Syllabus [2025Year 1 Term]

Course Information

Course Title	IoT Systems	Credits	3
Course Code	556530-1	Required/Elective (For Undergraduate Courses)	Selective majors
Department or Major	Department of Mobile Systems Engineering	Language	English
Methods of Teaching		Lecture Room	월1,2,3/수4,5,6(국제210)
Time Allotment	Lecture(3) Experiments(0) Trainging & Practice(0) Performance(0) Designing & Planning(0)	Cyber Lectures	
Course Type	offline		

Lecturer

Lecturer	Name	JaeYeon Park	Rank	Assistant Professor	Final Academic Degree	공학박사
	Department & college	Department of Mobile Systems Engineering		Office		
	Office Phone Number	—		e-mail	jaeyeon.park@dankook.ac.kr	
	Field of Interest					

Course Summary

Course Description	This course focuses on the theories and practical aspects of designing and implementing IoT (Internet of Things) systems. Students will learn the basic concepts of embedded systems, hardware structures, interrupt handling, GPIO control, and various communication protocols, while applying these concepts through hands-on practice. Additionally, students will gain foundational knowledge in mobile and embedded IoT system development through Raspberry Pi environment setup and programming. Through team projects, students will have the opportunity to design and implement real-world IoT systems. The course aims to equip students with a balanced understanding of theoretical knowledge and practical experience, focusing on the complete pipeline of data collection, processing, and utilization in mobile and embedded systems.
Description Related Courses	This course is closely connected to System Programming and Programming Fundamentals. - It builds upon system programming knowledge, such as interactions between hardware and software in embedded systems, interrupt handling, memory mapping, and device control.

	- Additionally, the programming and GPIO control of Raspberry Pi, as well as the use of the WiringPi library covered in this course, are strongly tied to the programming languages (e.g., C, Python) introduced in Programming Fundamentals.
Course Goals	- Students will develop the ability to independently explore and acquire the necessary hardware and software components while setting project goals and analyzing problems during the IoT system design and implementation process. - By applying theoretical concepts, such as signal processing, GPIO control, and communication protocols, in hands-on practice and projects, students will enhance their ability to effectively utilize learned knowledge in real-world scenarios. - Students will cultivate comprehensive thinking skills by integrating knowledge from various domains, including embedded systems, communication, and programming, to design IoT systems and solve related problems.
Projected Results	- Students will acquire a foundational understanding of the components and principles of embedded systems. - They will develop practical skills to design and implement real IoT systems using various sensors and modules. - Through team projects, students will enhance their ability to share ideas, collaborate, and address challenges in integrating hardware and software.
Percentage of the original language classes(%)	100

Syllabus

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
1	Introduction to the Course and Embedded Systems	Overview of the course, evaluation criteria, and reference materials Definition and characteristics of embedded systems	강의,	
2	Basics of Circuit Theory	Signal frequency range Operation principles of resistors, capacitors, and inductors	강의,	
3	Microprocessor Architecture	Fundamental structure of microprocessors Architecture and operation of ARM processors Processor modes and register structures	강의,	
4	Interrupt Handling and Exception Management	Concept of interrupts and ISR (Interrupt Service Routine) implementation Exception handling mechanisms in ARM	강의,	

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
5	Device Control in Embedded Systems	GPIO pin mapping and I/O Device control based on interrupts	강의,	
6	System Design and Optimization	Energy-efficient system design methodologies Performance analysis of real-time systems	강의,	
7	Raspberry Pi Environment Setup and Linux OS Installation	Installing and configuring Ubuntu 22.04 Remote connection setup (SSH, VNC, etc.)	강의,	
8	Midterm Exam			
9	Introduction to GPIO, WiringPi Setup and GPIO Control Practice	Basics of GPIO and its pin configuration and functions Installing and configuring the WiringPi library GPIO control	강의,	
10	Understanding Serial Communication Protocols	Basics and characteristics of I2C, UART, and SPI protocols Setting up and using communication protocols Reading sensor data based on I2C and SPI	강의,	
11	Understanding and Applying PWM (Pulse Width Modulation)	Principles of PWM PWM signal generation Sensor control using PWM	강의,	
12	Team Project Practice and Implementation I	Analyzing project requirements Selecting hardware components and software development environment	강의, 팀기반학습(TBL),	
13	Team Project Practice and Implementation II	Assembling hardware circuits Coding software modules, integration testing, and problem-solving	강의, 팀기반학습(TBL),	

Times	Lecture Topic	Lecture Goals	Lecture Methods	Assignments
14	Team Project Presentation	Project presentations and sharing results	강의, 토의토론수업,	
15	Final Exam			

Methods of Grading

sequence	Description	Percentage	Details
1	Mid-tem Exam	25%	
2	Final-exam	30%	
3	Pop Quizzes	0%	
4	Assignments	0%	
5	Reports	0%	
6	Presentations & Discussions	25%	
7	Attendance	20%	
8		0%	
9	Others	0%	
All		100%	

Core of Value

핵심가치	전공역량	역량정의	역량구분	값(%)
혁신 (Discovery)	창의적문제해결 (Creative problem-solving)	주어진 상황과 문제를 창의적으로 해결할 수 있는 능력	부역량	20%
혁신 (Discovery)	도전 (Challenging)	전공 지식을 새로운 분야와 융합하고 아우를 수 있는 능력		10%
혁신 (Discovery)	지식융합 (Knowledge convergence)	새로운 분야를 개척하거나 도전적으로 임할 수 있는 능력		10%
헌신 (Dedication)	세계시민 (Universal value)	세계 공동체 구성원으로 전공자로서 국제적 이슈에 대응할 수 있는 능력		0%
헌신 (Dedication)	상호협력 (Cooperation)	공동의 목적 달성을 위해 타인과 상호협력을 할 수 있는 능력		0%
헌신 (Dedication)	공동체 (Sense of community)	공동체의 구성원으로서 필요한 태도와 윤리의식을 가질 수 있는 능력		0%

핵심가치	전공역량	역량정의	역량구분	값(%)
능동 (self- Determination)	자기주도 (Self-Managing)	주어진 상황과 문제를 주도적이고 능동적으로 해결할 수 있는 능력	부역량	20%
능동 (self- Determination)	지식활용 (Knowledge application)	주어진 상황과 문제에 대해 논리적으로 파악하고 분석할 수 있는 능력	주역량	40%
능동 (self- Determination)	논리적사고 (Logical thinking)	전공관련 지식을 필요에 따라 다양하게 적용하고 활용할 수 있는 능력		0%
능동 (self- Determination)	의사소통 (Articulation)	대화를 통해 다양한 의견을 조율하고 합의를 이끌어 낼 수 있는 능력		0%

Textbook(s) & References

Description	Title	Author	Publisher
References	Embedded System Design: A Unified Hardware/Software Introduction	Frank Vahid and Tony Givargis	Wiley

Memo