



HANYANG UNIVERSITY

INTERNATIONAL SUMMER SCHOOL

Name	Nyoman B. Karna
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Home University	Telkom University
Department	Electrical Engineering

Course Title	Microprocessor and IoT
Credits	3
Contact Hours	45
Course Code/Number	ISS1125
Course Description	This course discusses about how microprocessor works, using x86 and RISC architectures as case studies, followed by its usage on microcontroller (case study: ARM/Atmel). The last 2 classes discuss about future research and enhancement possibilities in microprocessor world including IoT and its supporting technologies.
Course Objective	<ul style="list-style-type: none">- Students should be able to explain how microprocessor works by comparing x86 (case study: i8088) and RISC architecture (case study: ARM Cortex)- Students should be able to design and program microcontroller using ARM Cortex M3- Students should be able to design and program an IoT device using ARM-based Arduino system using emulator (TinkerCAD.com) and send its data to IoT Platform for analytic- Students should be able to explain the future trends of microprocessor technologies
Preparations (Pre-Knowledge)	Understanding on Logic Circuit and C Programming is needed but not mandatory



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Materials (Textbook/Websites)	<ol style="list-style-type: none"> 1. Jacob Millman and Arvin Grabel, "Microelectronics 2nd ed.," McGraw-Hill, 1988 2. John L. Hennessy and David A. Patterson, "Computer Architecture: A Quantitative Approach 4th ed.," Morgan Kaufmann, 2007 3. William Hohl and Christopher Hinds, "ARM Assembly Language: Fundamentals and Techniques 2nd ed.," CRC Press, 2015
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Lesson Plan	
Week 1	Topic: How Microprocessor Works
1st Day	Introduction to the class (included in Class 1)
Class 1	Story of Microprocessor and How it Works (Digital Transistor)
Class 2	Microprocessor and Memory Interaction (Hardware Perspective)
Class 3	Microprocessor and I/O Interaction (Hardware Perspective)
Class 4	Machine Instruction (case study: CISC-i8088 and RISC-ARM Cortex M3)
Week 2	Topic: Making Microprocessor Faster
Class 5	Pipeline in DLX Architecture, Hyper-Threading, Memory Management
Class 6	Parallel Processing and Hyper-Threading
Class 7	Memory Management (Data Caching)
Class 8	Midterm exam
Week 3	Topic: IoT Environment
Class 9	Introduction to Microcontroller (case study: Microchip and ARM)
Class 10	Programming Microcontroller (case study: Arduino Uno and Raspberry Pi)
Class 11	Designing IoT Device: Sensor Input and Display Output (case study: Arduino Uno)
Class 12	Connecting to IoT Platform for Analytic, Reporting, and Controlling
Week 4	
Class 13	Future Research on Microprocessor
Class 14	Best Project Presentation
Class 15	Final Exam



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Evaluation (%)								
Assignments	Attendance	Final	Group Project	Mid-term	Participation	Presentation	Daily Quizzes	Total
0%	0%	20%	40%	20%	0%	0%	20%	100%