UI guidelines in Android

Android Design

Creative Vision

Ice Cream Sandwich (Android 4.0) marks a major milestone for Android design. We touched nearly every pixel of the system as we expanded the new design approaches introduced in Honeycomb tablets to all types of mobile devices. Starting with the most basic elements, we introduced a new font, Roboto, designed for high-resolution displays. Other big changes include framework-level action bars on phones and support for new phones without physical buttons.

We focused the design work with three overarching goals for our core apps and the system at large. As you design apps to work with Android, consider these goals:

http://developer.android.com/design/
Why User Interface Design?

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User Interface
On Terminology

- UI design does not stop at displaying Information via a GUI, MUI or VUI
- That is where it starts!
- That is when the human-machine interaction can be grounded into actions as simple as:
  - Clicks, Taps, Swipes, Gestures, Typing
- In order to accomplish a task (“Compose an email”)
- It applies to designing human-machine interactive systems and NOT only
Why

- In a typical mid-large SW project the UI designer function should be present.
- In small project teams (people < 2-3) might not be available.
- He/She a minority whereas the team is mostly made of programmers/managers.
- It is important that programmers know what UI design is about.
  - Better Communicate SW system development team.
- Programmers might turn into UI designers!
Lecture Plan

1st Part
- User Interface Design
  - Principles (applicable to any Human-Machine Interface System)
  - Psychological and Cognitive Motivations

2º Part
- Mobile UI guidelines
- Prototyping: WireFraming
- Examples
Human - Computer Interaction

ARTICULATION

TYPING

POINTING

SPEECH

HEARING

VISION

VISION

OBSERVATION

PERFORMANCE

RECOGNITION

TTS

GUI

PRINT

PRESENTATION

Spring 2012
De-Constructing Communication

Signal

Input / Output

Complexity

INTERACTION

Devices
Human Computer Interaction

The Interface

- Device
  - Input Device: Mouse, Keyboard, Joystick, Audio, ..
  - Output: Screen, Speakers, Virtual Reality goggles

- Interface
  - GUI
  - WIMP (Windows, Icons, Menus & Pointers) [Xerox ‘70s]

- Human-Machine Interaction
  - Multimodal (Speech, Text, Gestures)

- HCI principles
  - U³: Useful & Usable & Used
Demo
Mobile Phone 1990

Useful
Usable
Used
Outline

- Intro
- Principles (Design Rules)
- Foundations
  - Perception
  - Vision
  - Attention
  - Memory
  - Task Execution

Reference for the lectures: “Designing with the mind in mind”, Jeff Johnson
User Interface Design

- Educated ART
  - Creativity
  - Human Interaction Understanding

- Based on
  - Science (Cognitive, Psychology)
  - Engineering

- Goal of Designing interactive systems based on requirements
  - SW, HW
  - Interaction System (User, Machine)
Many solutions to the problem of

“Design and Build a bridge from point A to B, that can carry car/truck traffic, pedestrians, be stable in super-windy conditions, earthquakes etc.”
Bridge Design and Engineering (1)
House design

- Given a set of requirements
  - Location
  - Real estate space
  - Energy saving materials
  - Project costs

- There are many solutions
  - Different Aesthetic appeal
  - Space layouts
  - Expected people behavior
House design: Project 1
House design: Project 2
Artifact requires

- Science (Cognitive, Psychology..)
- Engineering (Technology & Systems)
- User/Social acceptance
  - Reward (“it takes from A to B, it saves time, it is safe, it is fun! It is beautiful!”)
  - Aesthetics (sensorial information) universals
- Architecture, Industrial, User design
  - Require all of the above to reach a point equilibrium == solution
- Not unique!
Towards a Science of HCI Systems

- Engineering of Bridge Building
  - DOES not need people to evaluate the solution!

- In HCI systems, users are part of it.
  - They are needed to study and evaluate

- Usability Testing
  - Limited by the number of users and delay between prototype and final engineered solution
A word of advice from S. Jobs:

“You can't just ask customers what they want and then try to give that to them. By the time you get it built, they'll want something new.”
UI Design Principles

- They guide towards optimal equilibrium of requirements
- Do not provide analytical solution
- Should allow to avoid errors in early phases
  - System, User Requirements, Prototyping
- And not to rediscover each time dos and donts
  - “color blindness”
- They may be Ambiguous and Contradictory
- Goal to **UNDERSTAND** the motivations of such principles so to **GUIDED** in executive decisions.
Guidelines – A (Shneiderman 1987)

- Strive for Consistency
- Cater to Universal Usability
- Offer Informative Feedback
- Design Tasks Flows to yield closure
- Prevent Errors
- Permit Easy Reversal of Actions
- Make Users feel They are in Control
- Minimize Short-Term Memory Load
Guidelines – B
(Nielsen and Molich 1990)

- Consistency and Standards
- Visibility of System Status
- Match between System and Real World
- User Control and Freedom
- Error Prevention
- Flexibility and Efficiency of Use
- Aesthetics and Minimalist Design
- Help Users Recognize, Diagnose and Recover from Errors
- Provide Online Documentation and Help
What they do come from?

