

The Chair of Theoretical Information Technology has an immediate opening for a

## **Master Thesis, Research Internship, IDP: Analysis of Information-theoretical Limits of Integrated Sensing and Communication**

Integrated Sensing and Communication (ISAC) is envisioned to become a key technology in the next generation wireless systems. Due to the similar hardware requirements and signal processing algorithms, it becomes more and more desirable to merge both functionalities into the same platform to further explore the performance potential. However, the performance limits of ISAC system is still an open problem. In this work, we aim to analyze the fundamental limitations of ISAC from the perspective of information theory, understand the trade-offs between both functionalities.

### **Contents of the project and areas of responsibility**

- Construct and analyze information-theoretic channel model for ISAC.
- Derive the (achievable) capacity-distortion (C-D) region for point-to-point, multi-user ISAC.
- Investigate and develop optimization algorithms for derived C-D regions.
- Adopt the results to MIMO-AWGN scenarios.

### **Your qualifications**

- Currently enrolled in electrical engineering, communications engineering, computer science, physics or similar.
- Good knowledge in information theory, signal processing, and optimization theory.
- Hands-on programming skills in at least one of the following languages: MATLAB, Python, and C/C++.
- Goal-oriented, independent, and structured work style

**To apply just send an e-mail to [xinyang.li@tum.de](mailto:xinyang.li@tum.de) with the subject "6g-it". Make sure to add your latest transcript of records and a short description of yourself!**

### **Technical University of Munich**

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Munich, March 2023