Mobile Development

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- Mobile Operating Systems
- Programming Languages and Frameworks
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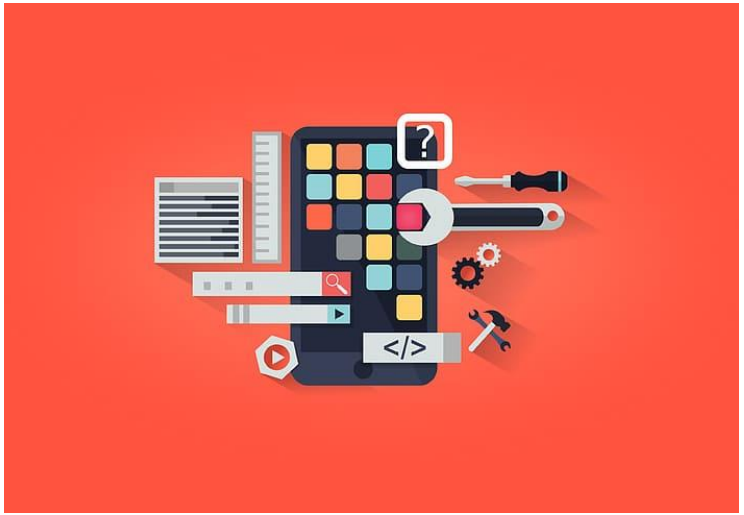
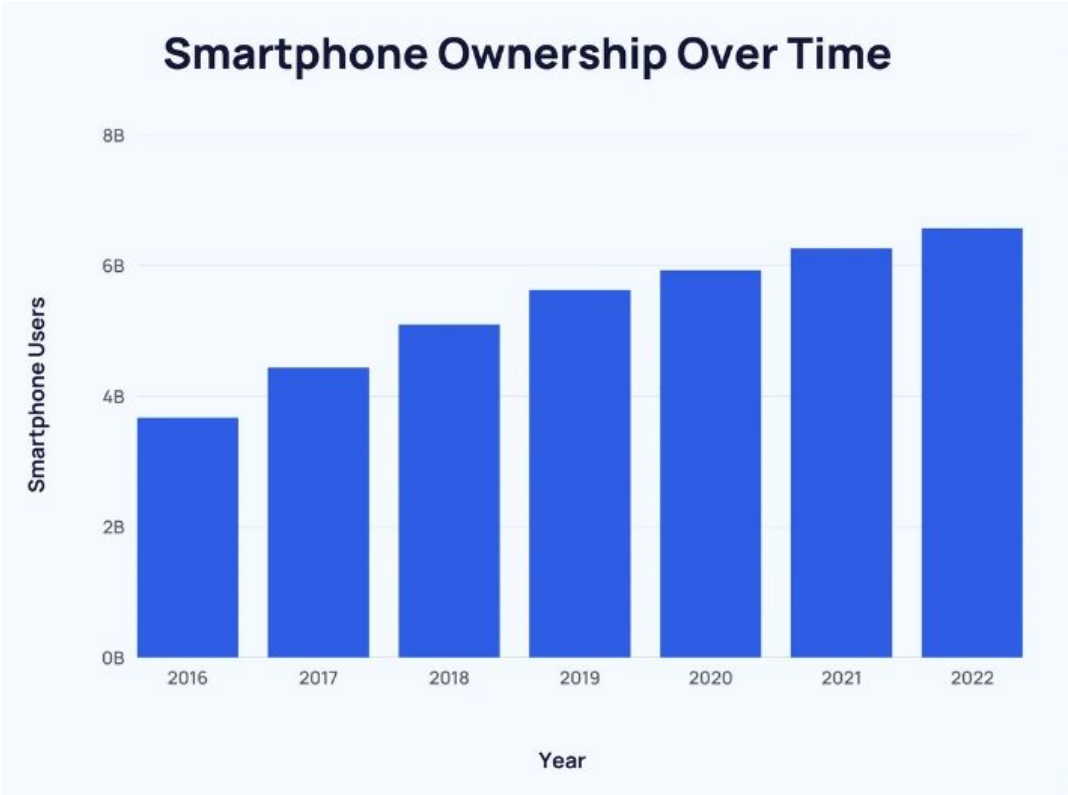
What is mobile development