- They are inspired from human psychology processes
- Science on how people
  - Perceive
  - Remember
  - Learn
  - Reason
  - Ground Intentions into Actions
Perception

Perception is the process of interpreting signals being collected by our sense organs into our nervous system.

Hearing, Sight, Smell, Taste, Touch
“Vision”, W. H. Freeman, New York, NY
ATM Transaction

Select Amount

No

Yes
ATM Transaction

Please Confirm Amount

200 $?
ATM Transaction

Do you want a printed receipt?

YES  NO
Perception is biased by

**Past**: Experience or prior information
Language is Ambiguous

Giorgio e Luca erano compagni di banco

- Senso ➔ Mobile

Il direttore del banco di Napoli

- Senso ➔ Istituzione di credito

Il nuovo test sarà il banco di prova

- Senso ➔ Test

.......Banco ottico

.......
Perception is biased by

- **Past**: Experience or prior information
- **Present**: Current Context
  - Also from concurrent signals from different sensorial information (sight & hearing)
  - Influence/Reinforce each other (e.g. lip reading)
“Cocktail Party Problem”

- Human Perception Experiment
- Multiple audio sources
- Humans can “adaptively” separate a specific sound source
- Cocktail Party Problem
  - Audio sample 1 source
  - Audio sample 2 source
  - Audio sample 3 source

“yes I would like to make a reservation..."
Perception is biased by

- **Past**: Experience or prior information
- **Present**: Current Context
- **Future**: Our Goals

- Our goals may filter our perception
- Example of goal oriented information over web
- Ignoring information ≠ Do not notice information
Take Away Guidelines
Perception

- Avoid Ambiguity
  - Requires effort

- Be Consistent
  - Exploit users past experience

- Understand users’ goals
  - Either be explicit
  - Or Implicitly track them
The Gestalt Theory

Visual Perception

- Psychologists proposed in 20th century to explain how visual perception works
- Supported now by neurophysiological experiments
- Descriptive framework
- Support for graphic and user interface design
The Gestalt Theory

Visual Perception

It identifies rules/principles human visual perception groups tokens together
Rules
- Proximity
- Similarity
- Continuity
- Closure
- Symmetry
- Figure/Ground
Proximity (1)
Proximity (2)
Proximity (3)
Proximity (4)

EXAMPLE (stars) where you perceive horiz

```
Giuseppe-Riccardis-MacBook-Air:~ beppe$ ls
Applications Library Public
Desktop Movies Send Registration
Documents Music Sites
Downloads NetBeansProjects sharing_vista
Dropbox Pictures
Giuseppe-Riccardis-MacBook-Air:~ beppe$ ls -la
total 64
drwxr-xr-x+  31 beppe staff  1054 Mar  26 11:31 .
drwxr-xr-x  5 root admin  170 Mar  2 2011 ..
-rw-------  1 beppe staff   3 Mar  2 2011 .CFUserTextEncoding
-rw-r--r--@  1 beppe staff 15364 Apr 18 14:34 .DS_Store
drwx------  2 beppe staff   68 Apr 22 16:36 .Trash
drwxr-xr-x   5 beppe staff  170 Oct  6 2011 .android
-rw-------  1 beppe staff  4552 Apr  6 15:16 .bash_history
drwx------  3 beppe staff  102 Mar  5 2011 .cups
drwx------  14 beppe staff  476 Apr 22 16:40 .dropbox
drwxr-xr-x   5 beppe staff  170 Jun 23 2011 .editix
drwxr-xr-x   3 beppe staff  102 Feb  9 16:40 .m2
drwxr-xr-x   4 beppe staff  136 Sep 12 2011 .netbeans
drwxr-xr-x   2 beppe staff   68 Apr  1 2011 .spss
drwx------   3 beppe staff  102 Apr  1 2011 .ssh
drwxr-xr-x   4 beppe staff  136 May 30 2011 .sysdb20
-rw-------  1 beppe staff  912 Feb  9 16:00 .viminfo
```
Similarity
Continuity (1)
Continuity (2)
Closure (1)
Simmetry
Figure/Ground (1)
Figure/Ground (2)
Common Fate
Moving Objects
Closure-Symmetry-Continuity

Cover of “Coherence in Thought and Action” book by Paul Thagard
Homework

Select **three** smartphone (Android/Iphone) apps that you evaluate being for a given task and motivate it. What it does, Why you like, etc..
UI guidelines to build Your App

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App Structure

Apps come in many varieties that address very different needs. For example:

