ECE 4567 (Approved): Design of Mobile Internet-of-Things

Course Description

This course focuses on theoretical and practical insights into design of Internet of Things architectures and mobile platforms. Concepts covered in this course include general IoT architectures, sensor, processing, and communication resources, device and cloud connectivity, mobility support. Practical aspects will be studied with lab assignments and the semester-long group projects.

Transcript Abbreviation: M-IoT Design
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Undergrad
Student Ranks: Junior, Senior
Course Offerings: Autumn
Flex Scheduled Course: Never
Course Frequency: Every Year
Course Length: 14 Week
Credits: 4.0
Repeatable: No
Time Distribution: 3.0 hr Lec, 2.0 hr Lab
Expected out-of-class hours per week: 7.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prerequisites: 2560, 3020, and 3027
Exclusions:
Cross-Listings:

Course Rationale: The course will be a computer engineering elective and a hub course for students with

diverse topical interests and backgrounds.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0902
Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Labs to meet weeks 4-11

Course Goals

Master embedded system architectures, input/output, processing, and communication routines
Become competent in practical design principles of IoT systems
Become familiar with algorithm design for embedded systems, algorithmic techniques, data acquisition, and on-board processing
Be exposed to could-based processing, security concepts, software development

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
IoT Architectures	3.0							
IoT Applications	1.0							
IoT Devices and Sensors	4.0		2.0					
IoT Connectivity	5.0		2.0					
Local and Distributed Processing in IoT Systems	5.0		3.0					
Cloud Processing and Storage for IoT	3.0		2.0					
Analytics and Machine Learning for IoT	3.0		1.0					
Mobile IoT Systems	4.0		2.0					
IoT Security	3.0		2.0					
Localization in IoT	4.0		2.0					
Vehicular IoT Systems	4.0							
2 Midterm Exams	2.0							

Representative Assignments

2 Midterm Exams to test theoretical knowledge
5 Homework Assignments from reference books
8 Laboratory Assignments to test the practical knowledge covered in the laboratory
1 Term Project that spans the entire semester, targeting a mobile IoT system design, including a final report

Grades

Aspect	Percent
Midterm Exams	40%
Homework Assignments	20%
Laboratory Assignments	10%
Term Project	30%

Representative Textbooks and Other Course Materials

Title	Author
Enchanted Objects (recommended)	David Rose
The Amazon Was on IoT (recommended)	John Rossman
Enterprise Internet of Things Handbook (recommended)	Arvind Ravulavaru

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
**	f	An understanding of professional and ethical responsibility.
**	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
**	i	A recognition of the need for, and an ability to engage in life-long learning.
***	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

CpE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
*	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences
**	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
***	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

EE ABET-EAC Criterion 9 Program Criteria Outcomes

Course Contribution		Program Outcome
***	1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
*	2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
**	3	an ability to communicate effectively with a range of audiences
**	4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
***	5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Course Contribution		Program Outcome
***	6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
***	7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Additional Notes or Comments

The course is proposed to count towards 1 hr of degree lab requirements

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