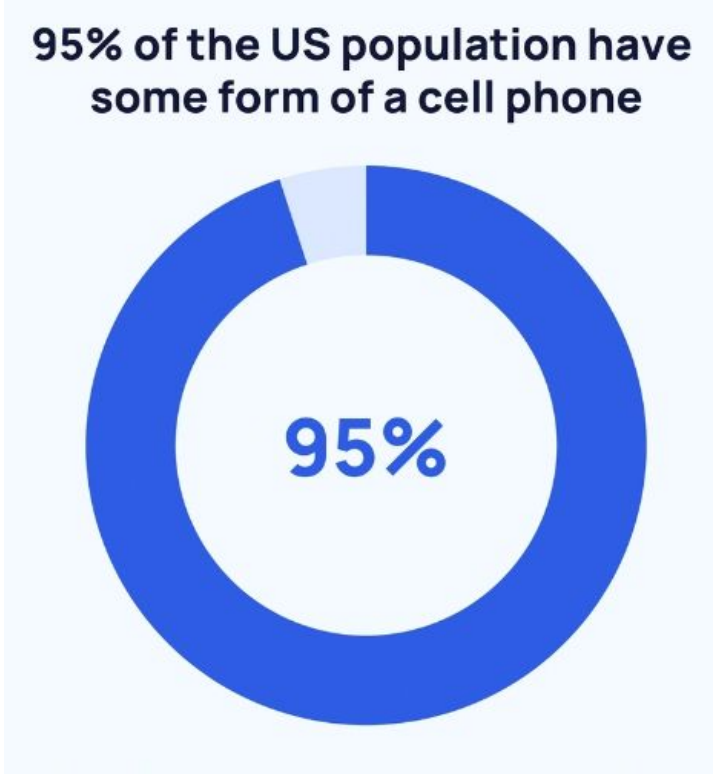
- Creating software designed for mobile devices, which includes smartphones and tablets



Why is it important?

- Cellphones and smartphones have become a huge part of daily life
- 95% of the US population owns some kind of cell phone
- Used for everything that you can imagine, from communication and entertainment to shopping and work
- Mobile devices make access to information and services very convenient and accessible
- Creating mobile applications allows you to reach to a huge audience, and engage users in new ways, and spread your products to
- It’s still a rapidly growing field because of increasing and widespread user of mobile devices


Smartphone Ownership Over Time
8B
6B
4B
2B
0B
Smartphone Users
2016
2017
2018
2019
2020
2021
2022
Year


95% of the US population have some form of a cell phone
95%

Brief History

1983

The first mobile phone was introduced by Motorola. It weighed 2.5 pounds and cost $3,995

1992

IBM introduced the first smartphone, called Simon. It had a touchscreen and the ability to send and receive faxes and emails.

1997

Nokia released the first phone with a built-in game, Snake, the Nokia 6110

2002

Palm introduced the Treo smartphone, which was the first device to combine a mobile phone, PDA, and email.

2007

Apple introduced the iPhone, which was the first smartphone to use a multi-touch interface and paved the way for modern mobile development.

2008

Google released the Android operating system, which has since become the most popular mobile operating system in the world.

2010

Apple introduced the iPad, which popularized tablet computing.

2012

Facebook acquired Instagram, which has become one of the most popular mobile apps in the world.

2014

Google introduced the Material Design language, which has become the standard for modern mobile app design.

