

CAN I COMBINE SCIENCE AND BUSINESS IN A SINGLE JOB?

YES.

We'll show you how at Fraunhofer IIS.

For the »**Machine learning and Validation**« group in **Nürnberg**, the Fraunhofer Institute for Integrated Circuits IIS is currently seeking a

Bachelor Thesis Student

for the Topic: Validation of different IMU calibration procedures

The group »Machine learning and Validation« of the Fraunhofer IIS department »Positioning and Networks« conducts research and measurement services using local and global positioning systems. A key competence of the work group is the analysis and fusion of information from different sensor systems (e.g. IMU, RSSI and radio based location) to determine position, orientation and motion patterns of objects. Typical field of application are sport and tool tracking systems.

What is this about?

The Bachelor Thesis is offered as part of the "Schreibtrainer" project that aims to develop a handwriting recognition system where the system learns to recognize and advice children with their handwriting. One goal of the project is to reconstruct the pen tip trajectory as accurately as possible using the inertial information from two different Inertial Measurement Units (IMUs) housed inside the pen. The reconstructed trajectory is then used to identify letters and words in the later stages of the pipeline of the project. STABILO INTERNATIONAL GmbH, one of the partners in the project, developed the pen used in this research.

Your responsibilities

The aim of the Bachelor Thesis is to research the impact of different calibration algorithms to improve the IMU sensor signal quality and finding an appropriate, possibly in-field calibration technique that can help to further improve the pen tip trajectory reconstruction. In a first step you will familiarize yourself with the already existing algorithms and conduct a literature survey to find additional calibration procedures and algorithms. In the following you will implement tests and compare the different approaches using a laboratory setup and, if applicable, an in-field setup. Finally you will generate a report that contains the test results as well as the advantages and disadvantages of the different approaches.

The goals of this thesis can be roughly divided as follows:

- Literature study and understanding the theoretical basics of IMUs and their calibration. (2 weeks)
- Understanding the signal model of the IMU and its error sources, understanding the state of the art pipeline to reconstruct positions from accelerometer and gyroscope signals. (3 weeks)
- Implement different calibration procedures and test cases in python. (2 weeks)
- Test the different calibration approaches in a laboratory and, if applicable, in an in-field environment (4 weeks)
- Generate a test report that contains the quality of the different calibration approaches as well as advantages and disadvantages of the procedures (3 weeks)

The thesis must contain a detailed description of all developed and used algorithms as well as a profound result evaluation and discussion. The implemented code has to be documented and provided. An extended research on literature, existing patents and related work in the corresponding areas has to be performed.

Your profile:

- You are pursuing a bachelor's degree in Computer Science / Electrical Engineering or a related field
- You have a good knowledge in Python
- You should have a basic knowledge of IMUs
- You ideally have first practical experience performing laboratory experiments

What you can expect from us

- An **open and cooperative** working environment
- Collaboration in **interesting and innovative projects**
- Many opportunities to gain **practical experience and attend seminars**
- Flexibility concerning your working hours

If you have any questions about this opening, please contact Christian Nickel (christian.nickel@iis.fraunhofer.de).

The thesis will be assigned and carried out in accordance with the rules of your university. For this reason, please discuss the thesis with a professor who can advise you over the course of the project.

Interested?

Please apply for this position using the following link: <https://recruiting.fraunhofer.de/Vacancies/62915/Description/2>.

Applications are possible **in German and English**. Please include a cover letter, your CV and your latest transcripts of records (as PDF) and quote ID number **62915-LV**. Address your application to Nina Wörlein.

Please let us know how you learned about this job opportunity.

Additional information is available on our website: www.iis.fraunhofer.de/en