Thompson Rivers University

COMP 2160
Mobile App Development I

MODULE 4:
Building a Simple Calculator App, Design Challenges

Module 4

1. Specifying Design Requirements for an App
2. Design Features and Implementation Challenges
3. Creating a Time Plan for Implementation


Design

Design Fields

There are different areas of design for mobile applications

- **UI**: **User** Interface and Visual Design
- **UX**: **User** Experience Design

- **Software Design**: Architecture of the application

There are guidelines available for each mobile platform

- **Android**:
  - https://developer.android.com/design/index.html
- **iOS**:
  - https://developer.apple.com/ios/human-interface-guidelines/overview/design-principles/

UI and UX guidelines

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What are guidelines based on?

- Some guidelines are based on user studies and scientific evidence, for example Fitts' law
- Some guidelines are based on current emerging trends or new device capabilities

Fitts' Law

There are guidelines available for each mobile platform

- **Developed in 1950s**
- **A mathematical formula for calculating the difficulty of acquiring a target using fingers, other limbs or a pointer**
- **Showed that the further a target is and the smaller it is, the harder it will be to reach**
- **http://sixrevisions.com/usabilityaccessibility/improving-usability-with-fitts-law/**

Targeting UI Elements

Discussion

Fitts' law proves that the larger and the closer a UI element is, the easier it will be acquired by users. Does this mean that we should always make tap target for UI elements on a mobile device as large as possible so that users do not miss them?

How do users hold their mobile phone

In what situations users interact with your app?

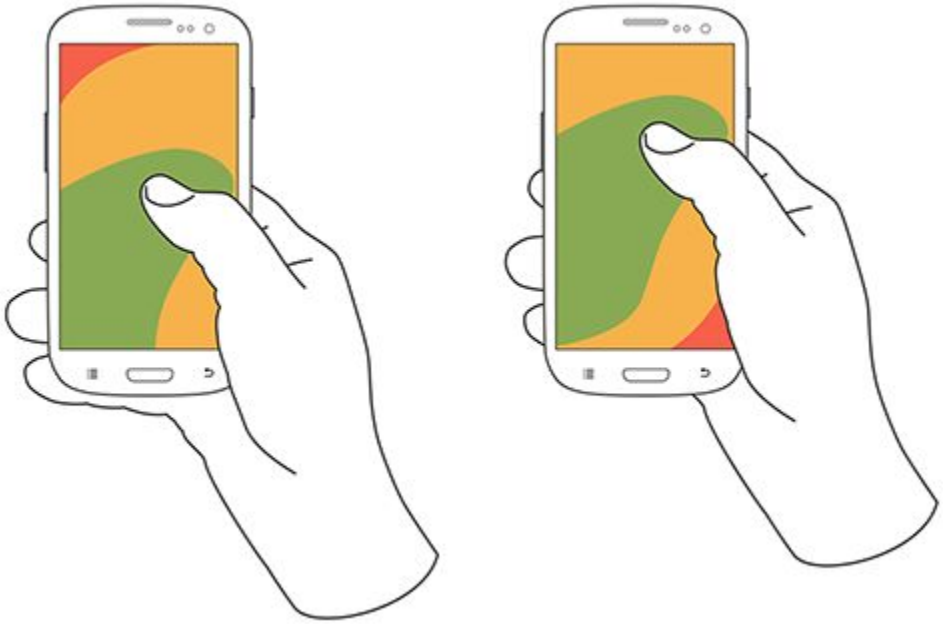


Image credit, UX Matters:
http://www.uxmatters.com/mt/archives/2013/02/how-do-users-really-hold-mobile-devices.php

Prototyping

- Low fidelity prototype
- High fidelity prototype

Specifying Design Requirements for an App

Design Requirements

Questions to ask your client before writing the first draft of your design requirement document

1. Can you summarize the Mobile App in just a few sentences?
2. Who are the target users?
3. Is there scope to have multiple releases?
4. What's the budget?
5. What is the monetization strategy for the app?
6. Who will the app compete with?
7. What design considerations/constraints does the Mobile App have to work within?
8. How is it going to be hosted?
9. Do you need to collect data from the app to monitor performance and/or usage?
10. What's the real deadline?

