
  - **Anything I wish to report!**
- Flurry also gives guess as to age & gender of users!

Sample Flurry Reports



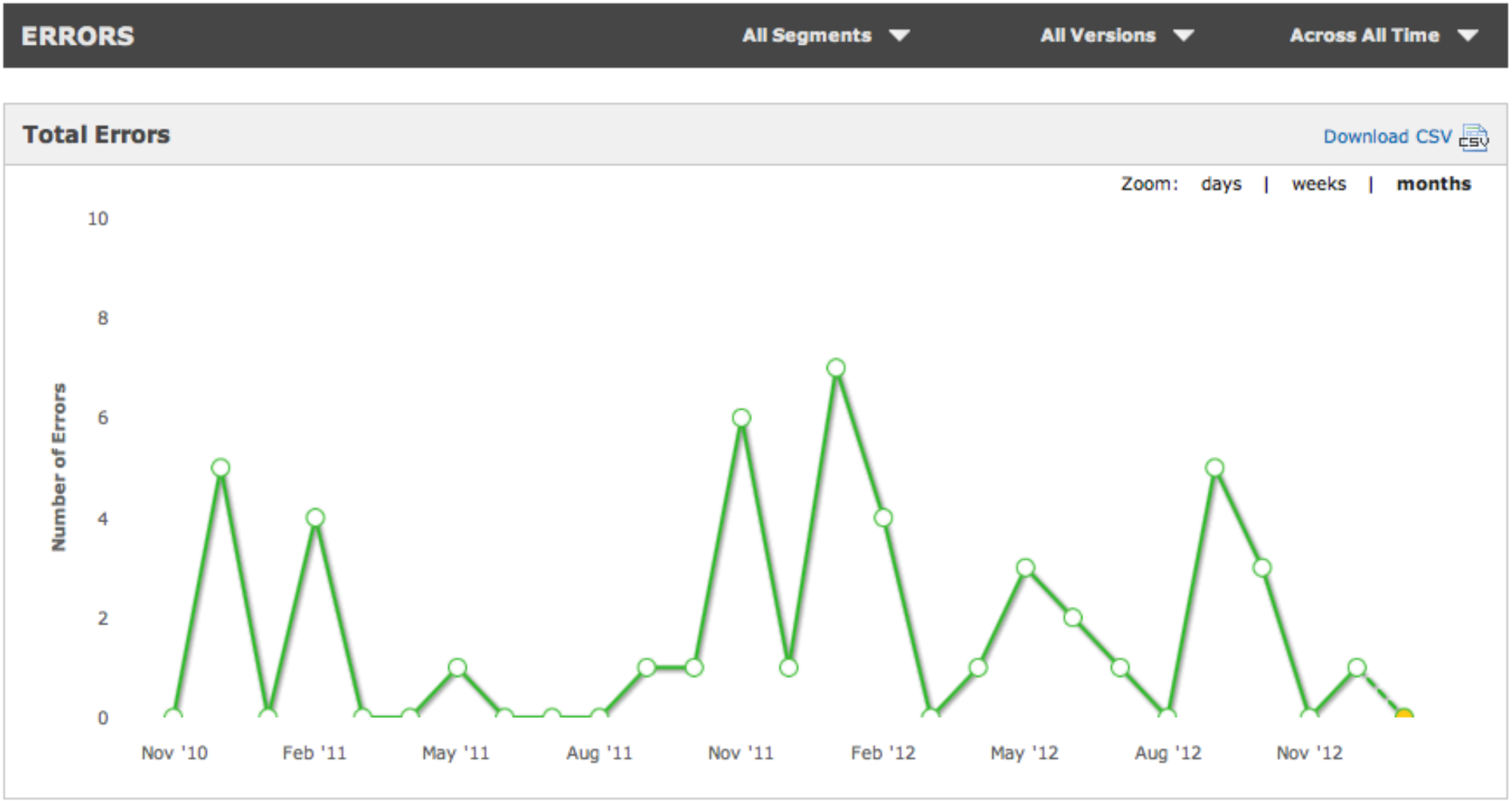
Event Logs

Global Event Logs

Page 1

Session Time	Version	Details
01/20/13 21:04:51 EST	1.5 (iPhone)	Apple iPhone 4s
1) **Teams Made**		
Game: Sunday Hockey ODBalOn A Avg: 5.14 Anum: 5 A pre: 0 A froz: 0 AOffAvg: 4.90 ADefAvg: 5.50 B Avg: 5.30 Bnum: 5 B pre: 0 B froz: 0 BOffAvg: 4.10 BDefAvg: 7.10: TeamScores		
01/20/13 20:36:09 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Teams Made**		
Game: Sunday ODBalOn A Avg: 7.47 Anum: 7 A pre: 0 A froz: 0 AOffAvg: 7.05 ADefAvg: 8.03 B Avg: 7.47 Bnum: 6 B pre: 0 B froz: 0 BOffAvg: 7.80 BDefAvg: 6.80: TeamScores		
01/20/13 20:34:20 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Teams Made**		
Game: Sunday ODBalOn A Avg: 7.47 Anum: 7 A pre: 0 A froz: 0 AOffAvg: 7.05 ADefAvg: 8.03 B Avg: 7.47 Bnum: 6 B pre: 0 B froz: 0 BOffAvg: 7.80 BDefAvg: 6.80: TeamScores		
01/20/13 20:09:33 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Adding Players Mode**		
2) **New Player Added**		
