CMSC 628/CMSC 491: Introduction to Mobile Computing

Lecture: Challenges in Mobile Computing

Nilanjan Banerjee

University of Maryland
Baltimore County
nilanb@umbc.edu
http://www.csee.umbc.edu/~nilanb/

Why do I need to learn smart phone programming?

"Smartphone penetration is now close to 67.3% with 1.5 billion smartphones sold worldwide"

--- Statistica.com

What does mobile phone programming encapsulate?

User-interface design

Operating system design

programming languages

networking

cloud computing

What are the challenges with the present hardware platform?

- Computational power
  - Usually 2.3 GHz processors (iPhone X)
- Memory (can be limited for certain applications)
  - 3 GB of RAM (half of it is the OS)
- Battery constraint (biggest constraint)
  - Limited battery is always a constraint
  - Cannot build apps which kill your battery
- Too many options ☺
  - Accelerometer, GPS, compass, WiFi, Bluetooth, LTE….

What are the potential applications… endless…

Course content

- Introduction to challenges in Mobile Computing (Today's lecture)
- Setting up the programming environment and basic walk through of an app in Android
- Android basics
  - Activity, Intent, Broadcast receiver, Services, Pending Intent
- Android user interfaces
  - Views and Controllers
  - Fragments
- Sensors and Location
  - IMU Sensor and Analysis, GPS and location, Maps and Localization
- Android Data Management
  - Local storage services
- Backend Cloud services and their interaction with Apps
  - AWS services
- Cross Platform tool introduction: React Native
  - React and React Native Introduction
  - Building User interfaces with React Native
  - Accessing webservices and sensors using React Native

Is this course for me?

- Should have knowledge of object-oriented programming.
  - Knowledge of Java is a must!
  - Knowledge of Javascript is good!

- Should have working knowledge of networking and operating system concepts

- This is not a book-oriented course. Your creativity will be tested in the assignments, class discussions, and final projects.

How will I be graded?

- Homeworks (Assignment, 4 homeworks) **(40 points)**
  - Individual Programming/App assignment
- Final project groups of 2 **(30 points)**
  - Hopefully we will have a poster/demo session
- In-class finals **(30 points)**
  - Testing design skills and mobile programming skills

Assignments

- Three assignments on design problems
  - **Assignment 1: Simple UI + Sensors**
  - **Assignment 2: Bar code scanner App**
  - **Assignment 3: Location + Maps**
  - **Assignment 4: React Native assignment**
- Individual Assignments
- Submitted via Blackboard
- Grading
  - Specified in the Assignment text

Finals

- In-class finals
- Design and coding problems
- Grading
  - 30 points towards final grade

Group Project

- Needs to be an interesting idea
  - Game, social app, home automation, whatever you want..
  - Should be commensurate to 4 members in the group
  - Should include an in-smartphone component and use of a backend webservice
    - If it does not satisfy these, the project would not be accepted.
- Submission of app code/video

Group formation semantics

- Groups of 2.

- There are due dates for three important components of the project
  - Abstract due: Group formation and idea
  - Midterm term review
  - Submitting the final project

- All submission via Blackboard.

Lecturing style

- Demo oriented and some live implementation
  - Bring your laptop
  - Bring your mobile phone

- Best way of building apps is building apps.

Resources you will need

- Laptop/Machine with descent amount of RAM
- Android Studio.
- You can perform most of your evaluation using the emulator but an Android device is always helpful

Administrivia…

- Course webpage and reading list
  - Piazza site (for discussion and course material upload): https://piazza.com/class/ldg0thyq2vx336/
  - BB Site (for submissions): https://blackboard.umbc.edu/ultra/courses/_72533_1/cl/outline
  - My email id: nilanb@umbc.edu
  - Class hours: 4:00pm – 5:15 pm (Mon, Wed)
  - Office hours: by appointment
- TA : Hemanth Gopal
  - Email: hemantg1@umbc.edu
  - Office hours: TBD

Lets start..

- Lets start with the tools
  - Installation of Android Studio

CMSC 628/CMSC 491: Introduction to Mobile Computing

Lecture: Challenges in Mobile Computing

Nilanjan Banerjee

University of Maryland
Baltimore County
nilanb@umbc.edu
http://www.csee.umbc.edu/~nilanb/