iOS Application Development

Lecture 1: Introduction

Simon Völker & Philipp Wacker
Media Computing Group
RWTH Aachen University

hci.rwth-aachen.de/ios
Team

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E-Mail Subject: [iOS]

Certified Trainer
App Development with Swift 4
Class Goals

- Learn the basic of iOS App development
- Learn how to use advanced iOS Frameworks
- Understand the differences between desktop and mobile development
- During the project: Focus on UX and Usability
- Coding, coding, and coding…
Our Projects with iOS
Administrivia

- 6 Credit points
- Class times
  - Mondays (12:30 — 14:00), Room 2222
  - Tuesday (10:30 — 12:00), Room 2222
- Only 42 Seats
Class Syllabus

• Part 1
  Lecture: Introduction into iOS and Swift

• Part 2
  Seminars: iOS Frameworks

• Part 3
  Project: App Development
Your Final Grade (6 ETCS)

- **Oral Exam** (15 min)
  - February, 6th and 7th
  - 33%

- **Project**
  - 50%

- **Seminar**
  - 17%

February 6th and 7th
Lectures

• Introduction to Swift
• XCode
• Introduction to UIKit
• Navigation and workflows
• Tables and persistence
• Working with the web
• and more…

https://www.apple.com/everyone-can-code/
Seminar
Possible Topics:

• Swift UI
• Core Data
• RealityKit & Reality Composer
• Core ML + Create ML
• WatchOS
• Extensions & Inter-App Communication
• Debugging and Instruments
• MapKit, CoreLocation

• SiriKit
• CloudKit & iCloud Drive
• GameplayKit
• Metal
• AVKit
• Bringing People into AR
• Networking in iOS
• ClassKit
• Scene Kit

• Groups of 3 (14 Groups)
• 20 minute presentations
• Overview of the framework
• Example applications
• Can be recorded
• Attending is mandatory
• 17% of the final grade
Project

Possible Topics:

• Games
• AR Apps

• Depending on the available devices

• Groups of 3 (14 Groups)
• Submittable app
• Final presentation with live demo
• Code documentation!!!
• 50% of the final grade
Oral Exam

• Questions about:
  • Lecture content
  • All Seminars
  • Your Project

• February 6th and 7th
• 15 minutes
• 33% of your final grade
Course Requirements

• OOP experience

• Apple Developer ID

• Mac and iOS Device would be helpful

• You must register for this course in RWTHOnline

• This course is only for students from:
  • B.Sc. and M.Sc. Computer Science
  • SSE / MI / DS / TK
Limited Seating

• We only have 42 seats are available

• Attending the seminar is mandatory (18.11 - 9.12.)

• Attending the project meetings is also mandatory (10.12 - 31.01.)

• Only take this class if you are sure you can attend all classes!!
How to get a Seat?

• Register in RWTHOnline today (08.10.19)

• Sign and hand in the Declaration of Compliance until 10.10.19.

• Form a group of 3 students and send us the group details until 10.10.19

• We will randomly select 14 groups on the 11.10.19
Find a Group

• Fill out the group sheet today after the lecture OR

• Send an eMail to voelker@cs.rwth-aachen.de until this Thursday (10.10.19)
  • Subject: iOS19/20 Groups
  • Content: Name and MatNr. of your group members

• We'll also invite everyone who is registered for the course in RWTHOnline temporarily to the Moodle-Room to use the forum for finding group partners.
Lecture Slides and Videos

• All slides and lecture videos will be available online:
  • http://hci.rwth-aachen.de/ios
  • https://www.youtube.com/user/i10rwthaachen
CHAPTER 0

Developing for Mobile Platforms
Mobile Device Characteristics

• Context is key: task, attention split, peripheral use, movement, interaction time

• Screen size is compact

• Users interact with one screen at a time

• Mostly users interact with one application at a time (iPadOS allows split screen)

• Onscreen help is minimal

• Direct touch or pen input
10 Golden Rules of Interface Design (see DIS 1)

• Keep the interface simple

• Speak the user’s language

• Be consistent and predictable

• Provide feedback

• Minimize memory load

  • Avoid errors, help to recover, offer undo

  • Design clear exits and closed dialogs

  • Include help and documentation

  • Offer shortcuts for experts

  • Hire a graphics designer
Three Examples

![Timer App](image1)

![Weather App](image2)

![Map App](image3)
The iOS Family
Life as an App

• iOS is an app-centric environment

• One app per task!
  • Define the task that users want to accomplish with your app
  • Do one thing, but do it well

• Data is stored per app

• Data exchange between some apps is difficult
Designing the UI

• Make it obvious how to use your application

• Sort information from top to bottom

• Use visual weight for relative importance

• Use alignment for groupings or hierarchy

• Use multiple views for different parts of the app
Designing the UI

• Text should always be legible

• Avoid inconsistent appearances

• Provide fingertip-size targets (.8 x .8 mm)

• Minimize text input
Interaction Design

• Smartphones are mostly used with only one hand

• Not everyone is used to Multitouch interaction
  • Only use Multi-touch if you need it

