Clone-based Cloud Robotics System for Robot Teleoperation

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Introduction

- Teleoperation was among the first applications in robotics back in the 1950s.
- Teleoperation is one way to combine robot skills and human operator abilities.
- The main challenges for the Teleoperation task in the cloud environment are security and communication constraints
- Robots are now able to assist humans in many demanding tasks.

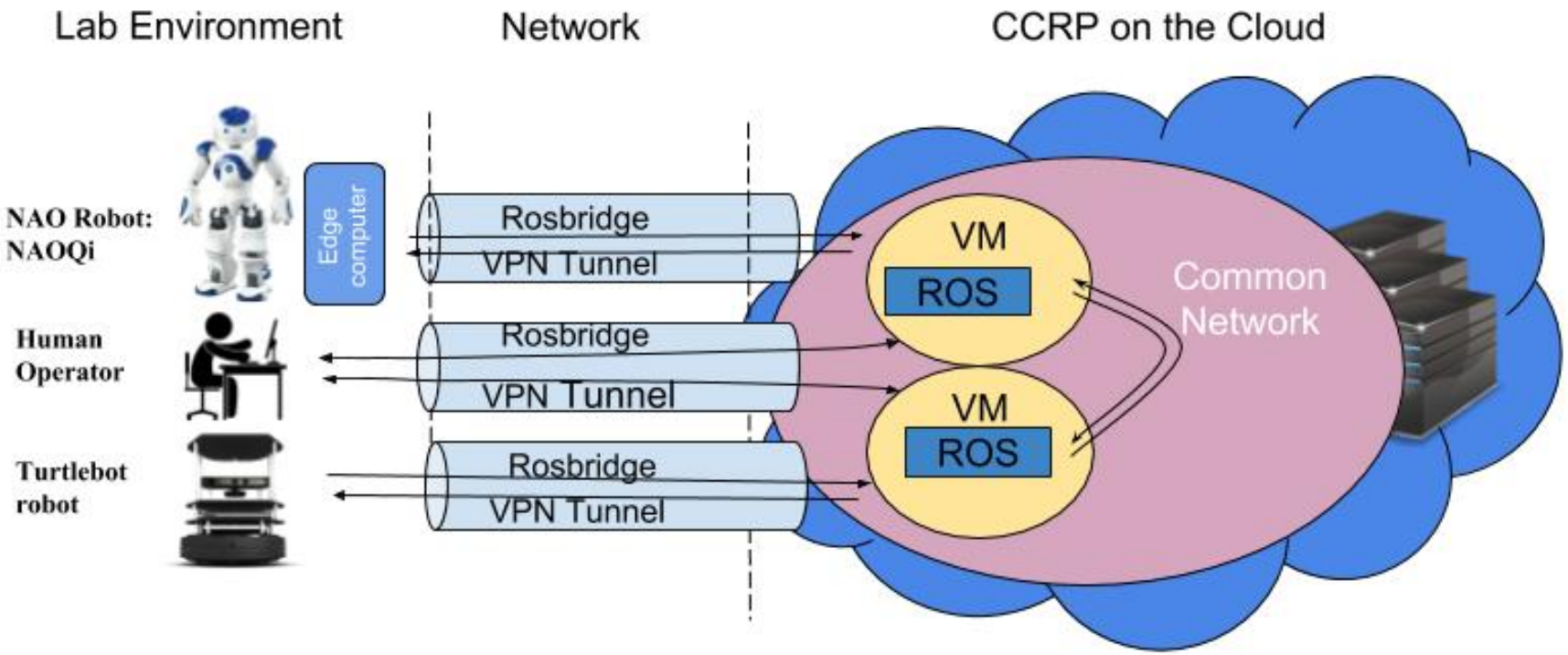
- Teleoperation application:
  - Transportation
  - Underwater exploration
  - Telesurgery

- These applications require a highly reliable platform that can securely manage the communication between a robot and its operator

