Sensor Technology and Android Programming Even Sem 2022 (6th Sem Elective)

By

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Outline of today's class

- Course outcome
- Course syllabus
- Rules of the class
- Tutorial submission Instructions
- Project synopsis, architectural design of h/w and s/w, demo, viva
- Text Book references

Course Outcome

CO1	**Understand the sensor, smart sensors and various platform of sensing devices**
CO2	Understand Anatomy of an android development environment (IDE) for sensing application
CO3	Accessing various physical sensors of the Android device and its programming
CO4	Develop various user services/app using Android and sensors

Course syllabus (Module-1 to 5)

- Module-1 : **Fundamental of Sensors**
- Module-2 : **Introduction to Android Programming**
- Module-3 : **Inferring Information from Physical Sensors**
- Module-4 : **Sensing the Augmented, Pattern-Rich External World**
- Module-5 : **Development of user Services using Android and Sensors**

Course syllabus (Module-1 to 5)

Module-1 : Fundamental of Sensors

- **Sensing and Sensor Fundamentals:** Sensing Modalities, Mechanical Sensors, MEMS Sensors, Optical Sensors, Semiconductor Sensors, Electrochemical Sensors, Biosensors
- **Key Sensor Technology Components- Hardware and Software Overview:** Smart Sensors, Sensor Systems, Sensor Platforms, Microcontrollers for Smart Sensors, Microcontroller Software and Debugging

Course syllabus (Module-1 to 5)

Module-2 : Introduction to Android Programming

- **Overview of the Android Platform:** Introducing Android, Setting Up Your Android Development Environment.
- **Android Application Basics:** Anatomy of an Android Application, Android Manifest File, Managing Application Resources.
- **Android User Interface Design Essentials:** Exploring User Interface Building Blocks, Designing with Layouts, Partitioning the User Interface with Fragments, Displaying Dialogs.

Course syllabus (Module-1 to 5)

Module-3 : Inferring Information from Physical Sensors

- **Overview of Physical Sensors,** Android Sensor API, Sensing the Environment, Sensing Device Orientation and Movement.
- **Detecting Movement:** Acceleration Data.
- **Sensing the Environment:** Barometer vs. GPS for Altitude Data
- **Android Open Accessory (AOA):** AOA Sensors versus Native Device Sensors, AOA Beyond Sensors, AOA Limitations, AOA and Sensing Temperature

Course syllabus (Module-1 to 5)

Module-4 : Sensing the Augmented, Pattern-Rich External World

- RFID, Near field communication (NFC), Inventory Tracking System using NFC, Camera Activity, Barcode Reader, Image-Processing using AOA, Android Clapper and Media Recorder.

Course syllabus (Module-1 to 5)

Module-5 : Development of user Services using Android and Sensors

- Development of android services such as motion detection, Air Monitoring, Screen Brightness Monitoring, Acceleration, Position, Air Pressure Monitoring and Monitor of Temperature

Rules of the class

- What's app group has been created in addition to google classrooms
- Attendance will be taken using google form and link will be shared during class hours only.
- Random students will be asked with questions related to lecture class, if response is not obtained such students will be marked absent.
- Few surprise class quiz will be taken, and any absentees will be marked zero.
- Time to time rules will be updated.

Tutorial/Assignment submission Instructions

Tutorial/Assignment submission Instructions

1. Tutorial/Assignment submission deadline should be strictly followed
2. Expect for few theory tutorial , most of the tutorial are based on the Android Programming.
3. Kindly install Android Studio 4.2
4. Buy/Barrow/Steal (from parent or siblings only) if you don't own Android phone to run Android Sensors Programming tutorial exercise.
5. Programming exercises submission should have code, instruction to run program, libraries and screen shot of the running program with selfie.
6. References used in every tutorial should be mentioned.

Project synopsis, architectural design of h/w and s/w, demo, viva

- Project synopsis should be submitted by 10th March 2022
- Architectural design of h/w and s/w should be submitted by 10th April 2021
- Demo of project is done at end semester in regular class from 25th May to 11th June. Therefore, project should be implemented before 25th May.
- Viva will be done along with Demo

Main References

- McGrath, Michael J., Cliodhna Ni Scanaill, and Dawn Nafus. "*Sensor technologies: healthcare, wellness, and environmental applications*". Springer Nature, 2013. Link: https://link.springer.com/book/10.1007/978-1-4302-6014-1
- Horton, John. Android Programming for Beginners. United Kingdom, Packt Publishing, 2015.
- Greg Milette, Adam Stroud, "Professional Android Sensor Programming", ISBN: 978-1-118-18348-9, Wiley June 2012. link: https://www.programmer-books.com/wp-content/uploads/2018/07/SolAndroid.pdf