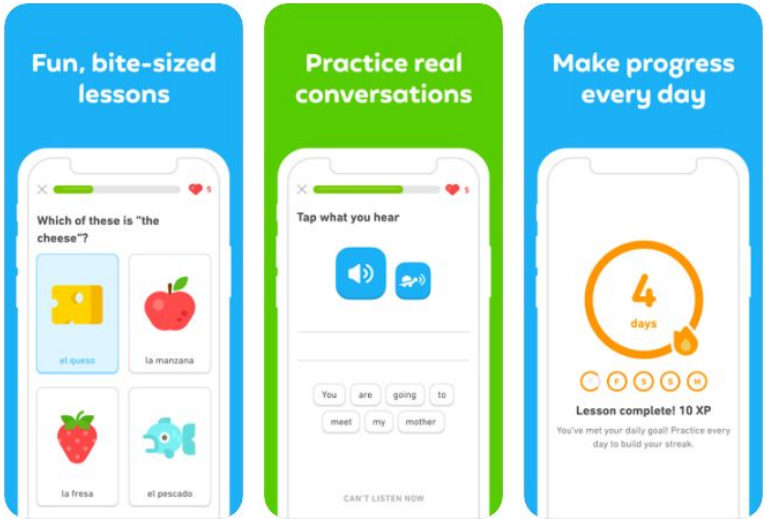
User Interface Design

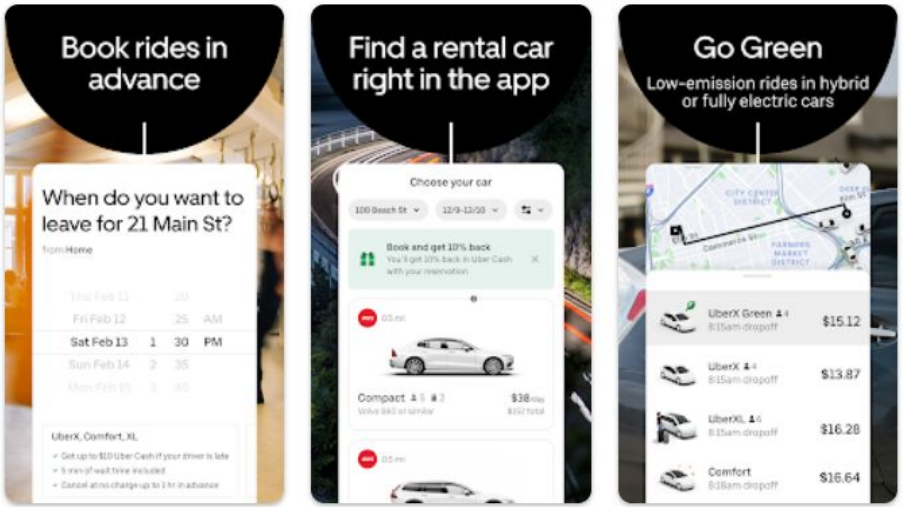
- User Interface
  - It refers to the actual graphical interface that is displayed
- User Experience
  - It refers to the all aspects of the user's interaction (and experience) with the application
  - Performance, usability, ease of use, and user satisfaction
- Good UI != Good UX
  - Even if the app is beautiful, if it is difficult to use or slow, it will not provide a good UX

Good Mobile UI Design Principles

- Simple
  - Should be easy to use
  - Users should be able to navigate it easily to find what they need
- Consistent
  - Should use consistent colors, fonts, layouts
  - Should be consistent with common design patterns preferably
- Clear
  - Should be easy to understand
- Feedback
  - UI should give feedback when interacted with

