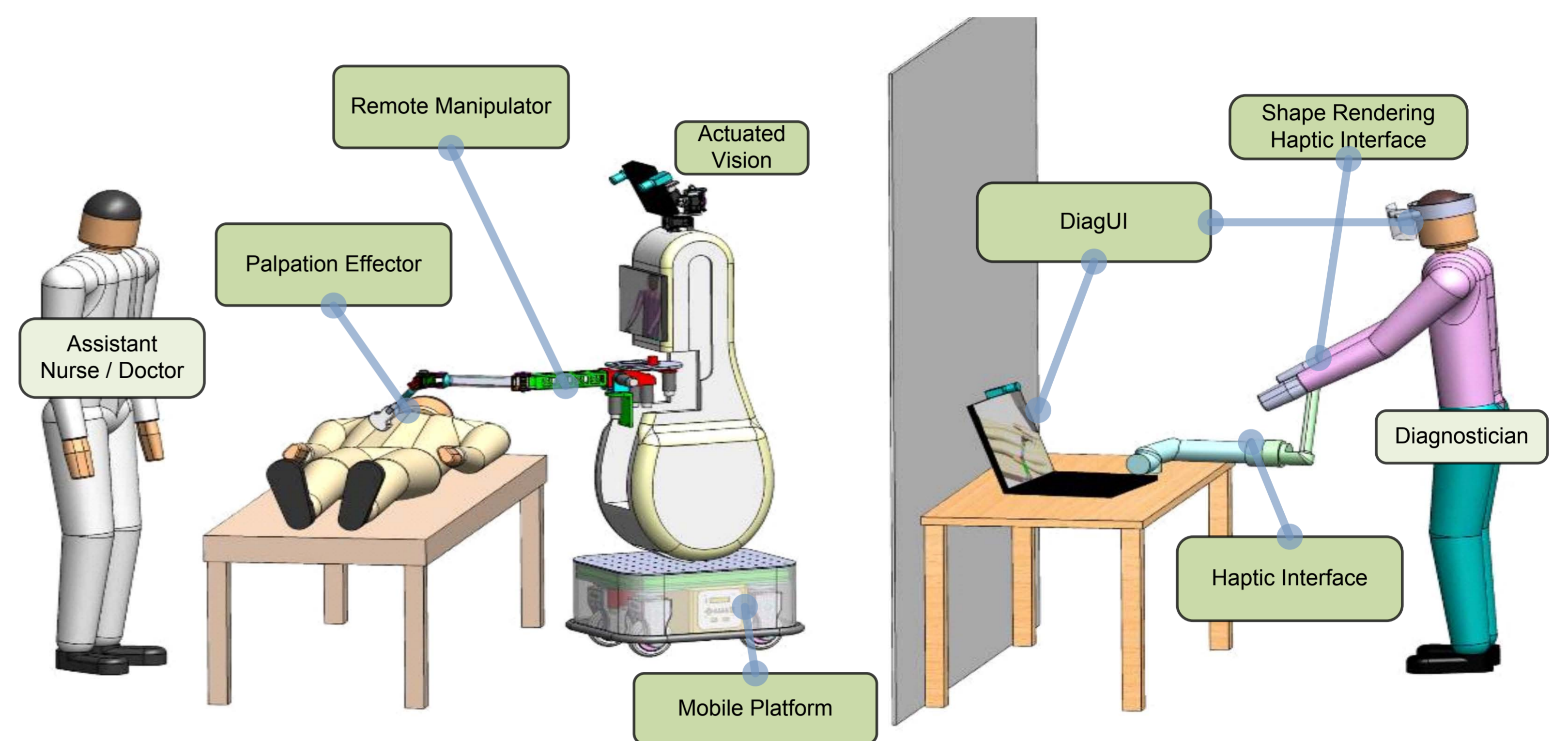


Motivation

The demand for specialized medical care is becoming higher in aging societies. Nowadays a majority of countries worldwide encounter a lack of physicians. Due to this lack, together with geographical (e.g. provincial hospitals), time (after regular working hours) and other logistic constraints, specialists are not always available in medical units. It is forecast that this lack will grow worse in the near future. This situation has led to the development of several types of medicine-related services performed remotely, ranging from Telenursing, Telepharmacy, Telerehabilitation, Telepsychiatry, Telepathology, Teledentistry, etc. to Telesurgery. All these medical tele-services are examples of the use of information and communication technologies (ICT) for health, so-called eHealth.

