

Simulating the A&V Robot Lab for use in Corroborative Verification

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Research Question

How can corroborative verification be applied to the Safe-ROS framework?

Background

Corroborative Verification [4] is a process where results from formal mathematical models, simulations and physical testing are compared to determine the safety of an autonomous system.

The A&V Robot Lab is a new space in the Computer Science department to be used to study the trustworthy behaviour of primarily ground based robots. The lab has been used with an Agile X robot for an initial corroborative verification approach in the Safe-ROS framework [2]. However in this case the hardware testing was done in the lab, but the simulation used a gazebo simulation of a waste store facility. The purpose of this project would be to create a simulation of the A&V Robot Lab that could be used in this study.

Approach

The A&V Robot Lab is a large irregularly shaped space with two fixed pillars and a number of desks. Robots used in the space include Agile X scout minis, NAO robots and small lego and raspberry pi based systems. The Agile X robots, in particular, use ROS. This project therefore is to produce a simulation of the lab in a ROS compatible simulator - either gazebo [3] or, potentially, Omniverse [1]. A ROS model of a scout mini can be placed in this model. If possible some validation studies should take place

to compare the fidelity of the simulated robot and lab with the behaviour of the actual robot within the physical A&V Lab.

Milestones

- A simulated version of the physical A&V Lab
- A simulation of an Agile X Scout Mini running the Safe-ROS framework performing a simple task within the simulation
- If time allows, validation of the simulation by comparing a physical Scout Mini performing the same task in the physical A&V Lab.

References

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- [3] KOENIG, N., AND HOWARD, A. Design and use paradigms for gazebo, an open-source multi-robot simulator. In *2004 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (IEEE Cat. No.04CH37566)* (2004), vol. 3, pp. 2149–2154 vol.3.
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