

Smart Sensors for Future Healthcare Robots

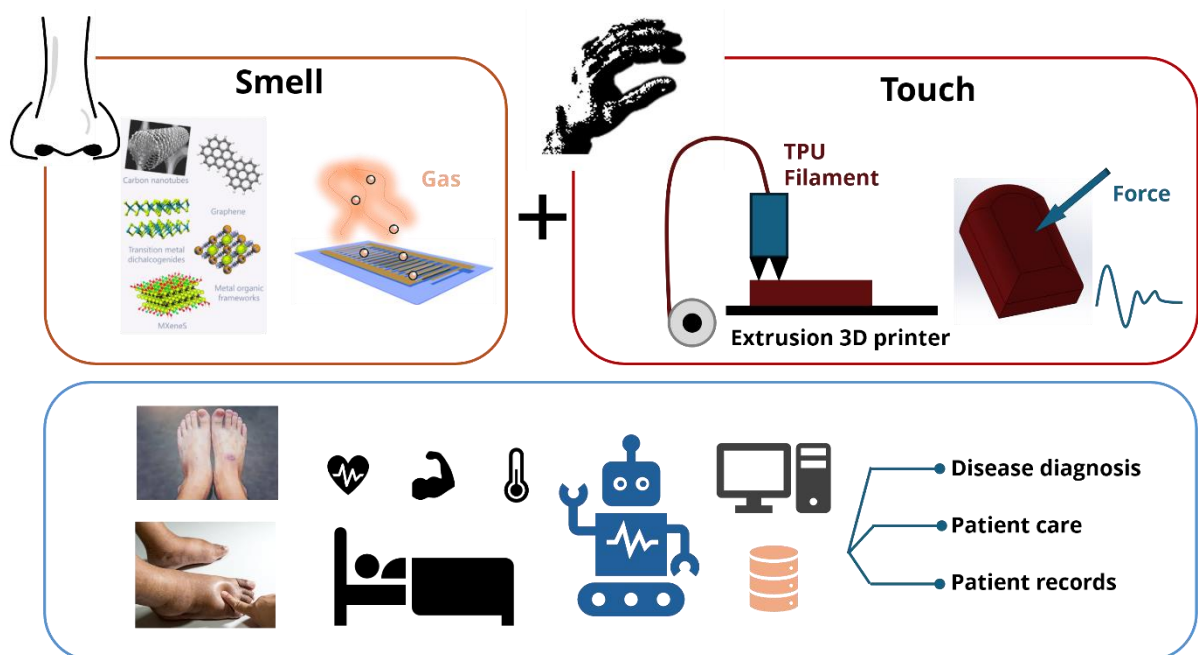
Project, Bachelor, Master, Diplom

Background

With the rapid advancement of robotics and artificial intelligence, service robots are increasingly being applied in healthcare to assist medical staff and reduce repetitive tasks such as patient care, symptom monitoring, and health record collection.

To achieve intelligent and safe human–robot interaction, robots require the ability to perceive both chemical and mechanical signals from the human body. Disease-related gas sensing enables non-invasive health monitoring, while tactile sensing provides physical interaction and feedback. Combining these sensing technologies with intelligent data processing in a closed-loop system offers a promising strategy for automated disease diagnosis and patient care.

This project aims to develop next-generation sensing technologies, including **nanomaterials based electronic olfaction sensors**, **3D-printed tactile sensors**, and **closed-loop healthcare systems**, providing students with opportunities to work at the intersection of chemistry, materials science, robotics, and artificial intelligence.



Objective

This thesis offers the opportunity to work on the development of advanced sensing systems for disease diagnosis and intelligent patient care. Depending on your background and interests, you can focus on one of the following research topics:

- **Development of MXene-based sensors** for the detection of disease-related gases.
- **Design and fabrication of 3D-printed tactile sensors** for humanoid robotic hands.
- **Development of a closed-loop sensing and feedback system** for automated patient care.

Requirement

- Interest in nanomaterials and their applications in gas sensing, tactile sensing, or 3D printing technologies.
- Basic knowledge in **one or more** of the following areas (depending on the selected topic): Characterization of nanomaterials, 3D CAD software (e.g., **SolidWorks**, **Rhino**, or other CAD software), Machine learning and data analysis
- Motivated to work in an interdisciplinary research environment involving chemistry, materials science, and computer science.

In case of questions, please reach out to us and we will jointly clarify your potential participation in this project.

We offer

- Supervision by experienced researchers from multiple disciplines
- Access to state-of-the-art laboratory and analytical equipment
- The opportunity to contribute to an innovative research project with significant scientific and societal relevance

Start date: as soon as possible

Supervisor: Prof. Cuniberti, Dr. Shirong Huang, Dr. Huijing Li