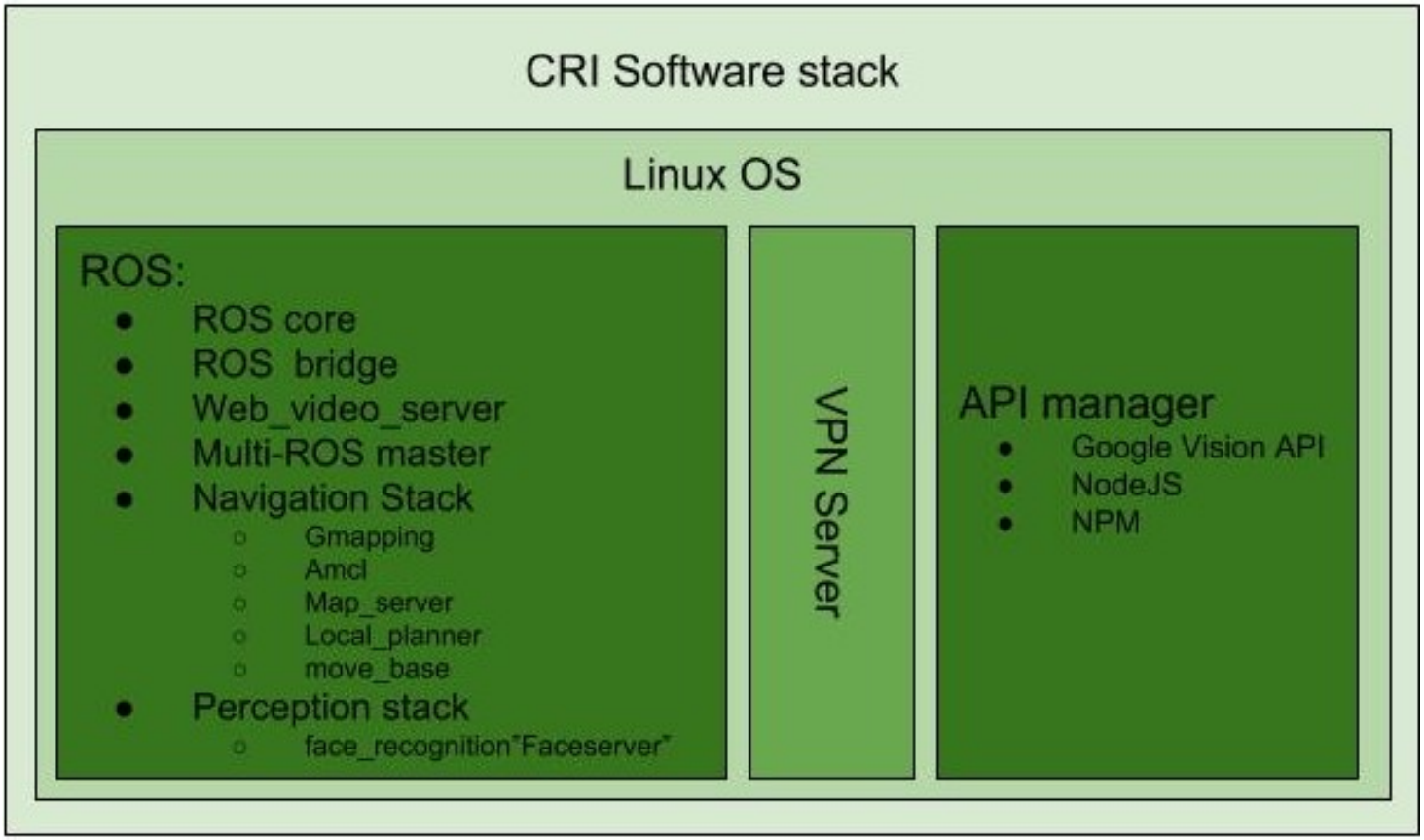
Aim

- Design and implement a cloud based teleoperation algorithm.
- Utilize clone based cloud robotic platform (CCRP) which is designed to provide platform-as-a-service (PaaS) for the client robots.
- Evaluate the capability of the CCRP system in handling real-time teleoperation for different types of robots.

