

Compensation According to TV-L 13

## Research Assistant for Capacitive Sensor Design

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Autonomous robots need to sense their surroundings to act safely in the human environment. Recently, we've made decisive steps developing a flexible and modular capacitive tactile proximity sensor (CTPS)<sup>1</sup>, which can be integrated into robotic hands and even used to cover a whole robot arm. So far, we've demonstrated the potential of these sensors for manipulation tasks<sup>2</sup> and collision avoidance<sup>3</sup>.

Still, to effectively use this technology in novel applications is an open research problem. Specifically, the following topics are of immediate interest for us:

- Integration of CTPS into multi-fingered robot hands
- Control of multi-fingered hands endowed with CTPS
- Recovering of large surfaces with CTPS for safe HRI
- Hardware-design and real-time control taking safety requirements into account

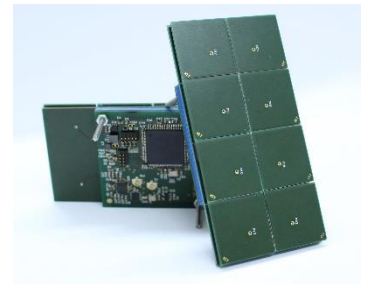
Our team is looking for an excellent graduate (master or diploma) of Electrical Engineering or Mechatronics. Graduates from Computer Science and Mechanical Engineering are also welcome to apply if they have the corresponding experience. For this position we expect the following profile:

- You should have experience developing analog and mixed-signal circuits. Experience using simulation tools is a plus.
- You should be proficient with PCB layout software (e.g. Altium Designer)
- You should have good knowledge of CAM/CAD software (e.g. Autodesk Inventor). Having experience with 3D-printing is a plus.
- You should be a proficient programmer, especially of micro-controllers. Having experience with DSP and FPGA is a plus.

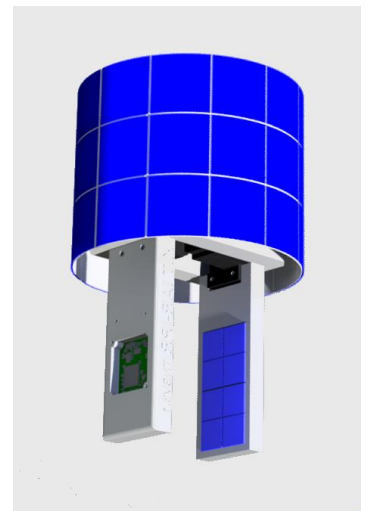
During your work you will develop technologies for enabling next-gen perception for robots. You will be able to work independently and push novel approaches and bring them to fruition. As part of your research you will demonstrate that your designs are able to fulfill their purpose in concrete use-cases and collaborate with other researches by building higher level applications together on top of your results. You will have to opportunity to publish your results on international forums, especially robotics conferences and journals. We anticipate that you intend to pursue a PhD degree in this field.

We offer the opportunity to work in a cross-disciplinary team. Teamwork, diversity, and transparency belong to our core beliefs. Excellent English language skills are necessary; German language skills are desired. In order to improve your German skills, language courses offered at KIT can be taken.

Please send your application to Prof. Dr. Björn Hein. KIT is committed to increasing the percentage of women in science and technology, and females are especially encourage to apply. Applicants with disabilities will be preferred if they are suitably qualified.



*A current version of the hardware of the capacitive tactile proximity sensor*



*Concept drawing for recovering a two-jaw-gripper: the jaws as well as the exterior of the gripper are equipped with sensors*

<sup>1</sup> Alagi, H., S. Escaida, M. Mende und B. Hein: „A Versatile and Modular Capacitive Tactile Proximity Sensor“, Haptics Symposium 2016

<sup>2</sup> Escaida, S., M. Schonert, B. Hein und H. Wörn: „6D Proximity Servoing for Preshaping and Haptic Exploration using Capacitive Tactile Proximity Sensors“, IROS 2014

<sup>3</sup> Escaida, S., S. Koch und B. Hein: „3D Contour Following for a Cylindrical End-Effector using Capacitive Proximity Sensors“, IROS 2016