Ref:
https://www.kumulos.com/2015/12/17/20-questions-to-ask-your-client-before-you-build-their-mobile-app/

App name, icon design, and logo:	
Number of layouts and their types:	
Number of activities/fragments:	
Number of services:	
Number of broadcast receivers:	
Number of content providers:	
Assets requirements/copyright issues:	
Minimum SDK version:	
Does the app have its own authentication requirements? What are they?	
Does the app have a cloud service dependency?	
Does the app have a social network dependency or logon possibility?	
Do you want the app to work only when the device is connected to the corporate network?	
Does the App need any wireless connections (NFC/Bluetooth/WiFi or WiFi direct)?	
Do you need to connect to a local or a cloud-based database?	
Do you need sensors?	
Do you need any third-party library?	
Do you need any special graphics requirement?	
Does the app require any permissions?	

Design Requirements

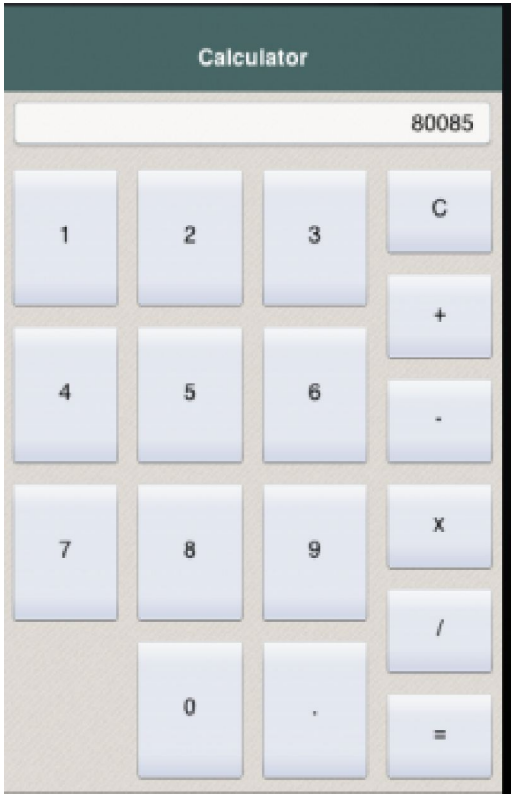
Mobile App Design Specification

1. Identify the actors (different users of your application)
2. List all functional requirement in a clear user-story
3. Support each requirement with an initial layout design
4. List all performance objectives (if any)
5. Explain the monetization model
6. Enumerate all limitations and constraints
7. Send the document to your client for review

Design Features and Implementation Challenges

Design Features and Implementation Challenges

Outdated is another word for not trendy



Ref:
http://www.creativebloq.com/app-design/16-killer-design-tips-creating-mobile-apps-11513821

Design Features and Implementation Challenges

Enumerate App Features

1. Basic Calculator Interface
2. Supports Addition, Multiplication, Subtraction and Division
3. **Optional:** Memory Call, Memory Add, Memory Subtract and Memory Recall Features
4. Has a separate Equal Button
5. Supports decimal point and negative sign
6. Identify the maximum number of digits that can be displayed
7. Identify the Maximum of digits after decimal points.
8. Specify layout Design (2D/3D buttons)

Ref:
http://www.creativebloq.com/app-design/16-killer-design-tips-creating-mobile-apps-11513821

Design Features and Implementation Challenges

List All Design Challenges

1. Numbers displayed from RTL
2. How to append numbers on-Click?
3. Must handle Divide by Zero scenario.
4. Should you create button-groups?
5. How to support incremental operations?
6. Must **handle changes in screen orientations**
7. How to deal with decimal points?
8. How to implement Zero suppression?
9. How to implement memory functions?

Implementation Steps

Calculator

1. Layout Design - Screen Orientation Choice?
2. OnClick Listener(s) – Programming approach?
3. Display numbers onClick (Results)
4. Appending Numbers / Zero suppression
5. Basic Operations (add,sub,mul,div)

Design Features and Implementation Challenges

Evaluation

1. The app layout has 10 buttons for numbers (0-9)
2. The app layout has a decimal point, and +/-.
3. The app layout has 4 buttons for +,=,/,* operations, a clear button and an equal sign button.
4. The app layout demonstrates efficient use of space.
5. All buttons in the app layout are aligned properly.
6. The Textview used to display the result uses a reasonable font size.
7. All buttons display the right value when clicked.
8. Numbers are displayed from Right to Left
9. The app handles zero suppression.
10. Numbers are appended correctly on Click
11. The app supports "running" calculations correctly (Test 1+33-18*3/48 -> Did you get results = 1)?
12. The app shows the intermediate result every time a user click in any one of the 4 operator.
13. All operations work with no errors.
14. The app adapts/scales reasonably to changes in device screen orientation.
15. The app has 4-digit precision for numbers after the decimal point.
16. The app handles divide by zero scenario.
17. The app doesn't crash at any test scenario.