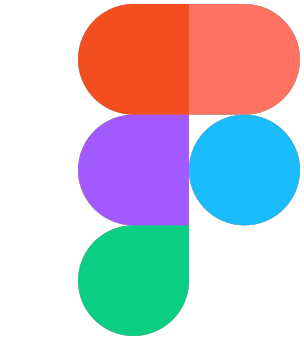
Examples of Good Mobile UI

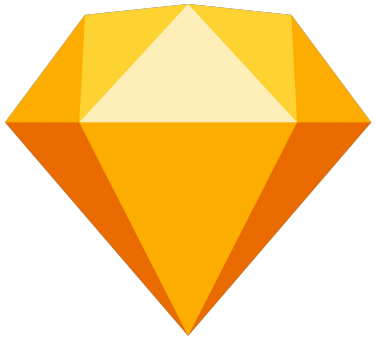




Tools for Mobile UI Design

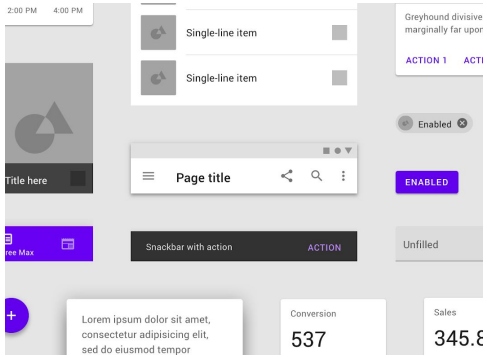
- Figma
- Adobe XD
- Sketch
- InVision

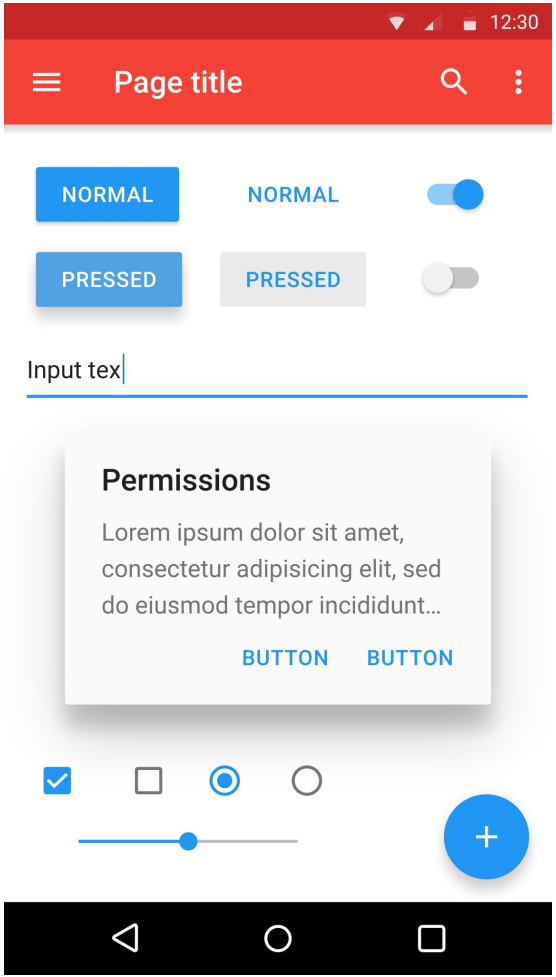




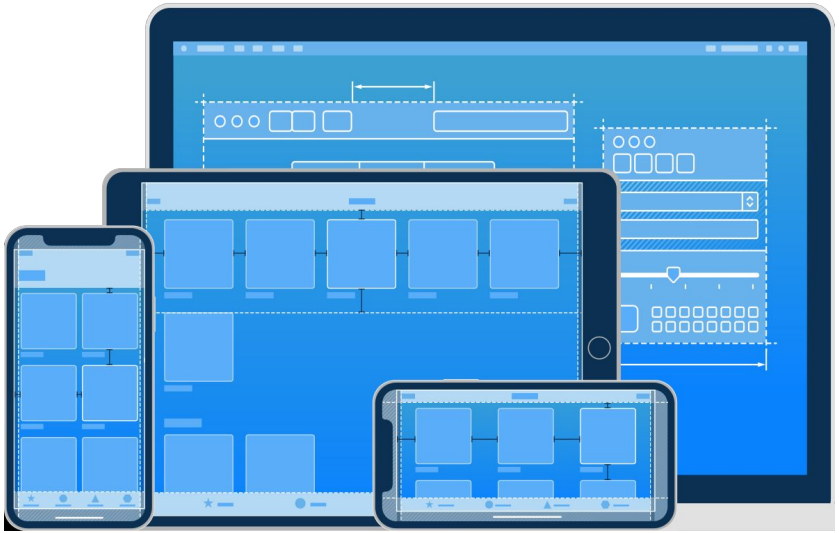
Popular Design Patterns

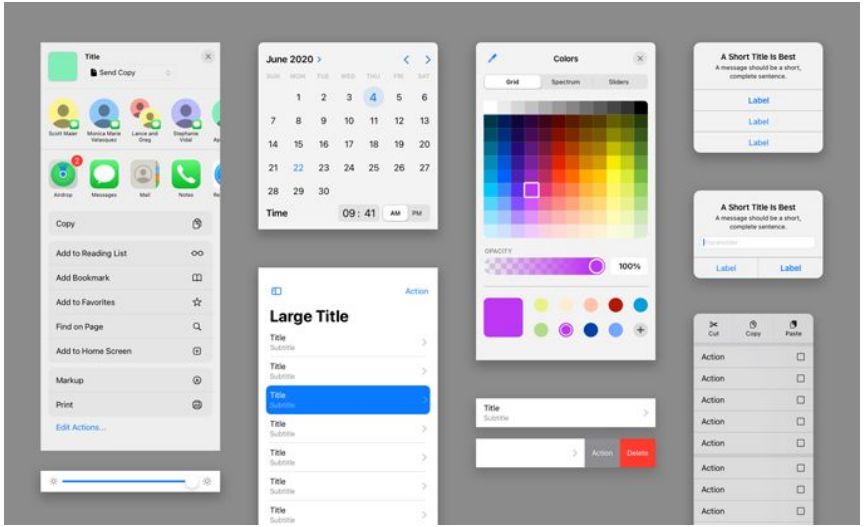
- Material Design
  - Design system/language developed by Google in 2014
  - Based on principles of real world materials
  - Material 3: https://m3.material.io/





- Human Interface Guidelines
  - Set of design principles and guidelines created by Apple
  - Consistency and usability across all its platforms and applications
  - HIG: https://developer.apple.com/design/





- Skeuomorphic Design
  - Replicates the look and feel of real world objects
  - Textured buttons, drop shadows, fancy fonts etc.
  - Was used in the early days of mobile development but not popular anymore

- Flat Design
  - Minimalist design philosophy that puts the emphasis on simple shapes, flat colors and clean typography
  - Avoids any “noisy” design elements such as drop shadows, gradients, etc.
  - Very popular nowadays

Mobile Operating Systems

- Android
  - Developed by Google in 2008
  - It is most used mobile OS globally (71.77%)
  - Based on the Linux kernel and is open-source, which allows manufacturers and developers to modify the OS and create custom version
  - Written in C, C++, and Java

