EPFL

MICRO-333	**Wireless sensor practicals**
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Cursus	**Sem.**	**Type**
Microtechnics	BA6	Opt.

Language of teaching	English
Credits	3
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	90h
Weeks	14
Hours	**3 weekly**
Practical work	3 weekly
Number of positions	**56**

Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.

Summary

In this course, students will design, fabricate, and characterize a wireless sensor wearable. Students will design a custom-chosen wearable around a standardized wireless microcotroller platform, including the electronics and packaging, and will characterize and analyze its performance.

Content

The course will have the following content
1. Introduction to wearable design lecture, including overview of microcontroller platform.   After the lecture, students will be organized into groups of 4 students. Each group will work together throughout the course.
2. Selection and approval of target device: Students will present a target device, including planned sensor choice, interface strategy, and package design considerations, and overall work flow plan, including assignment to individuals within a group. If approved, students will proceed in stages, with evaluation and feedback provided at each stage to guide the design process
3. Design and fabrication of electronics and packaging: Students will split the work among the group members, including analysis of sensor requirements, electronics design of the sensor interface, and design of the package.   The work will be completed over the course of 2 months.   As needed, students will make use of the DLL fabrication facilities, central workshops, and workshops in Neuchatel as needed.
4. Characterization and analysis: Students will evaluate the performance of their fabricated part and will analyze and report on the performance vis a vis expectations and design targets.
5. Reporting and presentation: Students will prepare a written report and will additionally present their work orally.

Keywords

Design, Sensors, IoT, wireless, wearables, packaging

Learning Prerequisites

Required courses

Entire MT curriculum through BA5.

Important concepts to start the course

Basic electronics including microcontroller-based design
PCB design
CAD for 3D printing

Learning Outcomes

By the end of the course, the student must be able to:

- Design a wireless sensor system
- Assess / Evaluate the performance of the part
- Assemble the wireless sensor, including package and electronics
- Plan The teaming and scheduling of the entire development
- Organize the workflow as a team

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Communicate effectively, being understood, including across different languages and cultures.
- Communicate effectively with professionals from other disciplines.
- Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles.
- Demonstrate a capacity for creativity.
- Make an oral presentation.

Teaching methods

Teaching will occur through:
1. Introductory lecture
2. Periodic lectures and recorded videos / other online resources as needed
3. Regular progress meetings with the professor
4. TA support in labs as needed, as well as acccess to DLLs

Expected student activities

Students will perform the following activities:
1. Design of PCB and board-level electronics
2. Design of 3D printed packages
3. Fabrication of electronics
4. Assembly of the integrated sensor
5. Characterization of the integrated sensors
6. Summary preparation and report writing and presentation

Assessment methods

Assessment will be based on:
1. Written report (70%): Quality of report, details of analysis and design vs. design and analysis metrics, overall results of wearable design
2. Oral report (30%): Quality of presentation and handling of Q/A.

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes
Others	Online videos on moodle.

Resources

Virtual desktop infrastructure (VDI)

Yes

Bibliography

Design guides for microcontroller interface will be provided, with links to manufacturer specifications.

Moodle Link

- https://go.epfl.ch/MICRO-333