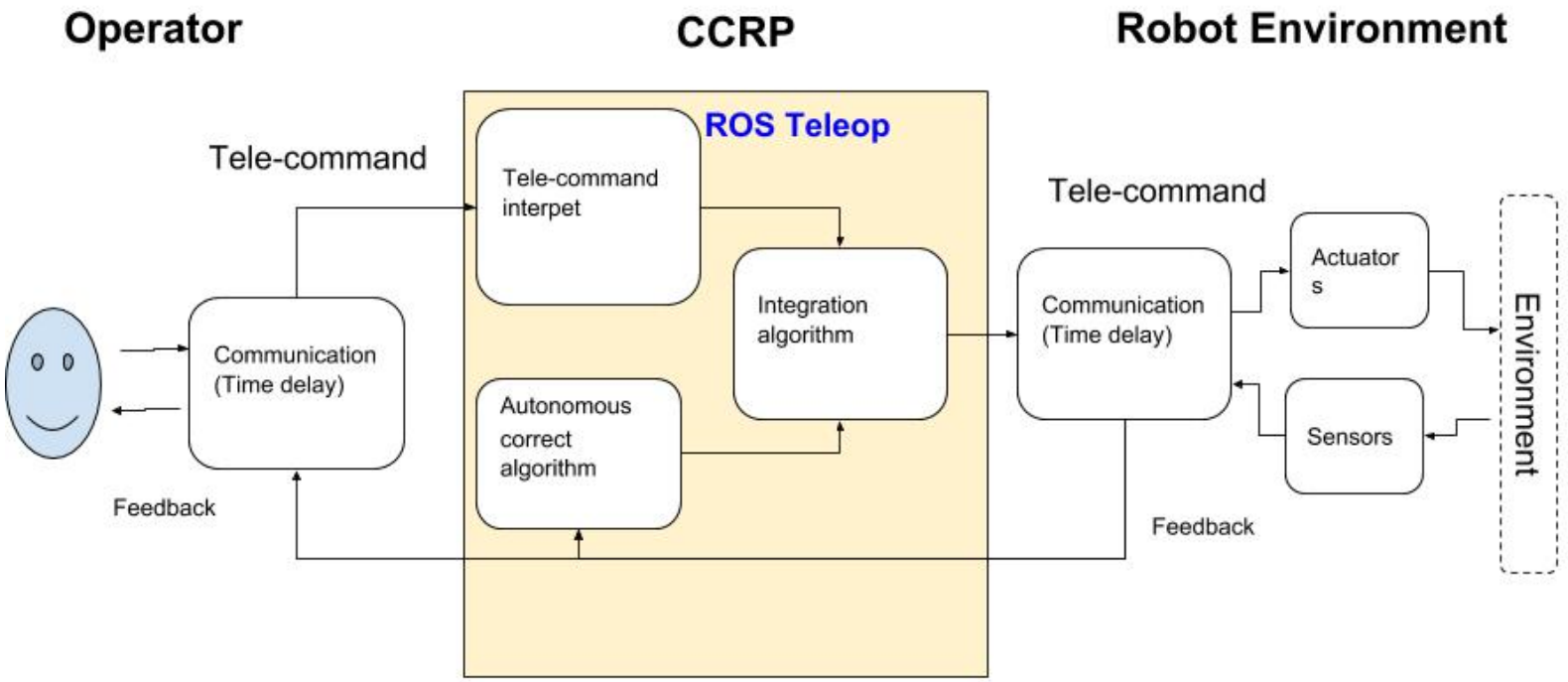
CCRP SYSTEM ARCHITECTUR



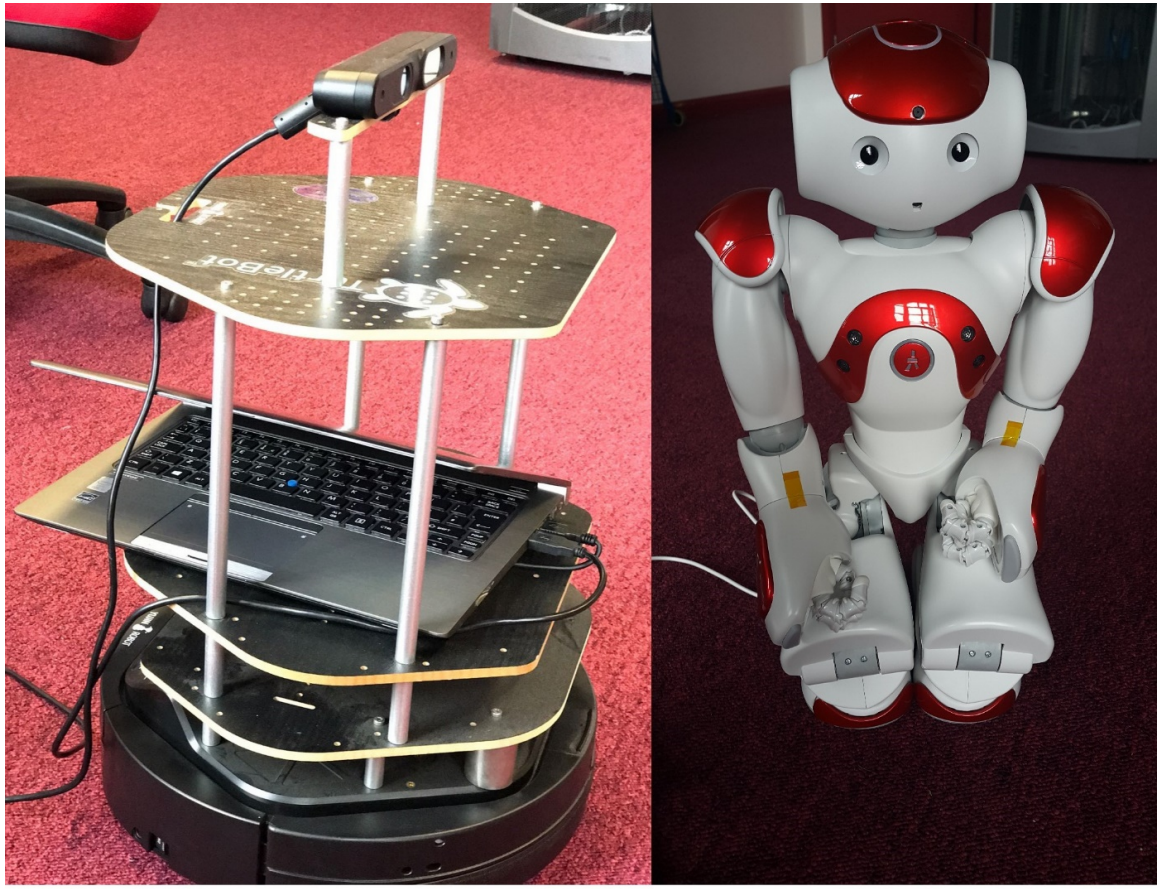
Software stack



TELEOPERATION ALGORITHM



Experiment requirements

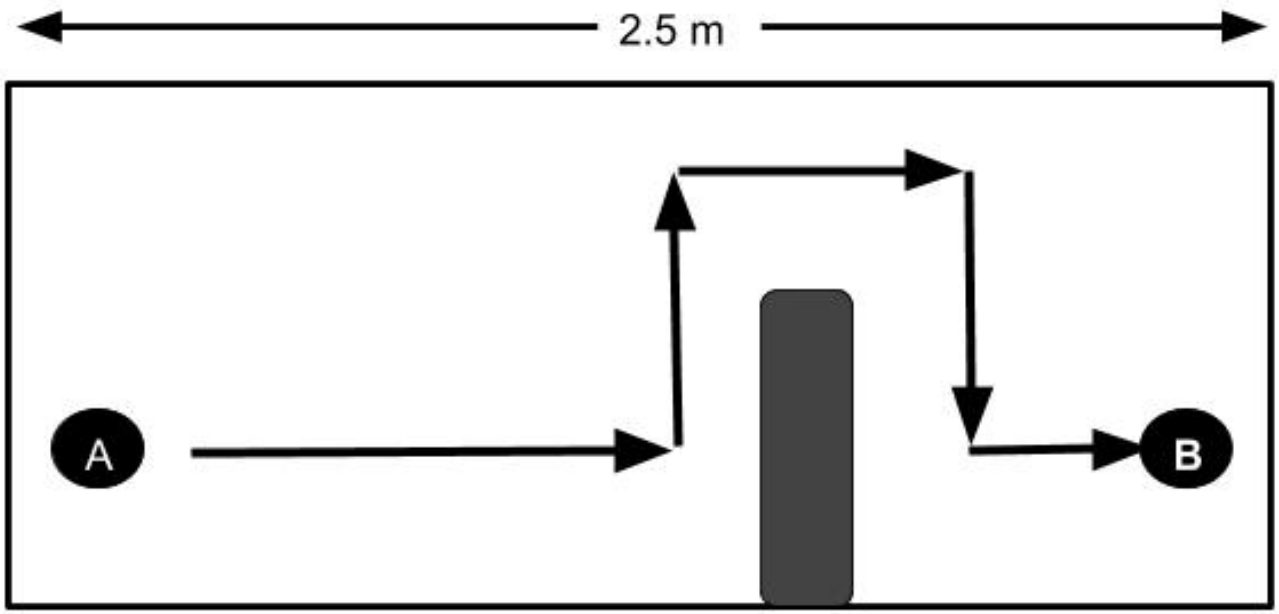


A B

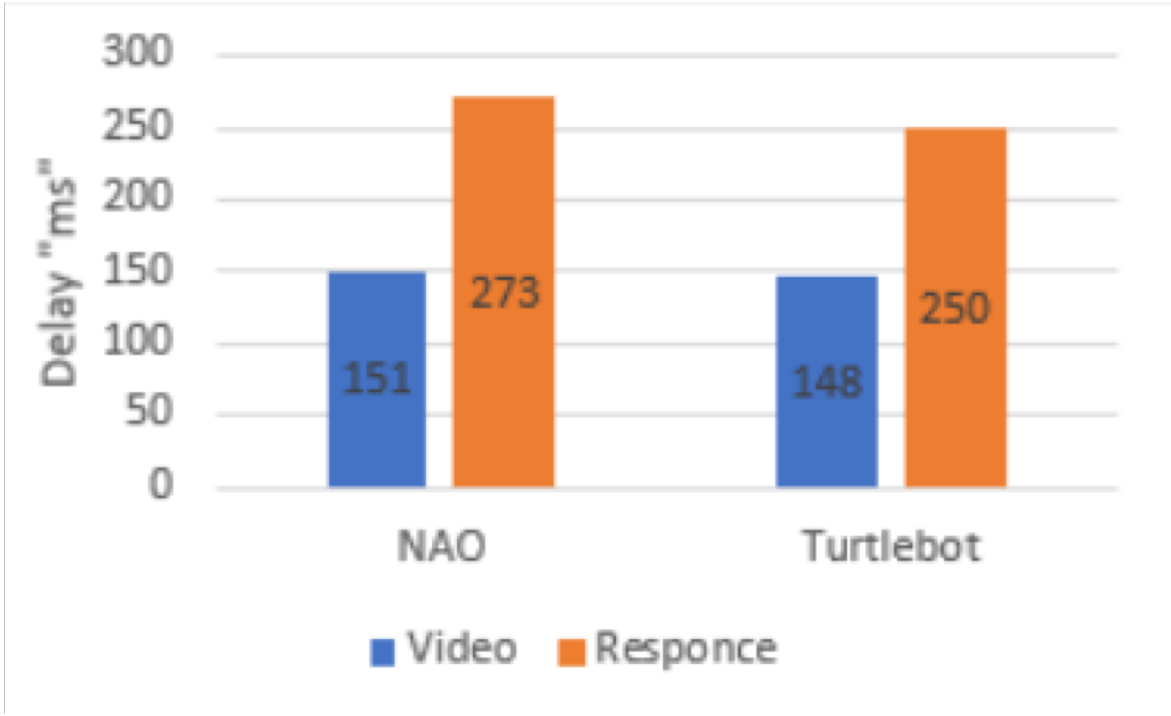
Fig. 1. A) Turtlebot robot B) NAO Humanoid robot

EXPERIMENT SETUP