- Apps such as Calculator or Camera that are built around a single focused activity handled from a single screen
- Apps such as Phone whose main purpose is to switch between different activities without deeper navigation
- Apps such as Gmail or the Play Store that combine a broad set of data views with deep navigation

Checklist

- Find ways to display useful content on your start screen.
- Use action bars to provide consistent navigation.
- Keep your hierarchies shallow by using horizontal navigation and shortcuts.
- Use multi-select to allow the user to act on collections of data.
- Allow for quick navigation between detail items with swipe views.
UI guideline docs in iOS

Introduction

*iOS Human Interface Guidelines* describes the guidelines and principles that help you design a superlative user interface and user experience for your iOS app.
App Design strategies

- Create an Application Definition
- List All the Features You Think Users Might Like
- Determine Who Your Users Are
- Filter the Feature List Through the Audience Definition
- Review
- Prototype and Iterate
Extreme Use Cases

- 60 SECONDS use case
  - Soccer match scores, weather, stock quotes..

- 60 MINUTES use case
  - Video watching, Reading (emails), Writing (blogs), making dinner plans..
Extreme Use Cases

Game

Casual

Serious

Utility

Dice

Flashlight

RPG

Banking

From Nathan Freitas
12 Myths of Mobile User-Interface Design
Over the years (2005 A. Marcus and adapted)

- Users want power and aesthetics. Features are everything
- What we really need is a Swiss army knife
- 3G is fine!
- Focus groups and other traditional market analysis tools are the best way to determine user needs
- If it works in New York, it will work anywhere
- The killer app will be games, --er, no, I mean, nightlife, or gps.... uh...

- Mobile devices will essentially be phones, organizers, or combinations, with maybe music/video added on
- The industry is converging on a UI standard
- Highly usable systems are just around the corner
- One operating system will dominate
- Mobile devices will be free-or nearly free
- Advanced data-oriented services are just around the corner
I want to easily create a shopping list easily, quickly and share it with my family.

I want to check how much exercise while I go to work, do sports and share it with my doctor.

I want to know where is the cheapest gas station wherever I am considering the mileage to reach it.

I want to plan my next summer vacation in the countryside and select from friends’ advices and social websites.

I want to monitor my language and improve my mnemonic skills.

I want my camera to tell me when is the best timing/lighting for me to shoot a picture.
The Story; Where and When

- At the office during a meeting
- At home, with my kids
- On Vacation with my friends
- 24/7
- A teacher with 1-10 grades students in class
- Recruiter on face-to-face interviews
UI prototyping: Wireframing

UI schema of application
- Visual layout and its elements (e.g. action bars)
- Functions of the elements (e.g. input text box)
- Navigation flow and rules
- Effect of interaction context on the visual state

DOES NOT focus on graphics RATHER on app user action dynamics and behavior in context

HOW: pencil, drawings, board and tools
Wireframing tools

**Sketching and Prototyping with Firefox**
- PENCIL PROJECT
- Works both as a Firefox plugin and standalone installation on windows, mac, and Linux


**Wireframe Sketcher**
- Works both as an Eclipse plugin and Standalone installation on windows, mac and Linux

[http://wireframesketcher.com/download.html](http://wireframesketcher.com/download.html)

**Standalone installation on windows, and mac**

Justinmind Prototyper free

Download and Install the Justinmind Prototype

Install the Android widget
http://www.justinmind.com/prototyper/widgets-mobile
Features

- **No programming required.** Justinmind Prototyper is an intuitive tool. Just drag the components or interactions that you need from the palettes to the work area.

- **Instant Simulations.** See your application's prototype in action by simply clicking the Simulate button. No waiting required.

- **Exportable to HTML.** Export to HTML effortlessly, so that your clients or users can see it work online and give you their opinion.
The Tool

Widgets

PropertieS

ScreeNS

Canvas

simulate
Prototyping

1) The Widgets Palette contains the main widgets for mobile and web prototyping.

2) Once you add the Android Widgets from the website, you should get various Android Controls.

3) Drag and drop them to the Canvas.

4) Change the Properties to adjust the look and feel.
Add Screens

Click on the + symbol under the Screens Palette to add a new screen.

Enter the name of the new Screen.

Add Controls to the new Screen.
Add Transitions

Requirements:

a) On Clicking on the input box you should pop up the keyboard
b) On Clicking the button open a new page with a Menu
Create all three Screens

- Create the Screens Separately
Transition

Requirement 1: On Clicking on the input box you should pop up the keyboard

How to:

a) Click on the Input box in Screen 1
b) Drag and Drop it to the Screen 2 icon under Screens
Transitions

Requirement 2: On Clicking the button open a new page with a Menu

How to:

a) Click on the Button Screen 1
b) Drag and Drop it to the Screen 3 icon under Screens
Test

- Click on the simulate Button
Test
Screenshots
Course Material

Lecture Presentations

Text Books
7. S. Young et al., *The HTK Book*, Cambridge University Engineering Department, 2002