Design Features/Challenges

Activity 2

What is the most difficult design challenge in the calculator App?

Design Requirements

Activity

Write a design requirement sheet for your basic calculator App.

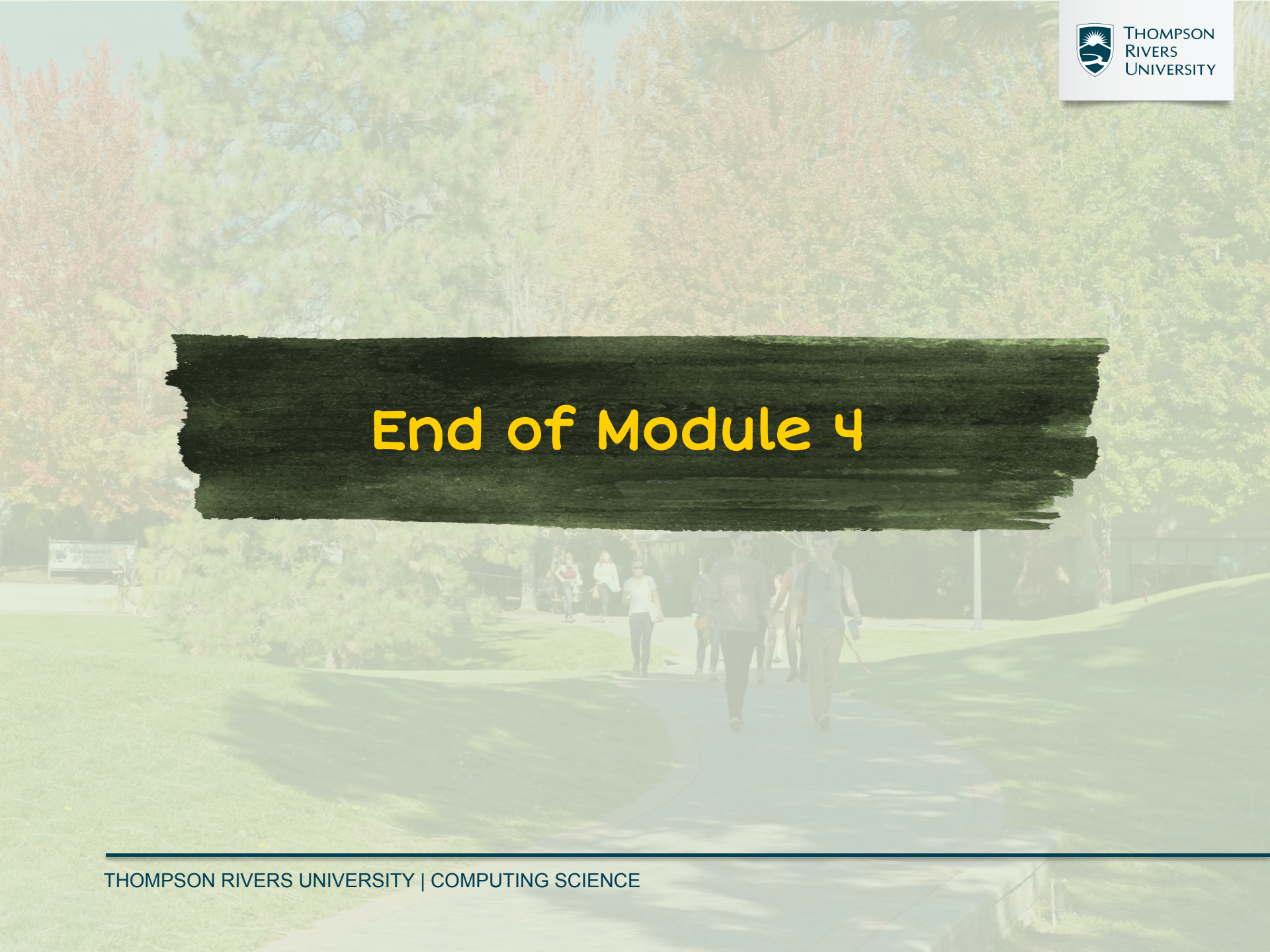
Use these requirement to create low fidelity mockups of your calculator.

Creating a Time Plan for Implementation

Time Plan

Activity

How much time you need to complete the development and testing of the basic calculator App? Consider a margin of time for unforeseen circumstances before setting a delivery date for the project delivery.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