

EXIST-Forschungstransfer: Search for Team Member, DE | EN

On-robot proximity and touch sensors

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We are planning a technology transfer of our research on on-robot proximity and touch sensors via the foundation of a start-up. The foundation should be financed with the help of the funding program EXIST Forschungstransfer. We are looking for a team member with a background in economics. The funding provides financial support for 18 months in the first phase equivalent to a full-time university employee (TVL-13). Please contact us if you are interested in our project.

In modern industry and service sectors, safety for humans is a top priority. Due to these requirements, many collision detection/avoidance methods and concepts have emerged in recent years. A perception gap in the vicinity of the robot (Figure 1), where the field of view, such as 3D cameras, can be occluded, and the touch and force sensors do not respond due to the lack of contact. This perception gap reduces the performance and effectiveness of robotic applications, especially with stringent safety requirements, e.g., in close human-robot collaboration, because the robot has to operate at a slower speed.

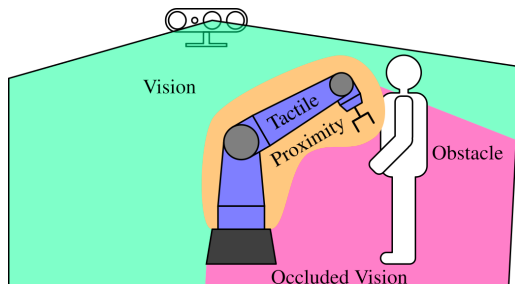


Figure 1: Perception ranges of different sensors.

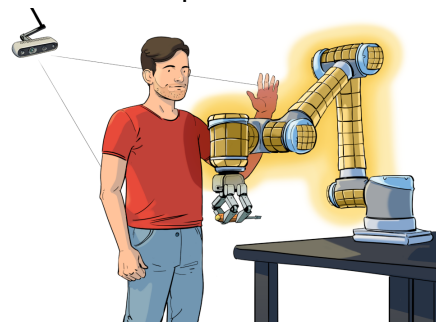


Figure 2: Concept of on-robot proximity sensors [1].

Proximity sensors (Figure 2) attached to the outer shell of robots (industrial robots, mobile robots) bridge the perception gap and enable fast and occlusion-free perception of the robot's workspace. Compared to cameras with a large space coverage, which are strongly influenced by lighting, proximity sensors provide few readings with high reliability concerning lighting conditions. In addition, proximity sensors do not encounter problems with occluded detection areas because anything that blocks the view of the proximity sensors is a detected obstacle. Furthermore, proximity sensors can be used in areas where cameras are not permitted for reasons of personal data protection or privacy.

Of course, these requirements also apply to modern automation and logistics systems of any form and not only to robotic arms. Besides, various surfaces can be equipped with proximity- and touch-sensitive surfaces (sensor arrays) and serve as input interfaces. The principle design of the sensors allows for easy integration and adaptation to almost any surface, making objects and devices capable of interaction.

[1] S. E. Navarro et al., "Proximity Perception in Human-Centered Robotics: A Survey on Sensing Systems and Applications," in *IEEE Transactions on Robotics*, doi: 10.1109/TRO.2021.3111786.