ROS2 compatible simulation environment for RoboCup Rescue Simulation
Benefiting from the ROS2 multi-robot capabilities

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Challenge

- After a disaster a team of robots must explore the devastated area. The major technical goal is to encourage intuitive human interfaces, combined with autonomous and semi-autonomous algorithms that can be used to supervise and control multiple heterogeneous robots operating in challenging environments.
- At the last DARPA challenges principal solutions have been demonstrated, but those advanced robot systems need large teams of specialized operators. DARPA made e.g. the following recommendations (Norton et al, 2017):
  - Balance the capabilities of the operator and the system to effectively perform the task.
  - More autonomy from the robot to perform simple mobility tasks
  - More interaction from the operator to augment robot autonomy when planning difficult mobility tasks
  - Maintain operator awareness of the robot state
  - Duplicate sensor fusion displays using different perspectives

ROS2 capabilities

- In 2022 the Virtual Robot competition ported the simulation environment to ROS2 Foxy.
- ROS2 has several advantages compared to ROS1:
  - Teams of multiple robots: while it is possible to build multi-robot systems using ROS1, there is no standard approach
  - Non-ideal networks: we want ROS2 to behave as well as is possible when network connectivity degrades due to loss and/or delay (Blass, 2021)
  - Production environments: ensure that ROS1-based lab prototypes can evolve into ROS2-based products suitable for use in real-world applications.

Virtual Robot demonstration

To support the teams, the technical committee has made several scenarios and demos available:

- Essential for current rescue exploration scenarios is that these demos are extended with aerial and crawler robots.

Conclusion

- ROS2 made it possible to build multi-robot systems with a standardized approach. It also allows to flexible start scenarios by creating launch files with logic.
- The scenarios can be evaluated remotely during a pandemic in a cloud ROS2 environment such as the one provided by The Construct.

References


More information https://github.com/RoboCup-RSVRL/RoboCup2022RVRL_Demo