RIA CENTAURO

Robust Mobility and Dexterous Manipulation in Disaster Response by Fullbody Telepresence in a Centaur-like Robot

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- **Motivation**:
  Capabilities of disaster-response robots are insufficient for providing effective support to rescue workers.

Fukushima disaster 2011, Image: Digital Globe CC 3.0.

- **Objective**:
  Human-robot system where a human operator is telepresent with its whole body in a Centaur-like robot, which is capable of robust locomotion and dexterous manipulation in the rough terrain and austere conditions characteristic of disasters.

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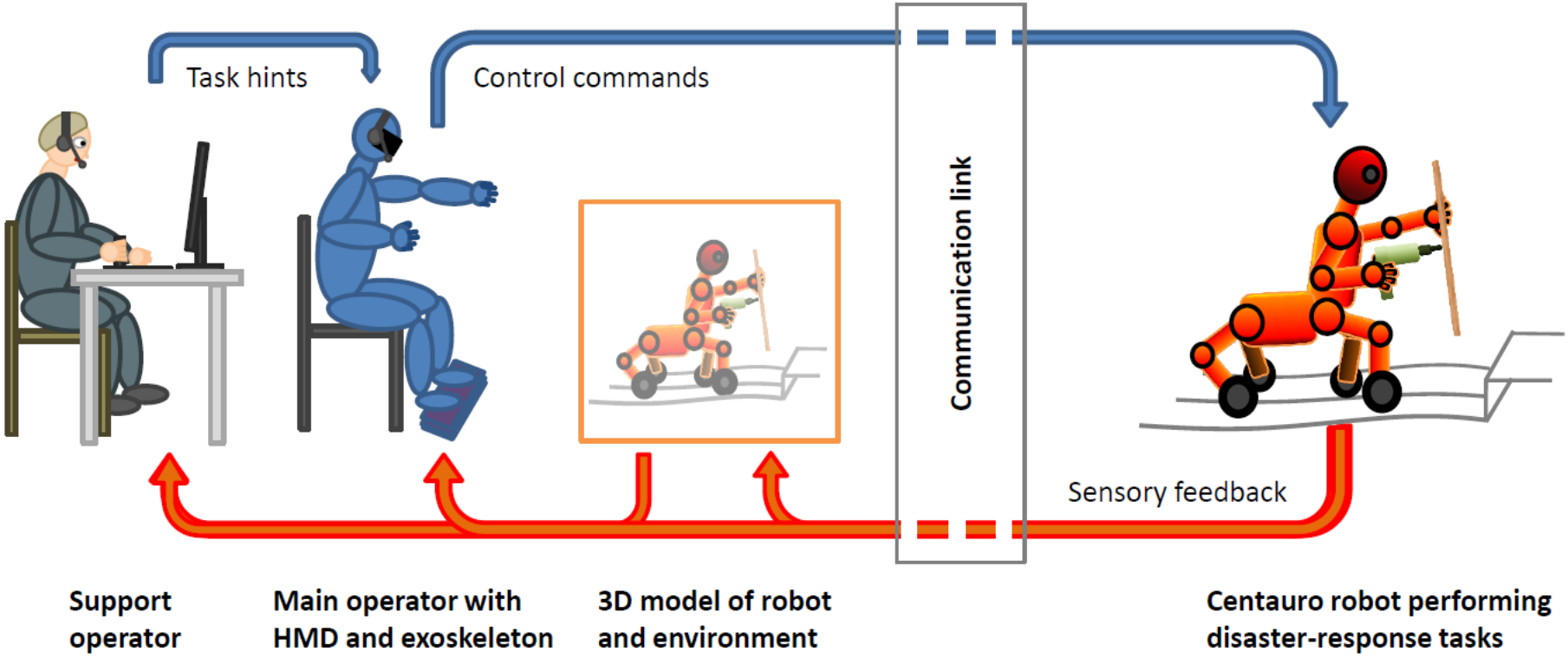
CENTAURO Approach



- Hybrid wheeled-legged base => Flexible locomotion
- Anthropomorphic upper body => Dexterous manipulation
- Telepresence suit => Situation awareness, intuitive control
- Predictive robot-environment model => Action planning
- Supervised autonomy => Effective human-robot teamwork

CENTAURO Impact

- **Evaluation**:
  - Develop systematic benchmark scenarios and performance measures based on input of end-users
  - Test in realistic rescue training facilities (TRL6)
- **New level of capabilities**:
  - Perception: Semantic 3D environment modeling
  - Mobility: Omnidirectional driving, adaptation to terrain, climbing over obstacles, stair climbing
  - Manipulation: Two-armed handling of objects, autonomous manipulation skills, tool use
  - Human-robot interaction: Full-body telepresence, operator assistance functions

=> Breakthrough in the introduction of robots for disaster relief applications