

Scene supervision, human tracking and situation detection in OP:Sense

OP:Sense is a research platform for surgical robotics developed at the IAR-IPR at KIT (<http://rob.ipr.kit.edu>) within several national and European research projects. [1] gives a first, short introduction of the system and its research directions whereas [2] shows the most current technical realization of OP:Sense based on ROS.

Within OP:Sense, a ToF-camera-based supervision system was developed and realized for safety-critical applications [3]. [4] describes our approach to combining different camera systems (Kinect, ToF) for increased performance and/or tracking robustness. Both topics as well as applications to a surgical setting, including the effects of sterile draping on camera perception, are covered in detail in the PhD thesis of Philip Nicolai [5].

For the detection and tracking of persons within the scene, a supervision system cameras was developed and integrated to OP:Sense, first based on Kinect v1 cameras [6, 7] and later extended with Kinect v2 cameras [8]. Detailed information about the Kinect camera systems and their application in workflow-based control of surgical systems is given in the PhD thesis of Tim Beyl [9].

Based on data acquired by the different camera systems, Luzie Schreiter is performing research on probabilistic situation detection in an OR environment [10, 11].

For more information about the topics listed above, please contact Philip Nicolai (contact@philipnicolai.de), Tim Beyl (tim.beyl@kit.edu), Luzie Schreiter (luzie.schreiter@kit.edu) or the head of the medical research group at IAR-IPR, Dr. Jörg Raczekowsky (joerg.raczekowsky@kit.edu).

Further research conducted within OP:Sense includes:

- Knowledge-based endoscopic camera guidance (*Andreas Bihlmaier*)
- Optimal port planning for minimally invasive robotic surgery (*Jessica Hutzl*)
- Real-time workspace analysis and visualization for 7 DoF-robots (*Mirko Kunze*)

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