01/20/13 20:03:38 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Teams Made**		
Game: Sunday ODBalOn A Avg: 7.47 Anum: 7 A pre: 0 A froz: 0 AOffAvg: 7.05 ADefAvg: 8.03 B Avg: 7.47 Bnum: 6 B pre: 0 B froz: 0 BOffAvg: 7.80 BDefAvg: 6.80: TeamScores		
01/20/13 10:54:20 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Player Edit Mode**		
2) **Player Edited**		
3) **Adding Players Mode**		
4) **New Player Added**		
01/20/13 09:10:18 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Adding Players Mode**		
2) **New Player Added**		
3) **Player Edit Mode**		
4) **Player Edited**		
01/20/13 09:08:25 EST	1.5 (iPhone)	Apple iPhone 4 (GSM)
1) **Teams Made**		
Game: Tuesday ODBalOn A Avg: 7.83 Anum: 7 A pre: 0 A froz: 0 AOffAvg: 8.15 ADefAvg: 7.40 B Avg: 7.83 Bnum: 8 B pre: 0 B froz: 0 BOffAvg: 7.62 BDefAvg: 8.02: TeamScores		
01/19/13 07:57:00 EST	1.5 (iPhone)	Apple iPhone 4s
1) **Teams Made**		
Game: Saturday ODBalOn A Avg: 7.19 Anum: 9 A pre: 3 A froz: 0 AOffAvg: 6.95 ADefAvg: 7.67 B Avg: 7.56 Bnum: 9 B pre: 5 B froz: 0 BOffAvg: 7.38 BDefAvg: 7.70: TeamScores		

Errors (uncaught exceptions)