• Follow Apple’s examples if possible

• If you use complex gestures, help the user
<table>
<thead>
<tr>
<th>Gesture</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap</td>
<td>To press or select a control or item (analogous to a single mouse click).</td>
</tr>
<tr>
<td>Drag</td>
<td>To scroll or pan.</td>
</tr>
<tr>
<td>Flick</td>
<td>To scroll or pan quickly.</td>
</tr>
<tr>
<td>Swipe</td>
<td>In a table-view row, to reveal the Delete button.</td>
</tr>
<tr>
<td>Double tap</td>
<td>To zoom in and center a block of content or an image. To zoom out (if already zoomed in).</td>
</tr>
<tr>
<td>Pinch open</td>
<td>To zoom in.</td>
</tr>
<tr>
<td>Pinch close</td>
<td>To zoom out.</td>
</tr>
<tr>
<td>Touch and hold</td>
<td>In editable text, to display a magnified view for cursor positioning.</td>
</tr>
</tbody>
</table>
Designing the UI

• Several resolutions, about four aspect ratios:

• Device orientation: portrait or landscape

• Designing for the iPad requires more than increasing the resolution
From: nvl@rwth-aachen.de
To: rvl@rwth-aachen.de
Subject: AC® - der Gründungswettbewerb

Hi Simon,

Can you give me an update on the progress of the AC® competition? I'm a bit concerned about the delay.

Best,
[Signature]

Simon Voelker
RWTH Aachen University

Sent: 15 Oct 2013 03:58

Hi Simon,

I just wanted to check in and see how things are going with the AC® competition. We're almost halfway through the process, but I'm not seeing any updates.

Let me know if there's anything I can help with.

Best,
[Signature]

Philipp Wacker
RWTH Aachen University
From: Gesellschaft für Informatik e.V.  
To: Simon Völker  

GI-Radar 199: Spielend einfach  
October 6, 2017 at 08:57

Sehr geehrte Leserinnen und Leser,  
From: SNOWSport Team Aachen
to: meldmail@gmail.com

9 May 2013 00:24

Hallo aaronTest,
die Registrierung mit
Benutzername: aaronTest
Passwort: Das Passwort, das du während der Installation gewählt hast.
auf http://www.sportarten.rwth-aachen.de/SkiAG wurde soeben freigeschaltet.
Aktualisieren doch direkt mal dein Profil:
http://wp.me/P3mDBn-nx
Viel Spaß auf unserer Seite!

SNOWSport Team Aachen
http://www.sportarten.rwth-aachen.de/SkiAG
<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Body</th>
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<tbody>
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<td>09/05/2013</td>
<td>SNOWSport Team Aschen</td>
<td>[SNOWSport Team Aschen] Dein Account ist aktiviert. Bitte aktiviere deine Registrierung mit Benutzername: aschenseiten Passwort: ...</td>
</tr>
<tr>
<td>05/05/2013</td>
<td>The VMware Team</td>
<td>My VMware: Password reset confirmation</td>
</tr>
<tr>
<td>04/05/2013</td>
<td>% Verena Damm</td>
<td>focus oberflächenstudie</td>
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<td>09/04/2013</td>
<td>micropayment™ GmbH</td>
<td>Zahlungsbestätigung - Ihr Kauf vom 07.04.2013...</td>
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<td>07/04/2013</td>
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<td>SourceTree for Windows is Now Available</td>
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<td>Bevrbung Buenos Aires</td>
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<td>15/01/2013</td>
<td>VF</td>
<td>Bevrbung Valparaso</td>
</tr>
<tr>
<td>15/12/2012</td>
<td>Ancestry.com</td>
<td>Thanks for downloading the Ancestry app</td>
</tr>
</tbody>
</table>
Starting

- Apps should start quickly to provide a fluid user experience
- Show a launch image that closely resembles the first screen of your app (launch file)
- Restore the state of last run (minimize user input)
- Delay a login requirement for as long as possible
- By default, launch in device’s current orientation
- Think carefully before providing an onboarding experience
Stop

- No Quit button or menu item
- Be prepared to quit at any time
- Program flow interrupted by external events
  - Incoming phone call
- Store state when stopping
- Application moved to background
- Notify users what feature are unavailable and limiting your app
Application Styles

Productivity

Photos

Utility

Weather

Immersive

Seadragon
Productivity Applications

- Organizing and managing detailed information
- Often organize data hierarchically
- Organizing the list, add or remove items
- Examples: Contacts, Photos
Productivity Applications

Photos

Contacts

Reminders

New List

iCloud reminders
No items

tasks
No items

Reminders
1 item
- Buy milk
Utility Applications

- Simple task, minimum user input
- Customized, visually attractive UI that enhances the displayed information
- Data is organized in flattened list of items
- Examples: Weather, Stocks
Utility Applications

Weather

Stocks

Elements
Immersive Applications

• Full-screen, visually rich UI

• Focussed on content and user experience

• Tends to hide much of the device’s user interface

• Custom navigational methods

• Examples: Living Earth, Carpenter
Immersive Applications

Living Earth

Carpenter
Games

Tiny Wings

Super Mario Run

The Maschines
Summary

• Mobile vs. desktop apps: user, task, context

• Keep hardware restrictions in mind

• Application styles: productivity, utility, immersive

• Further reading material:

What’s Next?

• Register in RWTHOnline today (10.10.19)

• Find a group and notify us via the sheet or eMail

• Notification on 11.10.19

• Next Lecture: 14.10.19 | 12:30 - 14:00
  • Distribution of seminar topics and introduction into Swift
Cocoa Touch
Media
Core
Core OS
Cocoa Touch Architecture

UIKit
User interface elements
Application runtime
Event handling
Hardware APIs

Foundation
Utility classes
Collection classes
Object wrappers for system services