

Asian Institute of Technology
School of Engineering and Technology

AT76.29 Positioning and Location-Based Services Technology 1(1-0) Semester: August

Course Objective: The objective of this course aims at providing students with knowledge and understanding about Location-Based Services (LBSs) technology. The fundamentals and operation of LBSs will be taught to obtain an understanding of its systems and methods. The key technology of various positioning method will be trained. Additionally, the course will also cover related technologies of Indoor Positioning, Augmented Reality and navigation systems

Learning Outcomes :

The students upon successful completion of this course will be able to:

1. Explain the fundamentals and operation of LBSs system and methods
2. Identify the suitable position method with various constraints and purpose
3. Identify the new opportunities by using the LBSs technology for solving the problems

Prerequisite: None

Course Outline:

- I. Introduction
 1. Overview of LBSs
 2. Context awareness services

- II. Fundamentals of LBSs
 1. Components of LBSs
 2. Wireless Communications and Cellular Networks
 3. Services provider

- III. Positioning and Locations
 1. Fundamental of Positioning and Location
 2. Satellite positioning
 3. Cellular Positioning
 4. Assisted GPS (aGPS)

- IV. Indoor Positioning
 1. WLAN Positioning
 2. Radio Signal and RFID Positioning
 3. Non Radiolocation Systems

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- V. Related technologies
1. Augmented Reality components
 2. Spatial Augmented Reality
 3. Navigation system

- VI. Applications
1. LBSs Applications

Laboratory Session(s):

None

Learning Resources:

Textbooks: No assigned textbook, but class notes and handouts will be provided.

Reference Books:

A.Kupper:

Location-Based Services: Fundamentals and Operation, John Wiley & Sons, Ltd, USA, 2005.

K.W. Kolodziej and J. Hjelm:

Local Positioning Systems: LBS Applications and Services, CRC Press, USA, 2006.

M.Werner:

Indoor Location-Based Services: Prerequisites and Foundations, Springer, USA, 2014.

O.Bimer and R. Raskar:

Spatial Augmented Reality: Merging Real and Virtual Worlds, CRC Press, USA, 2005.

Journals and Magazines:

International Journal of Digital Earth, Taylor & Francis

Journal of Geographic Information System, Scientific Research

Others: None

Teaching and Learning Methods:

1. **Lectures and class discussion:** Teaching and learning methods include lectures, class discussions and presentations on positioning and location based-service oriented technology and applications to understand the underlying fundamental of positioning and location based-service. Students

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will received the lecture notes and the weekly lecture schedule at the beginning of the course, and requested them to read the lecture notes before coming to the class.

Time Distribution and Study Load:

Lecture: 15 Hrs

Self-study + Assignments: 45 Hrs

Evaluation Scheme:

Assignments: 20%

Final exam (closed book): 80%

In the examination, an “A” would be awarded if a student can elaborate the knowledge and technique learned in the class by giving his/her own skills to design innovative application of LBSs. “B+” would be awarded if a student shows an overall understanding of all give topics and able to understand the core technology of LBSs Technology and able to select appropriate architecture for difference applications. A “B” would be awarded if a student shows an understanding of all give topics and able to identify core technology of any applications. A “C+” would be given if a student meets average expectation on both knowledge acquired and adaptation skills and a “C” would be given if a student meets below average expectation. A “D” would be given if a student does not meet basis expectations in understanding the topics and issues presented in course.

Instructor(s): Dr. Sarawut Ninsawat