Geography

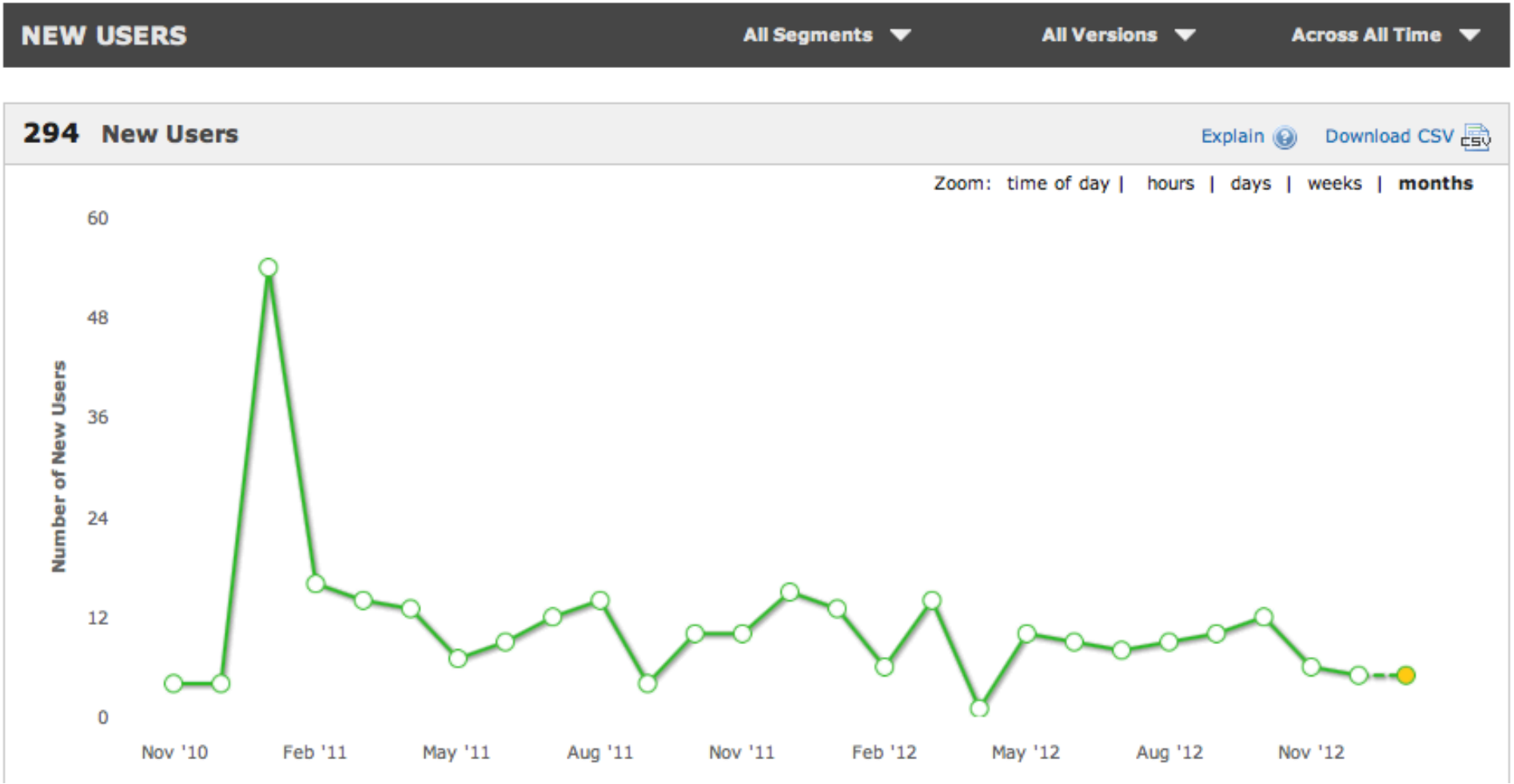
GEOGRAPHIC VIEW — All Segments — Across All Time

Total Sessions — Explain — Download CSV

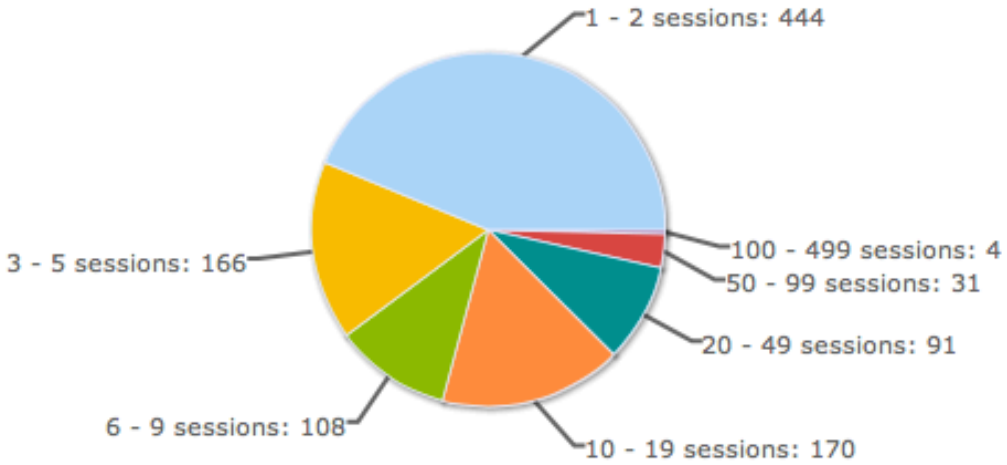
Detailed View — Explain — Download CSV

Region	Sessions	% of Sessions
North America	7,238	76.0%
Europe	2,184	22.9%
South America	42	0.4%
Oceania	26	0.3%
Africa	26	0.3%
Asia	7	<0.1%
Middle East	1	<0.1%
Central America	1	<0.1%

