



## Bachelor Thesis / Master Thesis – Interference Detection for TDoA Localization Systems using Machine Learning Methods

The Fraunhofer-Gesellschaft ([www.fraunhofer.com](http://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 IIS** in cooperation with the **TU Ilmenau** set up a testbed to enable the localization of mobile end-points using the LPWAN standard mioty for application in current research topics like IoT. The localization is based on **time difference of arrival measurements (TDoA)**.

Several effects in the transmission channel, like phase noise, multipath effects, or interferences from different communication systems in the same frequency band, lead to a decreasing performance of the localization accuracy. The subject of this thesis is the detection and classification of interference from communication systems within the same frequency band to improve localization accuracy. Therefore, suitable features must be extracted from the received baseband signals, and a model must be trained to detect and classify the interference patterns. To validate the developed classification model, simulations must be conducted. These simulations shall include different types of interference (e.g., narrowband, wideband, chirps, etc.). The trained model must be tested in a real-world environment using the described testbed.

**You are interested in combining research and practices and would like to develop further in the field of localization systems?  
Then have a look at our offer!**

### What you will do

- You conduct literature research on machine learning methods like kNN, random forests, and support vector machines.
- You implement an interference model into the existing simulation environment.
- You evaluate the effect of the implemented interference model on the localization accuracy.
- You conduct feature engineering and training of classification models to detect and classify interference patterns.
- You carry out real-world measurements in the mentioned testbed to verify the developed classification methods.

### What you bring to the table

- You are currently studying electrical engineering, information technology, or something similar.
- You are interested in machine learning and localization.
- You have first experience in programming, preferably Python.

### What you can expect

- **Flexible** working hours
- **Open** and **friendly teamwork**
- **Varied** tasks with room for **creativity**
- Exciting **seminars** and **events**
- **Networking** with scientists
- **Active contribution** in applied research
- **Interesting** and **innovative** projects
- **Mentoring program** »[josephine@](mailto:josephine@iis.fraunhofer.de)« for talented female students

Weekly working hours are determined by agreement. You can start from now on (as a student assistant from **10 to 20** hours a week or as an intern for a period of at least three months). You can reduce your hours before exams and

increase them during semester breaks. You can flexibly determine the working days. After your studies, you have the option of working with us full or part time.

We would be happy to offer you the opportunity to write a bachelor's or master's thesis in cooperation with us in the above-mentioned subject area. 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.

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.

**Interested?**

**Apply [online](#) now (PDF: cover letter, CV, transcripts). We look forward to getting to know you!**

Fraunhofer-Institute for Integrated Circuits IIS

[www.iis.fraunhofer.de/en](http://www.iis.fraunhofer.de/en)

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Location: Nürnberg

