

## THE PROBLEM ADDRESSED

Today's robotics systems are rapidly growing in complexity and are becoming more and more difficult to develop. Many design errors are introduced early in development, are only found at operation times, and we observe robots executing slower than expected, missing their deadlines, or completely failing their mission.

RAMSES-ROS is a platform allowing to specify, analyze, verify and synthesize complex robotics systems based on an extensive components model library. Thanks to RAMSES-ROS, robotics systems are developed with less effort, reduced time to market and improved quality.

RAMSES-ROS has been produced by the ACES research team of the LTCI lab (Telecom Paris) and the Lab-STICC lab (University of South Brittany). The team has been strongly involved in the AADL standard committee.

## TECHNOLOGY

- RAMSES-ROS benefits from the mature SAE standard AADL modeling language, a key component of the USA DoD digital engineering strategy.
- It leverages the OSATE reference open source AADL tool for model editing and analysis capabilities and uses the well-known Robot Operating System as middleware and development toolchain.

- RAMSES-ROS is built using mature model-driven engineering tools and techniques (Eclipse Modeling Framework).

## COMPETITIVE ADVANTAGES

- Integrated design approach that simplifies system design using abstract components typed by reusable benchmarked library components.
- Automated refinement of AADL models to add operating system specific components and characteristics.
- Accurate processor, memory and communication resources consumption analyses to detect design errors before the system is implemented.
- Extensible to add newly developed library components and legacy components via reverse engineering.
- Automatic generation of C++ code, configuration and launch files for the ROS middleware and associated operating systems.
- Besides ROS, RAMSES can be used to target different middlewares and operating systems.

## APPLICATION

- Complex industrial robotics systems
- Manufacturing & automation systems

## DEVELOPMENT STATUS

- TRL 4 (core RAMSES). TRL 3 (RAMSES-ROS)

## INVENTORS & CONTACTS

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## PUBLICATIONS

- E. Senn, L. W. J. Bourdon, D. Blouin, *Designing ROS-Based Robotics Applications with AADL, Demonstration on a Prototype Industrial Robot and Software*.
- E. Senn, L. W. J. Bourdon, D. Blouin, *Multi-Paradigm Modeling for early Analysis of ROS-based Robotic Applications using a Library of AADL Models*. Proc. of the 25th Int. MODELS Conference: Companion Proceedings.
- "Introducing CPU load analysis from AADL models for ROS applications : a use case", Eric Senn and Lucie Bourdon, in *IEEE 24th Forum on specification & Design Languages (FDL 2021)*, Antibes, France, September 2021

## LOOKING FOR

- Identification & Co-development for a first use case in real condition