

## Development of extra-sensory capabilities for a robotic humanoid avatar Roboy in the context of telepresence

### Short Description

The goal of this project is to equip a human operator that remotely controls a humanoid robot with extra-sensory modalities that provide additional characteristics about the robot's environment beyond human senses. Such extra-sensory modalities include, for example, an infrared camera that allows the operator to acquire a heat signature of a remote place, detect gas and water leaks, or run preliminary human health diagnostics.

### Introduction

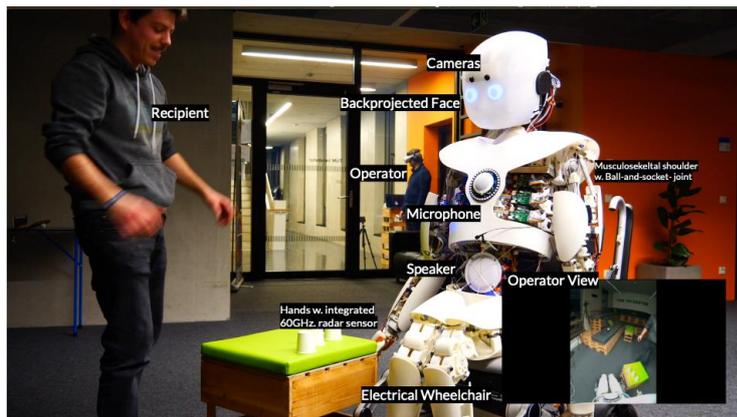


Fig. 1 Devanthro's telepresence system

[Devanthro GmbH – the Roboy Company](#) is competing in the ANA Avatar XPRIZE – a world-wide competition with a \$10M prize purse that aims to create an avatar system that can transport human presence to a remote location in real time. Devanthro, along with other 77 best robotics teams world-wide, is developing a telepresence system (Fig. 1) that consist of a humanoid robot Roboy 3.0 and an operator suit. Currently, Devanthro's solution allows for transmitting visual, audio and motion modalities between the avatar and the operator (see [video](#) for demonstration),

sending tactile and haptic feedback is currently in development. The next goal is to transmit sensory information not accessible through the human body (infrared, ultrasound, etc).

### Application Scenario

The Enhanced Avatar Mode provides enhanced capabilities to the operator. These capabilities are especially important for scenarios such as disaster relief where they can help ensure the success of the operation. For example, during a rescue operation the avatar conveys the location of a live person or an animal buried under rubble by assessing the environment for heat signatures and displaying it to the operator with an overlay.

### Goal & Tasks

- integrate a FLIR ONE infrared camera into Roboy 3.0
- acquire the camera's data on the on-board computing units of Roboy 3.0 (Jetson AGX Xavier/ Raspberry Pi 4/ Odroid-XU4/ Terasic DE10-Nano SoC FPGA)
- implement data processing and sensor fusion algorithms (i.e. with 3D spacial and camera image data)
- display the fused image data in operator's interface (Oculus Quest 2)

### Prerequisites

- Python/C++
- basics of signal processing
- experience with ROS
- Unity development
- Android development

### Supervisors:

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### Character

- Student team project
- Bachelor thesis (BA)
- Master semester project (SA)