



Student Helper (SHK) Position: Microfluidic Chips for Molecular Communication

We seek a highly motivated student to join our research team and focus on the exciting fields of microfluidic molecular communication and microfluidic chip design. This position is available from February 2025 and can be extended to a Diploma or master's thesis.

About the Project

Molecular communication (MC) represents an alternative communication paradigm for future networks. Unlike traditional wireless communication systems, such as 5G networks, which rely on radio waves, MC utilizes molecules as information carriers. This approach encodes information in chemical signals inspired by our living nature. The information is transmitted through physical media such as air, water, or biological tissue. MC is increasingly recognized as a suitable component of future communication networks. Future communication systems will encompass data transport, storage, computing, and sensing capabilities. Microfluidic chips offer a means to address these four pillars. On one hand, microfluidic chips allow precise control over small amounts of fluids, which is crucial in medicine. Additionally, microfluidic chips enable information storage in extremely small, biologically compatible formats and support data processing through biochemical reactions. Sensors integrated into microfluidic systems detect specific molecules and convert them into signals that can be utilized by digital systems, which is particularly valuable for medical diagnostics. Overall, this research project's overarching goal is to develop and optimize a molecular microfluidic communication system with potential applications in medicine, biology, and nanotechnology.

Responsibilities

- Elaboration of the current state-of-the-art in academia and industry (in cooperation with the industrial partner of the research project).
- Development and design of a communication engineering-based microfluidic chip design, comparing different approaches and using various metrics.
- Work closely with the research team to develop and test new approaches.

Qualifications

- Currently enrolled in a relevant degree program.
- Basic knowledge of Python and Latex.
- Interest in molecular communication, microfluidics, and information theory is a plus.

If you want to join our team and contribute to this innovative research, please apply with your CV and a brief statement of interest to pit.hofmann@tu-dresden.de. We look forward to hearing you.