Description

A successful medical treatment depends largely on a timely and correct diagnosis. The ReMeDi project addresses **telediagnosics** in clinical environments. More specifically, a **multifunctional robotic device** will be developed to allow performing a **remote physical and ultrasonographic (USG) examination**. We aim at mimicking direct examinations as close as possible to enable the physicians to perform the most natural and common medical techniques. Our goal is to make the ReMeDi robot user-friendly for physicians and acceptable to patients by combining enhanced human (tele-)presence with intelligent autonomous features.



The envisioned system consists of a mobile robot – ReMeDi – operating at the patient’s location, and a remote interface – DiagUI – placed at the doctor’s location. The role of the ReMeDi robot is twofold: firstly, it acts as a full embodiment of the doctor; secondly it is an intelligent robot system equipped with advanced perception, reasoning, and learning abilities. It is extremely important to emphasize that ReMeDi will go beyond traditional teleoperated diagnosis; it will be autonomous unless it is required to improve the quality of the diagnosis and guarantee the patient’s health and safety in critical situations. Therefore, ReMeDi can be considered more as a **diagnostic associate** and as a first step towards a fully autonomous diagnostician rather than just a sophisticated medical tool.

Remedi Use Cases

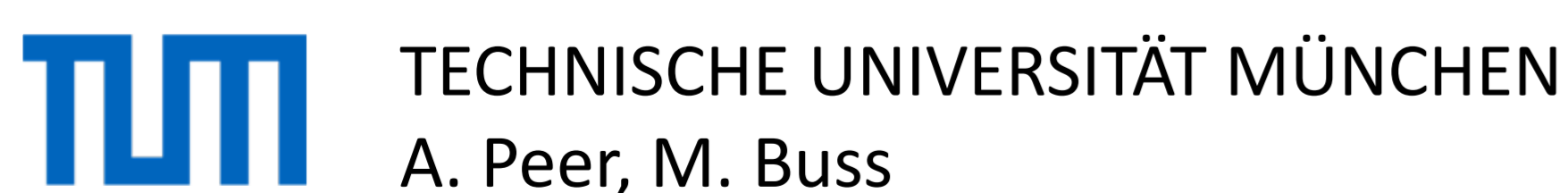
- Remote diagnostics of abdominal pain:** A patient in a small rural hospital suffers severe abdominal pain and has to be physically examined by a remotely located specialist to differentiate between several pathologies and to make a decision about therapeutic procedures.
- Remote diagnostics of acute heart failure:** A patient with symptoms of severe acute heart failure needs an immediate ultrasonographic examination of the heart (echocardiography), which can only be performed remotely.
- Remote assessment of aortic aneurysm and therapeutic plans:** A remote interdisciplinary consultation of an emergency unit patient is performed by a team of specialists
- Solution to help in physician’s recovery** after work-related musculoskeletal injuries

Expected Scientific Contributions

- Development of a **high-fidelity haptic teleoperated palpation system** that allows rendering a large range of impedances by exploiting advanced teleoperation techniques combined with high-quality sensing and haptic feedback devices
- Development of an **intuitive palpation and diagnosis user interface** that supports decision making and natural doctor-robot-patient-assistant interaction
- Development of **advanced perception modules** that localize the patient’s body and environment, recognize patient’s postures, gestures and emotional state.
- Integration of the above modules within a **context-aware cognitive robot control architecture** that combines enhanced telepresence with intelligent autonomous features to support remote palpation and diagnostics

Consortium

Coordinator



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