- iOS
  - Developed by Apple in 2007
  - Second most used mobile OS globally (27.6%) and the most used in the US (57.77%)
  - Exclusively designed for Apple hardware
  - Written in C, C++, Objective-C, and Swift

Programming Languages for Android

- Java
  - Primary language for developing native Android apps
  - Object oriented
  - Has a huge set of libraries and tools built for it and also Android development

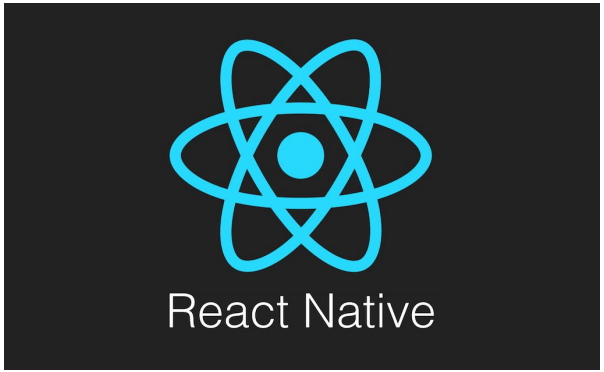
- Kotlin
  - Combines features of OOP and functional programming
  - Fixes a lot of unfriendly features of Java
  - Interoperable with Java so you can use both at the same time and makes migration easier

Programming Languages for iOS

- Objective-C
  - Used to be the default language to build iOS apps
  - Similar to C but object oriented
- Swift
  - Introduced in 2014, it was an alternative to Objective-C
  - Default language to develop for iOS, macOS, watchOS, tvOS

Cross Platform Frameworks

- React Native
  - Open-source framework for developing mobile apps for both iOS and Android using JavaScript and React in a single codebase
  - Developed by Facebook and released in 2015
  - Easy to use for web developers as it uses HTML, CSS, and JavaScript
  - It interfaces JavaScript with native UI components, so the resulting app replicates a native app



- Flutter
  - Open-source framework for developing mobile apps for iOS, Android, Windows, Linux, and even the web
  - Developed by Google and released in 2017
  - Easy to use with a lot of features and components supported out of the box
  - Uses the Dart programming language, which is kind of a mix between Java and Kotlin
  - Uses a graphics engine to recreate the feel of native apps but also gives developers pixel level control
  - The fast reload feature makes dev cycles much faster

Flutter

Dart

Other Frameworks

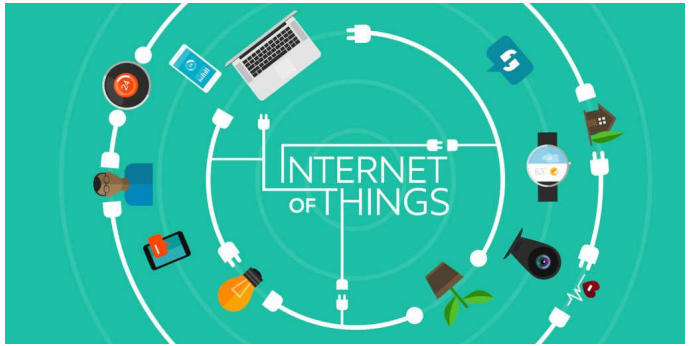
- Ionic
  - Open-source framework to build application using JavaScript and the Angular framework
- Xamarin
  - Open-source framework to build applications from iOS, Android and Windows using C#

Future of Mobile Development

- Augmented Reality (AR)
  - Integration of digital information with the user's real-world environment
  - Involves the overlaying data on the user’s surroundings usually through the camera
  - Pokemon Go
  - Google Maps Navigation
  - Snapchat Filters

- Virtual Reality (VR)
  - Experience a simulated environment through a headset or mobile device.
  - Virtual Tours
  - VR Gaming
  - Google Cardboard
  - Samsung Gear VR

- Internet of Things (IoT)
  - IoT is the interconnection of everyday devices and appliances
  - IoT is become increasingly popular and pervasive
  - Mobile apps to integrate all the devices together



- Artificial Intelligence (AI)
  - With increasing performance and storage, we are able to utilise a AI models with larger number of parameters and complexity

(Shameless) SIGMobile Plug

- Special Interest Group for Mobile Development
- Workshops on Flutter and Android
- Group projects
- Get help on your projects
- Looking for people interested in building out our infrastructure - website, iOS dev, app for ACM
- Weekly Meetings on Tuesdays from 5 to 6 at 1302 Seibel Center for CS

References

- Stats: https://explodingtopics.com/blog/smartphone-stats
- Market Share: https://gs.statcounter.com/os-market-share/mobile/worldwide