

„Wireless Internet of Things (IoT) Applications“

Course Syllabus

Time and Location

This course is an instructor led summer course during the 9th American-German Summer Program. Time is listed on detailed summer program 2018 schedule. The syllabus is adjusted to reflect special circumstances related to the international experience. The tabular schedule is a guideline; we will try to follow it closely, but be prepared to adjust to changes in pace dictated by our collective experience. Location is Germany, Jade University of Applied Sciences in Wilhelmshaven, Department of Engineering Sciences.

Instructors

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Office Hours

We can meet after each class for questions or on appointment.

Catalog Description and Prerequisites

Wireless Internet of Things (IoT) Applications

Prerequisites: Students should have already basic understanding of electric engineering and software programming skills.

Textbook

- The Internet of Things: Key Applications and Protocols, 2nd Ed., Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley
- Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, Wiley
- Habib M. Ammari (Ed.), The Art of Wireless Sensor Networks, Volume 1: Fundamentals, Springer
- F. Gustrau, D. Manteuffel: EM Modeling of Antennas and RF components for Wireless Communication Systems
- RF system design of transceivers for wireless communications, Qizheng Gu, Springer, 2005
- MQTT protocol specification

Purpose

This course provides a practical introduction into aspects of the emerging IoT (Internet of Things) technology. The focus is on the practical application of WIFI IoT modules. Students will learn about fundamentals of wireless communication based on IEEE 802.11 b/g/n, integration of sensors and data processing by Message Queue Telemetry Transport protocol (MQTT).

Learning Outcomes

Students will be able to identify and summarize the important features of wireless communication and TCP/IP network protocols.

Students will be able to develop software applications running on IoT modules.

Students will be able to describe the sensor data processing with MQTT (a machine-to-machine (M2M)/Internet of Things" connectivity protocol).

Students learn about electromagnetic (EM) radiation, EM wave propagation and adverse effects like multipath fading. Concepts for overcoming those effects will be explained (e.g. forward error correction, interleaver, guard interval).

Students will learn about the concept of complex IQ modulated signals and basic architectures of wireless communication systems.

Students will use EM simulation software to visualize electromagnetic fields and understand characteristics of antennas for wireless communication.

Students will be able to demonstrate their knowledge about Wireless Internet of Things (IoT) Applications by writing a specific laboratory report.

Course Schedule

Look at separate schedule of the summer program!

Examinations

The course is separated in 70% class and 30% laboratory work.

There will be a written test after 50% of class. During the laboratory work the student has to do practical laboratory work with a graded laboratory report. At the end of the course there is a final written examination.

Grading Policy

Final grade is determined based on test, laboratory report and final written examination. The approximate weighting of graded material in determining the final grade is as follows:

Item	Percent of Grade
test	30%
laboratory report	30%
final written examination	40%

Grades will be provided latest 2 weeks after the end of the course.

Notice: At Jade Hochschule, Department of Engineering Science this course has 5 ECTS (ECTS: European Credit Transfer System)