



Fachbereich Elektrotechnik und Technische Informatik  
*Department of Electrical Engineering and Computer Science*

**Project Work, Bachelor**  
**Sergej Wagner**

## **Fluidic Control and Optical Detection of Circulating Tumor Cells**

### **Abstract**

When cancer cells start to metastasize, they first enter the bloodstream. The quantities involved are extremely small and may only be detected by filtering them out from blood using micro-filtering devices that operate at cellular levels. While the micro-filter itself is small, of the order of  $15 \times 15 \times 3 \text{ mm}^3$ , the supporting fluidic control and detection subsystems are currently large, forcing the final instrument to be desktop-bound and hence limited to laboratory use.

The main objective of this project is to explore miniaturizing the low-pressure fluid delivery sub-system and the optical detection sub-system and then integrate them into a functional prototype. The prototype must sustain microscopic flow over a long period of time to achieve the required amount of filtering. It must also perform reverse fluidic flow for detection.

The work consists of analogue electronic design, software programming for microprocessor control, 3D mechanical design and CNC milling, and PDMS fluidic structure moulding in a cleanroom.

**Examiner: Prof. Dr.-Ing. Uwe Meier**