CAN I COMBINE SCIENCE AND BUSINESS IN A SINGLE JOB?

YES.

We'll show you how at Fraunhofer.

City: München
Date: May 25, 2022

Master Thesis: Design of a readout system for photoplethysmography (PPG) signals processing

The Fraunhofer-Gesellschaft (www.fraunhofer.com) currently operates 76 institutes and research institutions throughout Germany and is the world's leading applied research organization. Around 30,000 employees work with an annual research budget of 2.9 billion euros.

The Fraunhofer EMFT works on the research and development of technologies and solutions in the field of microelectronics and microsystems technology. It takes an interdisciplinary approach, combining traditional silicon semiconductor technologies with MEMS, microfluidics, system integration and flexible electronics. The focus here is not on miniaturization alone, but primarily on the heterogeneous technology integration and development of intelligent systems to enable novel solutions and products for everyday use.

What is this about?
Our group aims to develop analog and mixed-signal integrated systems. One of the its applications in medical instrument field is photoplethysmorgram (PPG). PPG is an optical technique used to detect volumetric changes in blood in peripheral circulation. It is an effective non-invasive method for performing measurements at the skin surface. The technique provides valuable information related to the cardiovascular system. A typical PPG signals processing system includes PPG LED sensor, transimpedance amplifier (TIA), band-pass filter, programmable gain amplifier (PGA), analog-to-digital converter (ADC), and data processing unit (DPU).

In this project, you will design and verify the signal-chain for sensing the PPG signal, select discrete components, design PCB board with Altium, develop software to analyze and visualize the sensed signal, and performing measurements as well as documenting the results you obtained. Publication of research results is encouraged.

TUM students will be supervised in cooperation with the Chair of Circuit Design (Prof. Ralf Brederlow).

What you will do

- Study the state-of-the-art works on PPG signals processing
- Define the specifications of building blocks in a PPG system
- Design an electronic PPG system on PCB with discrete components
- Develop software to analyze and visualize the sensed PPG signal
- Test and debug the development board
- Documentation of results

image of Fraunhofer logo, top right

What you bring to the table

- A master student in the field of electrical engineering or similar
- Understand fundamental knowledges of analog, mixed-signal electronics
- Good knowledge of designing embedded system
- Experience with PCB design tool and circuits simulation tool
- Hands-on experience in an electronic lab
- Work independently
- Good German or English language skills

What you can expect

We offer you a challenging and varied research task with responsibility and creative freedom.

In our open-minded team, you can set your own priorities, realize your ideas in projects and develop scientifically, professionally and personally. In doing so, you will be supported by various offers of the Fraunhofer Gesellschaft in order to combine family, job and career development in the best possible way.

The weekly working time is 39 hours. We value and promote the diversity of our employees' skills and therefore welcome all applications - regardless of age, gender, nationality, ethnic and social origin, religion, ideology, disability, sexual orientation and identity. Severely disabled persons are given preference in the event of equal suitability.

With its focus on developing key technologies that are vital for the future and enabling the commercial utilization of this work by business and industry, Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for groundbreaking developments and scientific excellence, Fraunhofer helps shape society now and in the future.

Interested? Apply online now. We look forward to getting to know you!

If you have any questions do not hesitate to contact:

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Fraunhofer Research Institution for Microsystems and Solid State Technologies EMFT

www.emft.fraunhofer.de

Requisition Number: 34043   Application Deadline: 07/31/2022

Application website: https://jobs.fraunhofer.de/job/M%C3%BCnchen-Masterthesis-Design-of-a-readout-system-for-photoplethysmography-%28PPG%29-signals-processing-80686/811472401/

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