

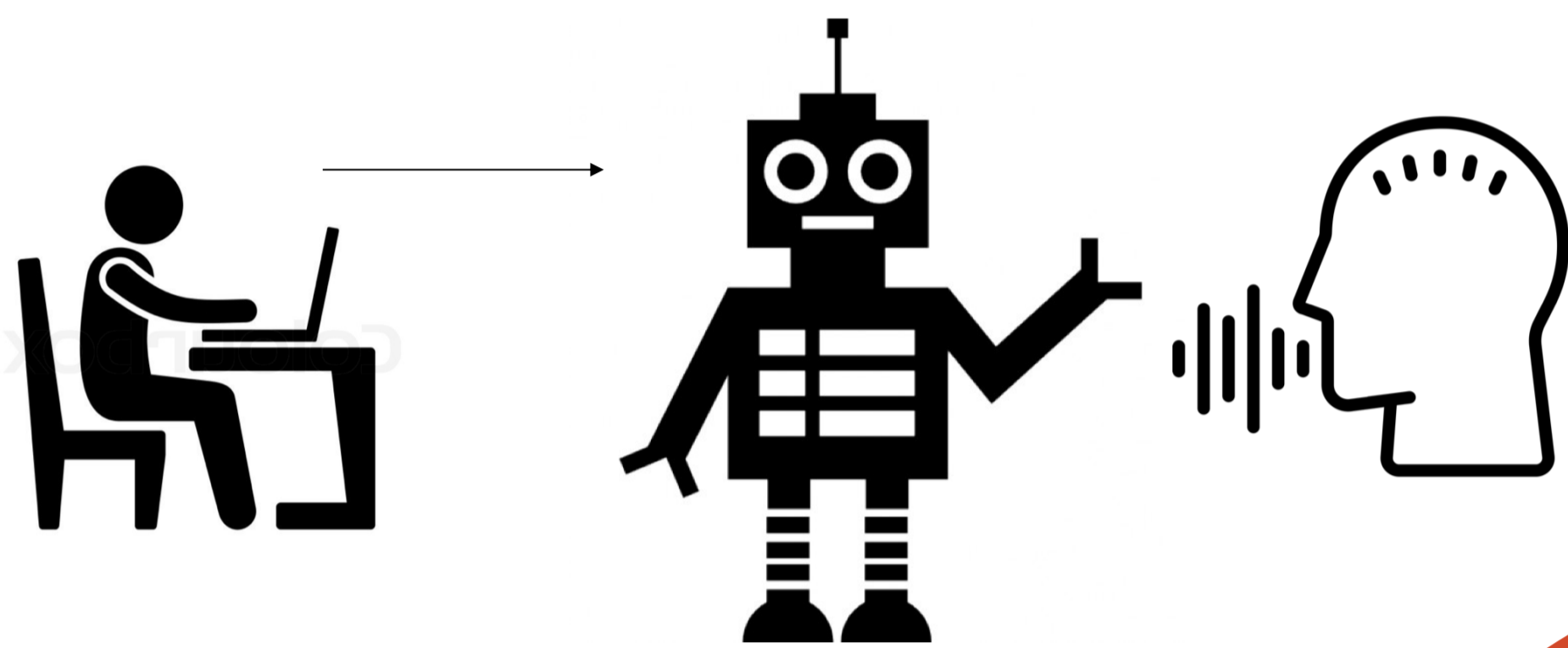
A Hands-Free Virtual Reality Teleoperation Interface for Wizard-of-Oz Control

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Wizard of Oz teleoperation in HRI

In WoZ paradigm, an experimenter remotely controls a robot, triggering some subset of the capabilities to be evaluated without requiring those capabilities it would ideally execute autonomously, such as movement, speech, or cognition.