New Users


NEW USERS
All Segments
All Versions
Across All Time
294 New Users
Explain
Download CSV
Zoom: time of day | hours | days | weeks | months
Number of New Users
60
48
36
24
12
0
Nov '10
Feb '11
May '11
Aug '11
Nov '11
Feb '12
May '12
Aug '12
Nov '12

Frequency of Use



Monthly

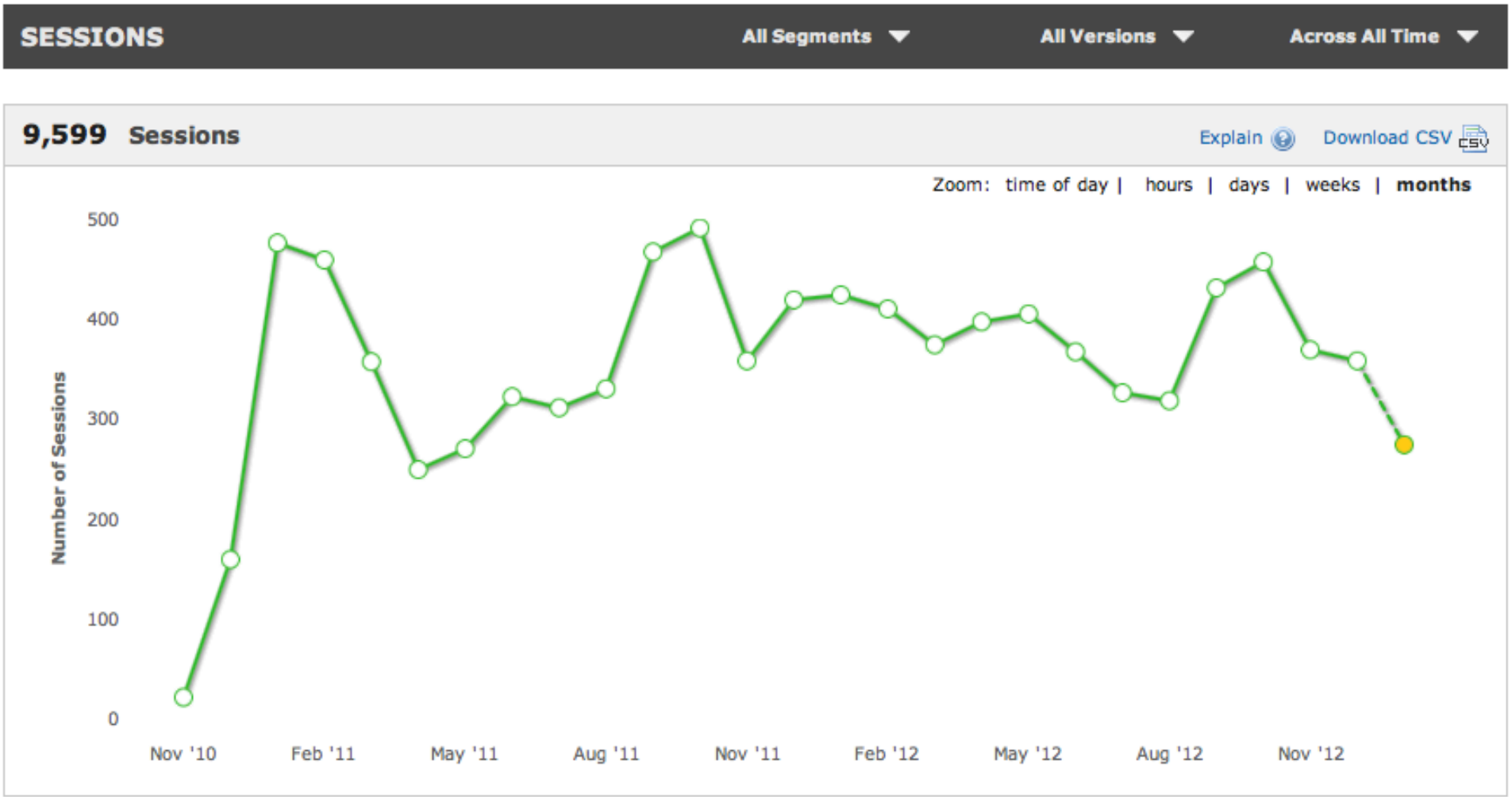
Median:
4.1 sessions / month

Benchmark:
Sports
2.6 sessions / month

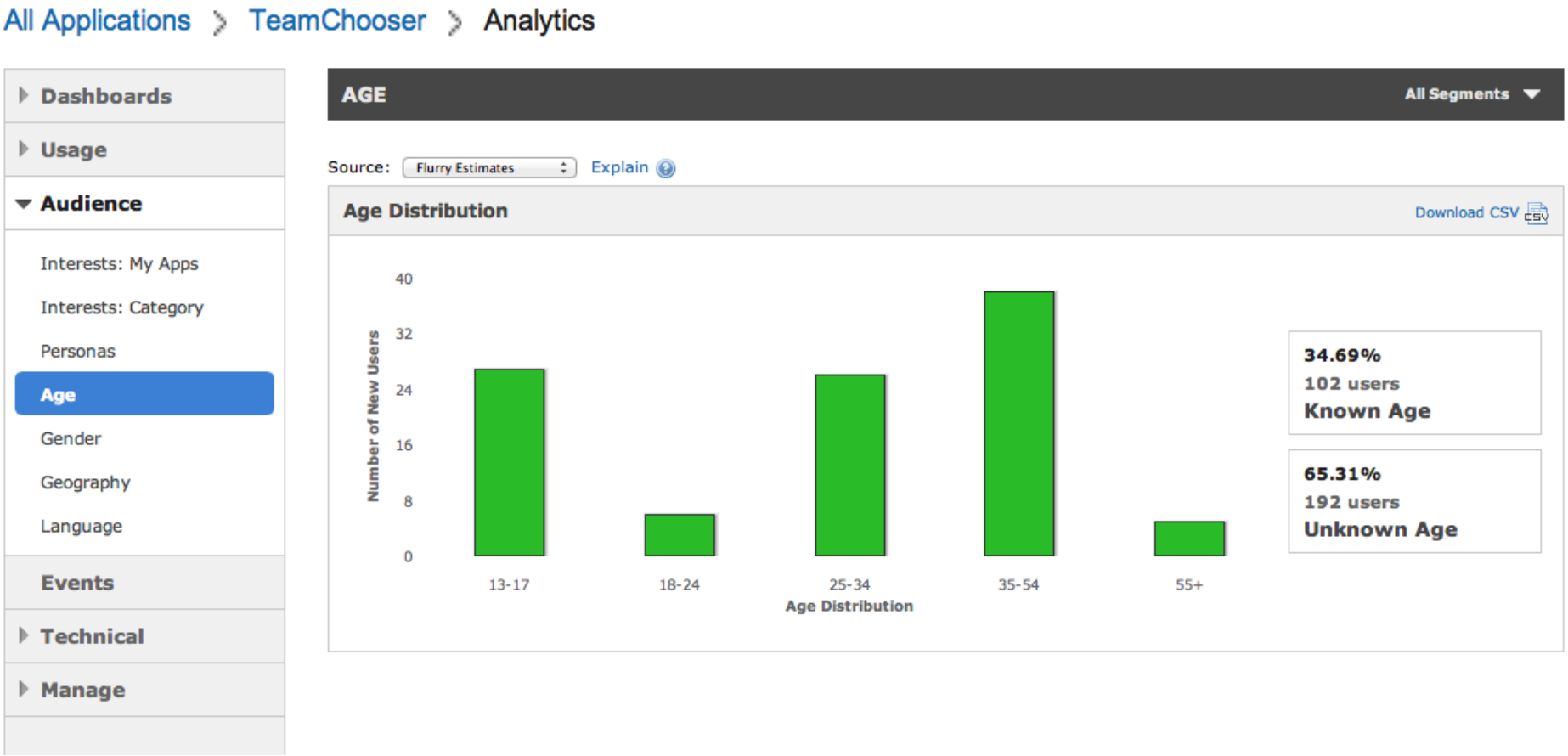
Compare to: Sports (same as this app)

