Course Syllabus

Home and Building Automation (MCM509), Spring 2019

Class Times and Locations

These are changing a lot. We should mostly be in L1 (FH2.422) and L2 (FH2.424) or L3. Check your calendar.

Instructor

Name + title: Dr. rer.-nat. Ulrich Norbisrath
Homepage: http://ulno.net
Contact information: http://contact.ulno.net
Office hours: I do not have dedicated office hours. Usually, you can just drop in. However, I might not always have directly time for you and also appreciate it if we schedule an appointment via email.

Introduction

Home and building automation has been around for a long while. It is a viable solution for equipping of and controlling industrial buildings with lighting, HVAC, security, audio/video, and computer networks. There are also plenty of solutions starting to become viable for the consumer.
In this class, we will learn to critically reflect, assess, and employ the solutions available. We will also focus on the integration of building automation technology and develop our own creative solutions.
The class has 5 ECTS. This means that you should budget on average an amount of 125 hours of effort for this class. This is in contrast to 42 hours presence in class. It means that only a third of the expected hours is class time. Therefore, expect to work outside of the class approximately 2 hours extra for each classroom hour.

Prerequisites

- technical bachelor
- programming knowledge
- git
- agile team-based programming
- Linux basics

Grading

0	<= score < 50%:	5
50%	<= score < 65%:	4
65%	<= score < 80%:	3
80%	<= score < 90%:	2
90%	<= score <= 100%:	1

The score consists of several elements adding up to 100%:

- **40% course project**
  10 (debate) + 10 (friend's house) + 20 (final integration)
- **10% special class commitment**
  There will be plenty of opportunity to provide material which is relevant outside class for the public or next class. This includes for example manuals, patches, good and documented examples, video guides, or solutions. They can be submitted as pull request against the initial git repository or via email suggestions to me. We might also identify potential submissions during class.

Try to excel in class discussions (in addition to the debate), on github (issues and PRs), with special project effort, and in more activities superseding the goals explicitly set in class

- **50% personal portfolio**
  Here, you will report everything what is going on in class and in your team in your own personal manner. Team activities can be linked and recorded shared, however, the link to them has to be personally curated.
  This includes what you have achieved as an individual, what you struggled with (yes, recording errors, mishaps and problems is really important and will be rewarded in this class) and what you solved or figured out for class facilitation.
  I will do some reviewing of your portfolios during the class and talk to your team or to you individually.
  There is lots to discover and you will need to help each other in class and share your discoveries. If something was hard or didi not work at all and you can explain why, this is also a discovery. Make sure to note down discoveries in your portfolio.
- There is no final exam. If you miss a class, you need a doctoral certificate to show that you are excused or agree with me on a work around in advance. All deadlines will be firm. There will be no late policy.

Content

As a lot in this class will depend on your input, this plan is not fix and will be constantly updated throughout the semester. Please check back and feel even free to comment and give feedback.

Here is an outline of the class contents (however, as already mentioned, this will most definitely change):

- 03.06. – 8h
  - Intro
    - Class logistics
    - Syllabus and grading
    - Teams
    - Best practice (github, Facebook/Matrix/Moodle, Google)
    - Home automation movies and discussion
    - Outline and **start project 1** (home automation debate)
  - “hello world” with IoTempower
  - Initial smart lock
- 04.11.– 4h
  - Simulation and testing (write your own mqtt components)
  - Intro IoT/IoTempower continue
  - Machine to machine communication, mqtt

- 06.06. – 5h

    - **Project 1 presentation: Home Automation Debate: Everybody should use Home Automation. True or False?**
    - Protocols and buses (zigbee, zwave, bacnet, X10, rs-232, rs-422/maybe, 485/dmx, knx-bus, SPI, I2C, one-wire, canbus, ebus)
    - mqtt simulation drivers
    - Advanced mobile smart lock with NFC integration, lock, temperature, and display
    - Outline / **Project 2 start**
- 11.06. - 8h
    - Portfolio review (class hello world, skills, discussion)
    - Frameworks (homeassistant, openHAB): integrate temperature sensor, and lock/led with IoTempower, extra sensors
    - Philips hue
    - KNX intro course (submit KNX certificate for portfolio inclusion)/one KNX project for every team - start
- 12.06. - 8h
    - **Project 2 presentation:** Automate your friend's home
    - Portfolio review (smart lock, mqtt, protocols, integration at least two more devices)
    - multimedia, kodi integration
    - **Project 3 (final) start:** Integrated Building Automation Project
- 13.06. - 5h
    - Voice assistant (Mycroft.AI)
    - More sensors
    - Final project planning and start, scenario assessment
- 19.06. - 2h (and last session)
    - **Project 3 (final) presentation**
    - Class wrap-up
- 09.07.2018 14:00 CET: **Link to/URL of finished personal portfolio** (in respective git folder) has to be clearly marked in top level of previously submitted git project folder, no changes after this date allowed. I will try grading until end of July and single grades (projects, extra, portfolio) should be available beginning of August from the front office.

Projects

These are the projects, you will cover in and outside the class.

1. Home Automation debate.
2. Automate your friend's home.
3. Integrated project (span multiple domains = here you can select), for example:
    - Some voice control – phone/tablet, Alexa/Google Home
    - Mutimedia/alarm system
    - Music/sound follows person
    - Multimedia mood lighting

- Voice assist (and other new modern interfaces) control

Resources

- IoTempower: https://github.com/iotempire/IoTempower
- Chat rooms:
  - public: #iotempower:matrix.org and Facebook group iotempower
  - private (course specific): moodle