- Each robots are required to move from a point A to point B.
- Avoid one obstacle.



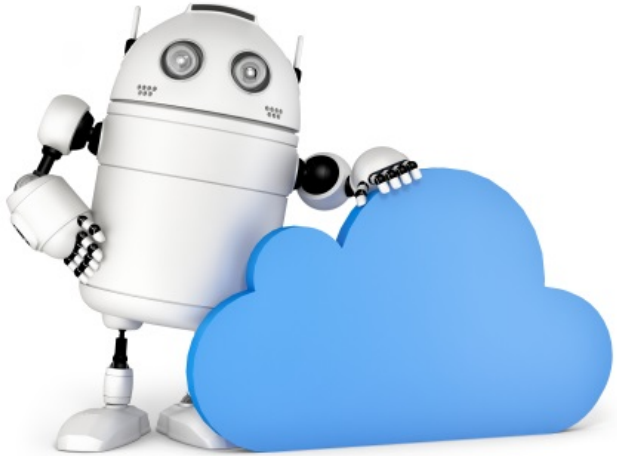
EXPERIMENTAL RESULTS



It took around 70s compared to the Turtlebot which takes only around 25s to accomplish the given task.

Summary

- We presented a cloud-based robot teleoperation algorithm.
- The teleoperation is an effective approach in combining a robot skills and a human operator abilities.
- The result of our experiments show that the CCRP is capable of supporting manual teleoperation application (with an operator's control) due to a low robot response time.
- It can support heterogeneous robots within the multi-ROS environment.

Thank you for Listening

Any Questions