Explain

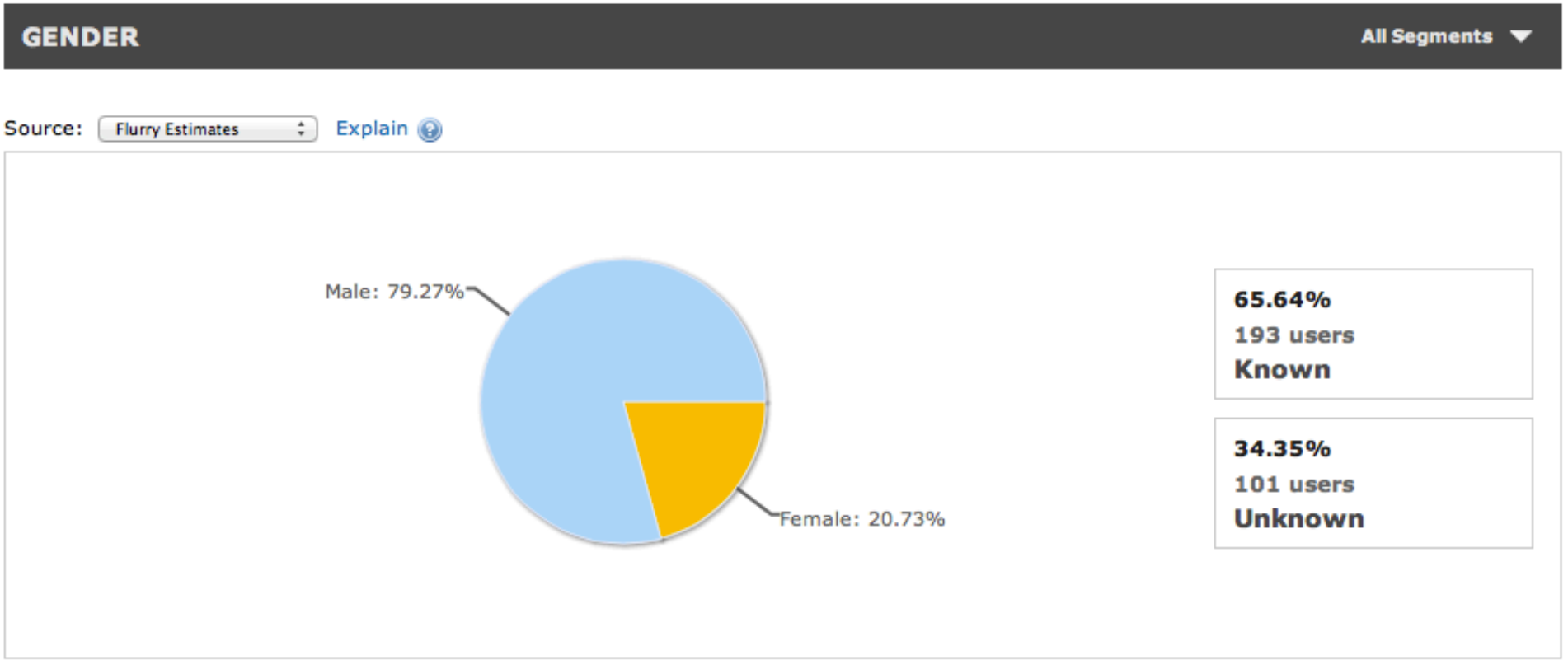
Sessions


SESSIONS
All Segments
All Versions
Across All Time
9,599 Sessions
Explain
Download CSV
Zoom: time of day | hours | days | weeks | months
Number of Sessions
500
400
300
200
100
0
Nov '10
Feb '11
May '11
Aug '11
Nov '11
Feb '12
May '12
Aug '12
Nov '12

Age Estimates!



