Lahore University of Management Sciences

CS 677 – Internet of Things

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Subject to Change

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Course URL (if any)	TBA

Course Basics				
Credit Hours	3			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	75 Minutes each
Recitation/Lab (per week)	Nbr of Lec(s) Per Week		Duration	
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

Course Distribution	
Core	No
Elective	Yes
Open for Student Category	All
Close for Student Category	All

COURSE DESCRIPTION

This course focuses on a new emerging topic the Internet of Things (IoT). IoT enables people to remotely interact with their "things". It's going to make everything in our lives "smart" - from alarm clock to doorbell to home to street lights to airports. IoT is the wildest extension of the Internet mankind has ever seen with multiple surveys reporting over 50 billion "things" to be added to the Internet by 2025. This extension brings with itself enormous CS research challenges that we will discuss in this course. The course includes a small amount of background 'primer' review material to get all students to an equivalent level, but primarily lectures will follow a "seminar style" structure. This implies course work includes readings, presentations, and discussion of technical papers taken from the currently available IoT literature. Seminar style requires active student participation in both the presentations and in the discussions. This participation is a significant component in the students' grade.

Starting fall 2018 we are introducing a new and exciting seminar style: **Every seminar lecture will represent a technical program committee (TPC) meeting. One student will give a short presentation on a given paper. The rest of the class will be divided into two groups: one that will champion for paper acceptance and the other that will argue for rejection. Students can choose to be part of any of these groups on a per lecture basis by submitting their reviews prior to the lecture. The instructor will be the Chair of this TPC meeting and will decide the "acceptance" or "rejection" of the paper based on the strength of arguments. Your class participation grade component heavily depends upon your active participation in this TPC meeting.**

Note: TPC meetings is a mechanism used by top EE and CS conferences to decide the fate of submitted papers, and by and large follow the above structure.

COURSE PREREQUISITE(S)

Grad Standing or CS 382 or CS 471

The instructor assumes participants to understand basic concepts of computer networks and operating systems.

COURSE OBJECTIVES

Students should deepen their understanding of the fundamental concepts in Internet of Things (IoT) and how to leverage this knowledge to research, design, and engineer IoT-based systems.

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Learning Outcomes
Students should have developed: • Basic understanding of how IoT applications, protocols and algorithms differ from traditional computer networking concepts. • Thorough understanding of key IoT applications, protocols (6lowpan, RPL, IEEE 802.15.4), and operating systems. • Expertise in reading and critically analyzing research papers, and to some extent polish their technical writing skills. • Learnt at least one IoT development platform though assignments and term project.

Grading Breakup and Policy
• Class participation 15% • Term project 50% • Final exam (from selective papers) 30%. Note that the exam may be held in multiple module during the course of semester.

Examination Detail		
Midterm Exam	Yes/No: No Combine Separate: Duration: Preferred Date: Exam Specifications:	No
Final Exam	Yes/No: Combine Separate: Duration: Exam Specifications:	Yes Combine

Modules	Lectures	Topic	Class Style	Readings
Bootstrapping	**1**	Introduction to IoT and Wireless Sensor Networks – primer	Lecture	Recommended and mandatory readings for "discussion" style lectures will be made available on lms at least three days before the scheduled lecture
	2	IoT challenges and opportunities – the big picture	Lecture	
	3	Research Directions at SysNet	Seminar	
	4	Bring your IoT application	Seminar	
Applications (special topic: smart homes)	**5**	Occupancy detection for home automation	Seminar	
	6	Duty cycling appliances	Seminar	
	7	Smart thermostat	Seminar	
	8	ICT4D	Seminar	
	9	State-of-the-art in IoT	Seminar	
Operating Systems: (special topic: Intermittent Computing)	**10**	What is Intermittent Computing	Lecture	
	11	Mementos	Seminar	
	12	Hibernus	Seminar	
	13	Programming language support for IC	Seminar	
	14	Differential Checkpointing	Seminar	
	15	Mid Term Presentations	Seminar	
	16	Mid Term Presentations	Seminar	
	17	Flickr	Seminar	
	18	State of the Art in IC	Seminar	
Networking (special topics: networking and link layers)	**19**	Fundamentals of Wireless Networking	Lecture	
	20	Link layer technologies	Seminar	
	21	Novel MAC protocols	Seminar	
	22	Novel MAC protocols	Seminar	
	23	Link Estimation	Seminar	

	24	Routing	Seminar	
	25	Routing (capture effect)	Seminar	
	26	Network wide consensus	Seminar	
Final Project Presentations	**27**	Project Presentations	Seminar	
	28	Project Presentations	Seminar	

Recommended Books:

None: Research paper driven course modules