medizin
neu denken

twf Lebenswissenschaftliche Fakultät

Hard to believe!

- ❖ INTERNATIONAL MINOR (in ENGLISH)
- ❖ FREE accommodation in Siegen for this time
- ❖ FREE ticket for public transport in Siegen for this time possible
- ❖ The course is free

Contact

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31.08.2020 to 06.11.2020   International Minor

DIGITAL MEDICINE FROM THEORY TO HANDS ON PRACTICE

Digital medical devices are part of doctors' everyday life. But how do they work?
How are they made?

In this minor students will learn about types and architecture of digital medical devices, covering their hardware, software and communication details. In the practical part they will design, build and use sensor-based biomedical devices of their own.

The minor consists of:

- a theoretical part with lectures on fundamentals of medical informatics and telemedical technology.
- a creative project in which self-organized groups of students develop novel concepts of sensor-based biomedical devices to solve a demanding problem in current healthcare.
- a lab course, where the students actually design, build and program a digital medical device.

A strong offer with:

- high practical orientation
- Learning and working in small groups
- renowned lecturers
- excellent and individual support
- extensive possibilities for further qualification during your study

Digital Medicine on the pulse of time:

Period?   31.08.2020 to 06.11.2020
              Monday to Friday from 9 am to 5 pm
Place?   Artur-Woll-Haus
              Am Eichenhang 50
              57076 Siegen, Germany
How?   No technical skills required!
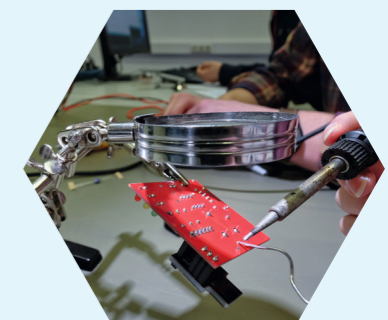
DIGITAL MEDICINE FROM THEORY TO HANDS ON PRACTICE

WEEK	01	02	03	04	05	06	07	08	09	10
MORNING 9:00 am–12:00 pm	P1	P2			P3					P+E
AFTERNOON 1:30–4:30 pm	L1	L2	CP							P+E

LAB PROJECT – FUNDAMENTAL PART

- Project work for groups of 2-3 students: solder and program a sensor circuit for medical applications
- Basics of sensor circuits and soldering
- Soldering of a predefined printed circuit board (PCB-Layout)
- Basic programming skills in Arduino (C/C++)
- Development of a Heart-Rate monitor

P1

ADVANCED LAB PROJECT – TECHNICAL SKILLS

- Project work for groups of 2-3 students: biomedical signal processing (ECG, EMG, GSR, …) on a breadboard and visualization using a Smart-phone (Android development)
- P2.1: Basics of sensor circuits on a breadboard and first programming skills on a Microcontroller (C)
- P2.2: Integration of peripheral sensors, display and a Bluetooth module
- P2.3: Visualization of biomedical sensor data on an Android-Smartphone

P2

INTRODUCTION TO MEDICAL INFORMATICS

- History of IT in Medical and Medicine Related Applications
- Terminology and medical classification systems
- EPR / EHR Electronic Patient Records / Electronic Health Records
- HIS Hospital Information Systems
- Medical Imaging algorithms
- Biomedical Sensor-Based Systems

L1

INTRODUCTION TO TELEMEDICAL TECHNOLOGY

- Communication principles – Layer models, services & protocols
- Wireline communication – Copper & Fibre
- Wireless inhouse interaction – radio standards
- Security for medical data transfer – cryptography and firewalls
- Mobile digital communication basics – From GSM to 5G
- Telemedicine and industrial applications

L2

ADVANCED LAB PROJECT – HANDS-ON PROJECT

- Project work for groups of 2-3 students: Build your own medical system using sensor hardware
- P3.1: Creative phase – Finding and specifying a medical application to be implemented with the help of their acquired skills. This phase is performed in cooperation with local Siegen hospitals and/or doctors to make sure that a real-life problem from the medical domain is addressed
- P3.2: Pratical phase – Implementation and test of the previously specified application (Microcontroller + Bluetooth).
- P3.3: Evaluation phase – Evaluation of the system in real-life application. If possible the local clinical partners are involved in the evaluation.
- Goal: Presenting the results of the own project in a 30 minutes talk with 15 min. discussion

P3

CREATIVE PROJECT DIGITALIZATION POTENTIAL FOR MEDICAL PROBLEMS

- Project work for groups of 3-4 students each in cooperation with Siegen clinics and/or doctors
- Preparing a technical feasibility study for a selected real-life problem in clinical applications where digitalization and the utilisation of embedded sensorics is promosing
- Researching the state of the art in the application field and performing a thorough requirements analysis
- Identifying technologies that appear promising for solution
- Designing a technical solution proposal
- Goal: Presenting the results in a 30 Minutes talk with 15 min. Discussion + a 10 page condensed textual description

CP

PRESENTATION AND EXAMINATION

- Presentations of the results of P3 and CP to all participants of the EEB and to the interested public and cooperation partners
- Live demonstration of the self-built devices
- Written Report with results from P3
- Time to prepare written examination
- Written examination
- Feedback session(s)

P+E