Gender Guess!

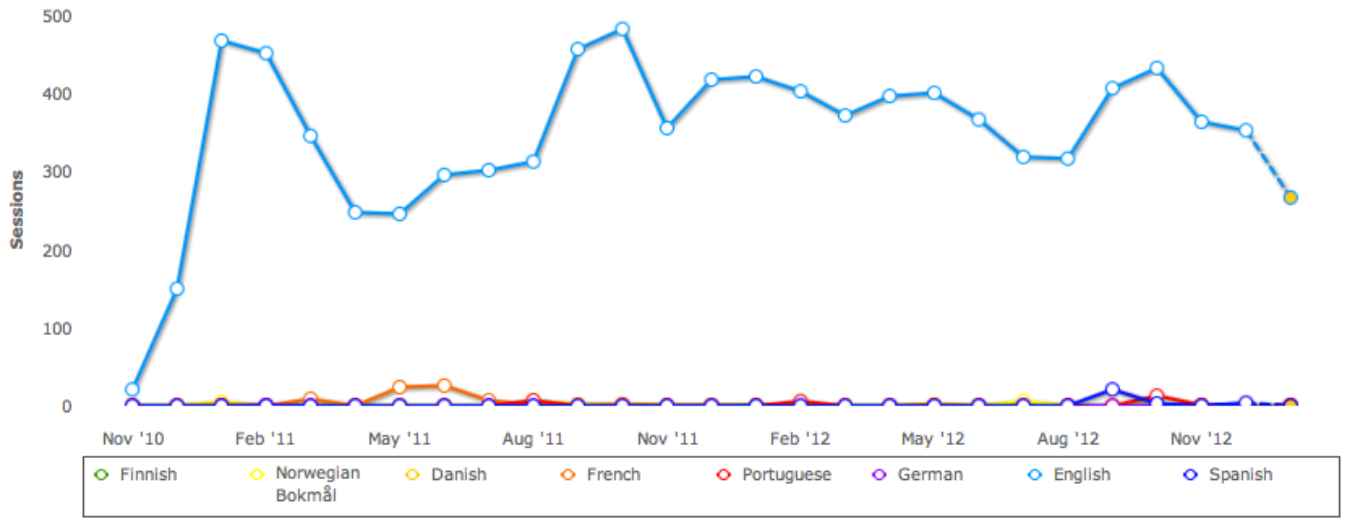


Languages

Top 8 Languages — All Segments — Across All Time

Sessions — Explain — Download CSV

Zoom: days | weeks | **months**

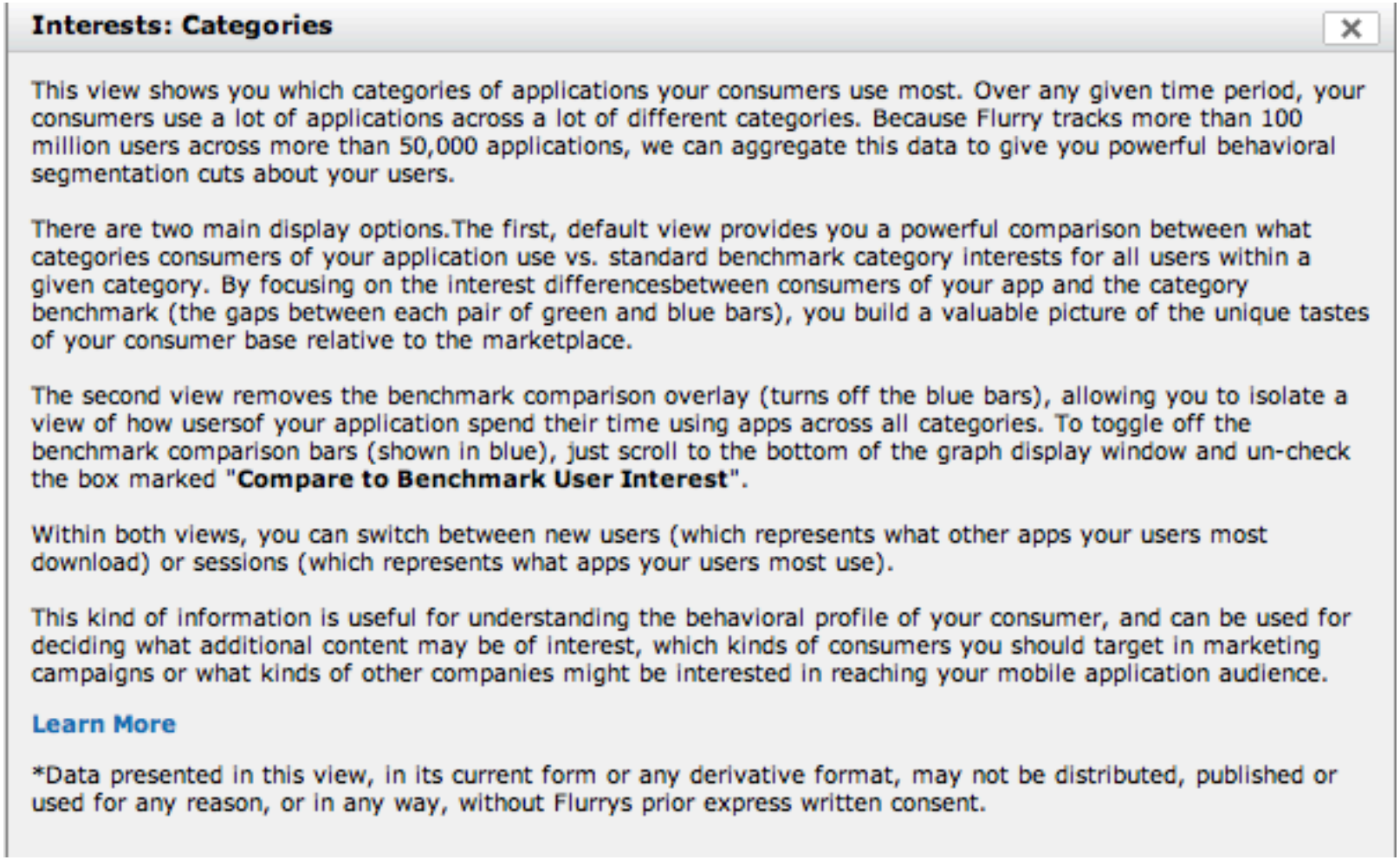


Detailed View — Explain — Download CSV

Language	Sessions	% of Sessions
English	9,378	98.3%
French	72	0.8%
Portuguese	29	0.3%
Spanish	28	0.3%
Norwegian Bokmål	24	0.3%
Danish	4	<0.1%
German	1	<0.1%

User Interests

- What other app categories do your users use?



Interests: Categories

This view shows you which categories of applications your consumers use most. Over any given time period, your consumers use a lot of applications across a lot of different categories. Because Flurry tracks more than 100 million users across more than 50,000 applications, we can aggregate this data to give you powerful behavioral segmentation cuts about your users.

There are two main display options.The first, default view provides you a powerful comparison between what categories consumers of your application use vs. standard benchmark category interests for all users within a given category. By focusing on the interest differencesbetween consumers of your app and the category benchmark (the gaps between each pair of green and blue bars), you build a valuable picture of the unique tastes of your consumer base relative to the marketplace.

The second view removes the benchmark comparison overlay (turns off the blue bars), allowing you to isolate a view of how usersof your application spend their time using apps across all categories. To toggle off the benchmark comparison bars (shown in blue), just scroll to the bottom of the graph display window and un-check the box marked "**Compare to Benchmark User Interest**".

Within both views, you can switch between new users (which represents what other apps your users most download) or sessions (which represents what apps your users most use).

This kind of information is useful for understanding the behavioral profile of your consumer, and can be used for deciding what additional content may be of interest, which kinds of consumers you should target in marketing campaigns or what kinds of other companies might be interested in reaching your mobile application audience.

Learn More

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User Interests