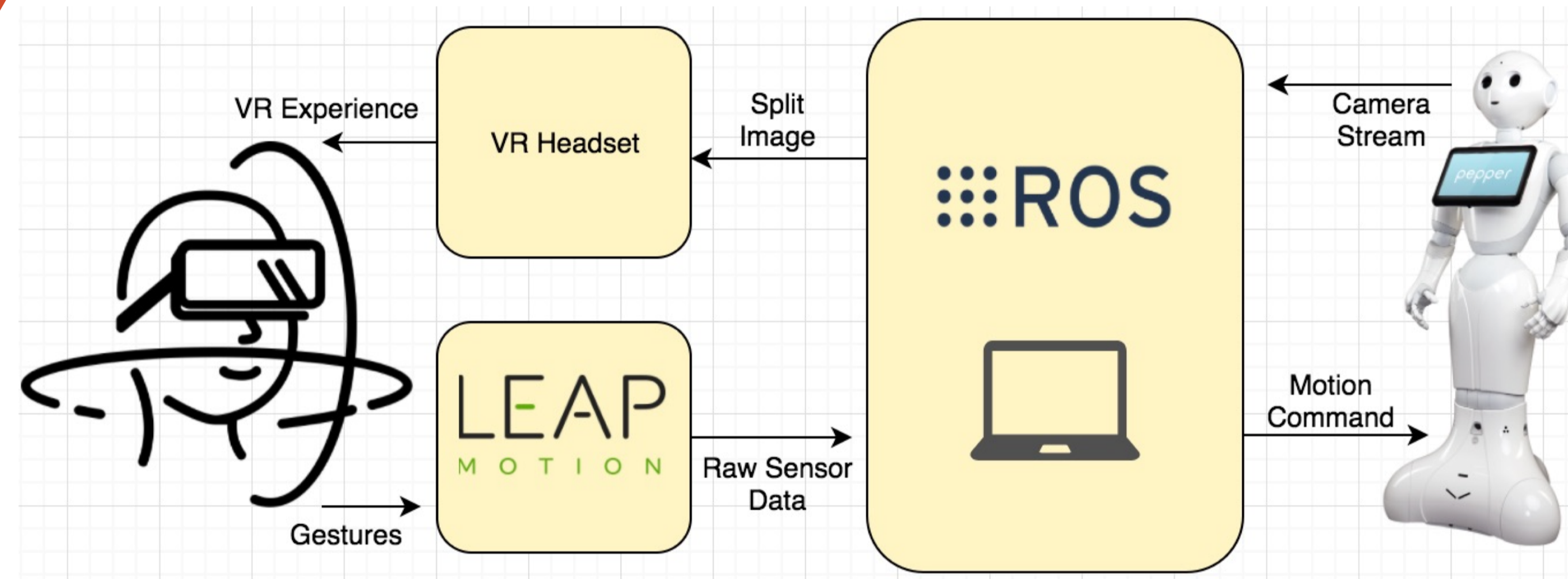
Integrated Approach

We propose an interface in which WoZ experimenters experience the robot's surrounding using a VR headset and control the robot using a Leap Motion Sensor

1. Images are streamed from a robot's camera to a VR headset, mimicking stereoscopic vision.
2. Leap Motion is used to teleoperate the robot using hand gestures
3. All components of the interface are integrated using the Robot Operating System (ROS).
3. An Android app was created to process image data from the robot's camera to the VR headset.
4. We utilize the Softbank Pepper robot.

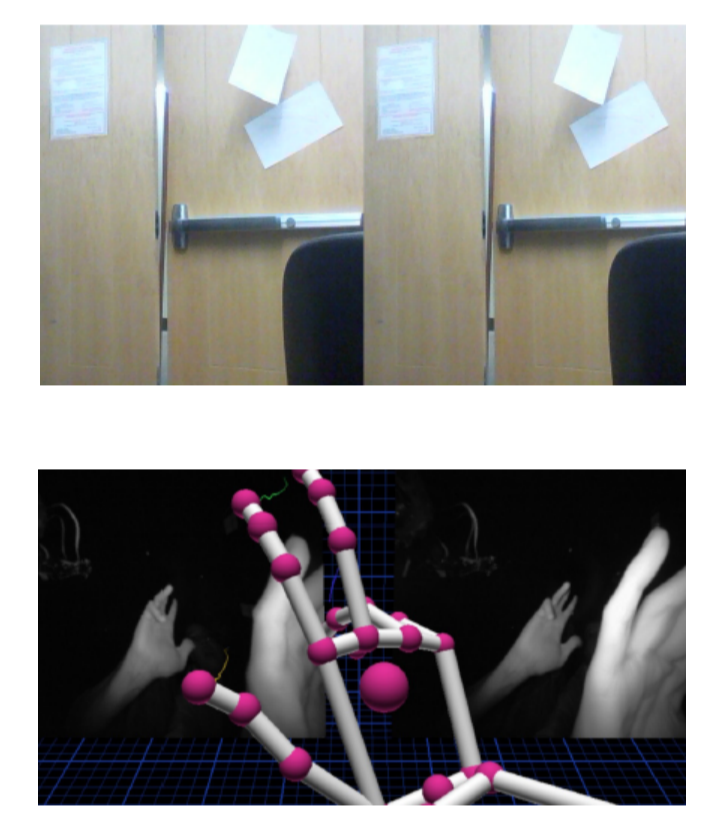
Why are conventional WoZ interfaces not always effective?

1. The process of deciding to issue a command, clicking the appropriate button, and having that command take effect on the robot is typically too long to facilitate natural interaction.
2. Often implemented from a 3rd person point of view and/or displayed on a screen. This decreases the situation awareness of the teleoperator and can harm the effectiveness of the experiment as the teleoperator is unable to view the robot's perspective.
3. Adding VR headset can enhance the experience, but it often requires two operators as a single person won't be able to see the teleoperation interface.



The Big Picture

The user interacts directly with a VR headset (e.g., Google Cardboard) and a Leap Motion gesture sensor. These devices send data to and receive data from a humanoid robot (e.g., the Softbank Pepper) using an instance of the ROS architecture whose Master node is run on a standard Linux laptop.



Current Progress and Future Work

1. The experience provided by the VR headset and the hands-free nature of the Leap Motion combine to create a user-friendly and effective interface for robot teleoperation.
2. In future work, we plan to evaluate this interface in comparison to other teleoperation techniques such as traditional WoZ GUIs.
3. We'd like to integrate WoZ-relevant augmented reality cues into this VR display, to provide further information to the teleoperator.
4. We'd also like to integrate speech recognition and text-to-speech and/or vocoder functionality to allow teleoperator more options to control the robot (e.g., verbal commands).

References

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