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SOTER on ROS: A Run-Time Assurance Framework on the Robot Operating System

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Sumukh Shivakumar, Hazem Torfah, Ankush Desai, and [Sanjit A. Seshia](#). **SOTER on ROS: A Run-Time Assurance Framework on the Robot Operating System**. In *20th International Conference on Runtime Verification (RV)*, October 2020.

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Abstract

We present an implementation of SOTER, a run-time assurance framework for building safe distributed mobile robotic (DMR) systems, on top of the Robot Operating System (ROS). The safety of DMR systems cannot always be guaranteed at design time, especially when complex, off-the-shelf components are used that cannot be verified easily. SOTER addresses this by providing a language-based approach for run-time assurance for DMR systems. SOTER implements the reactive robotic software using the language P, a domain-specific language designed for implementing asynchronous event-driven systems, along with an integrated run-time assurance system that allows programmers to use uncertified components but still provide safety guarantees. We describe an implementation of SOTER for ROS and demonstrated its efficacy using a multi-robot surveillance case study, with multiple run-time assurance modules and show, through rigorous simulation, that SOTER enabled systems ensure safety, even when using unknown and untrusted components.

BibTeX

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