

MIRoN

QoS Metrics-In-the-Loop for better Robot Navigation

2nd October 2020

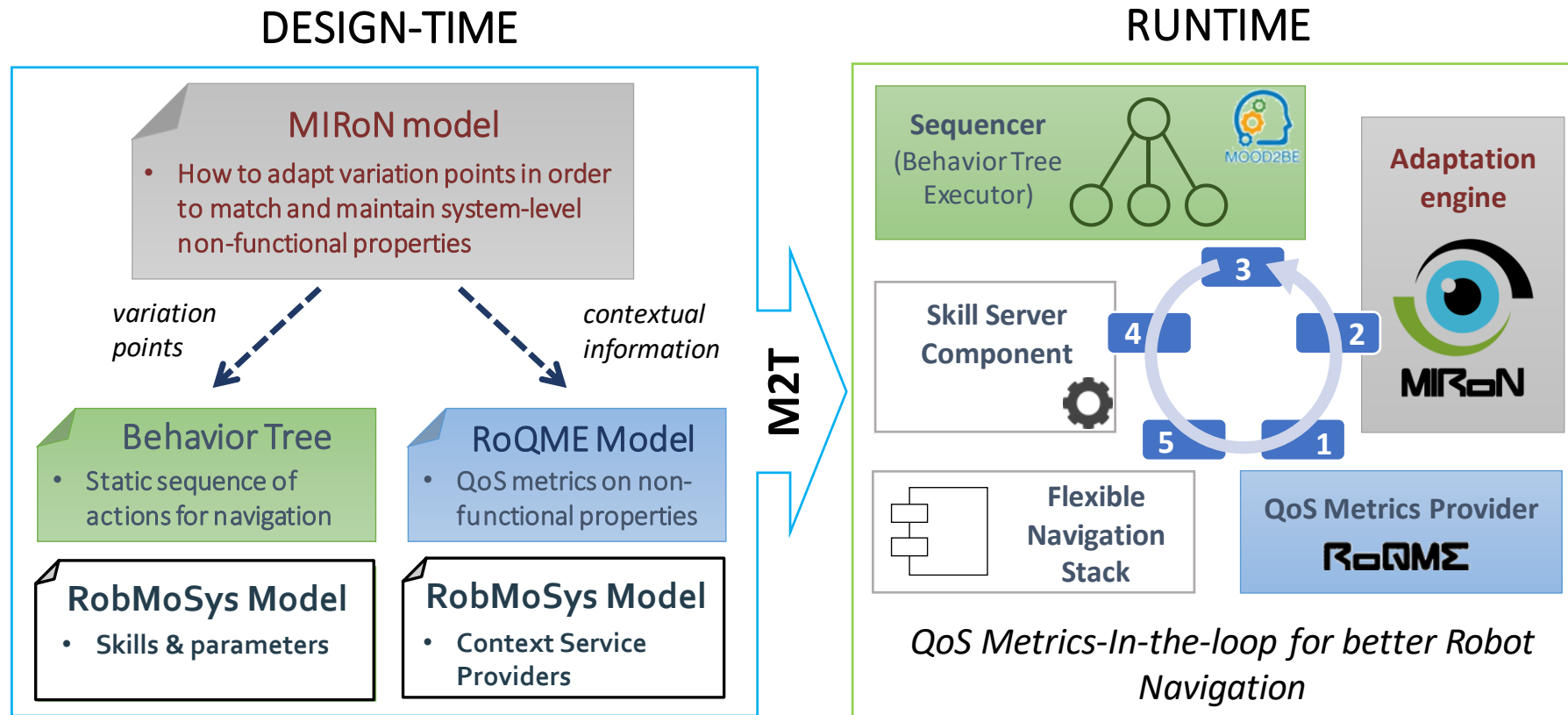
Cristina Vicente-Chicote



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732410

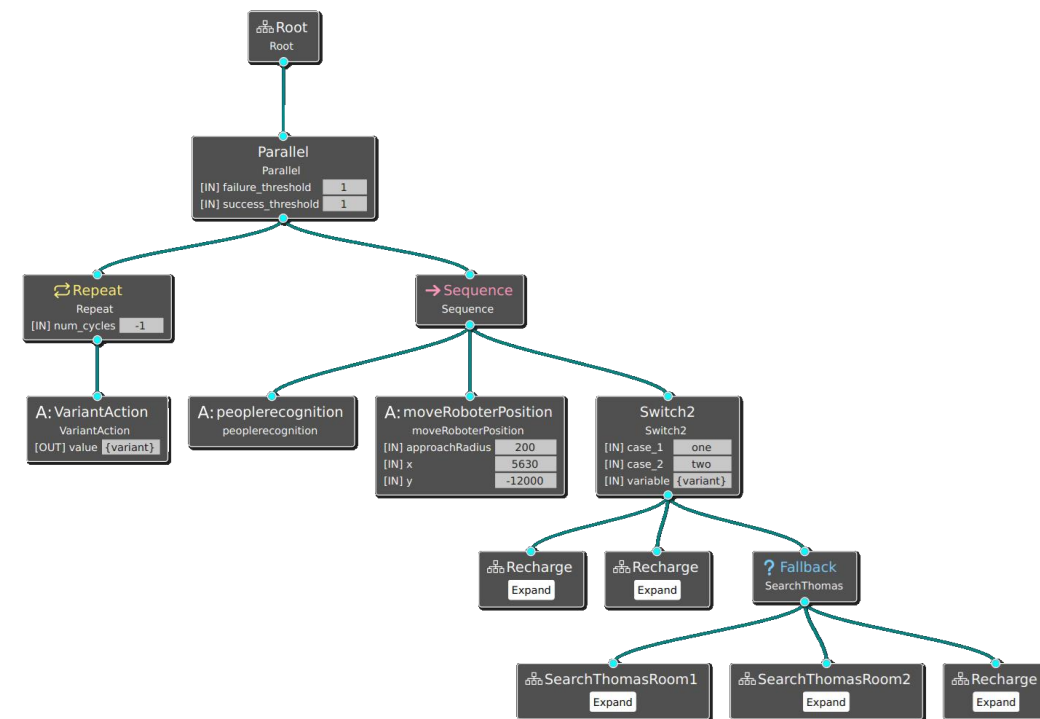
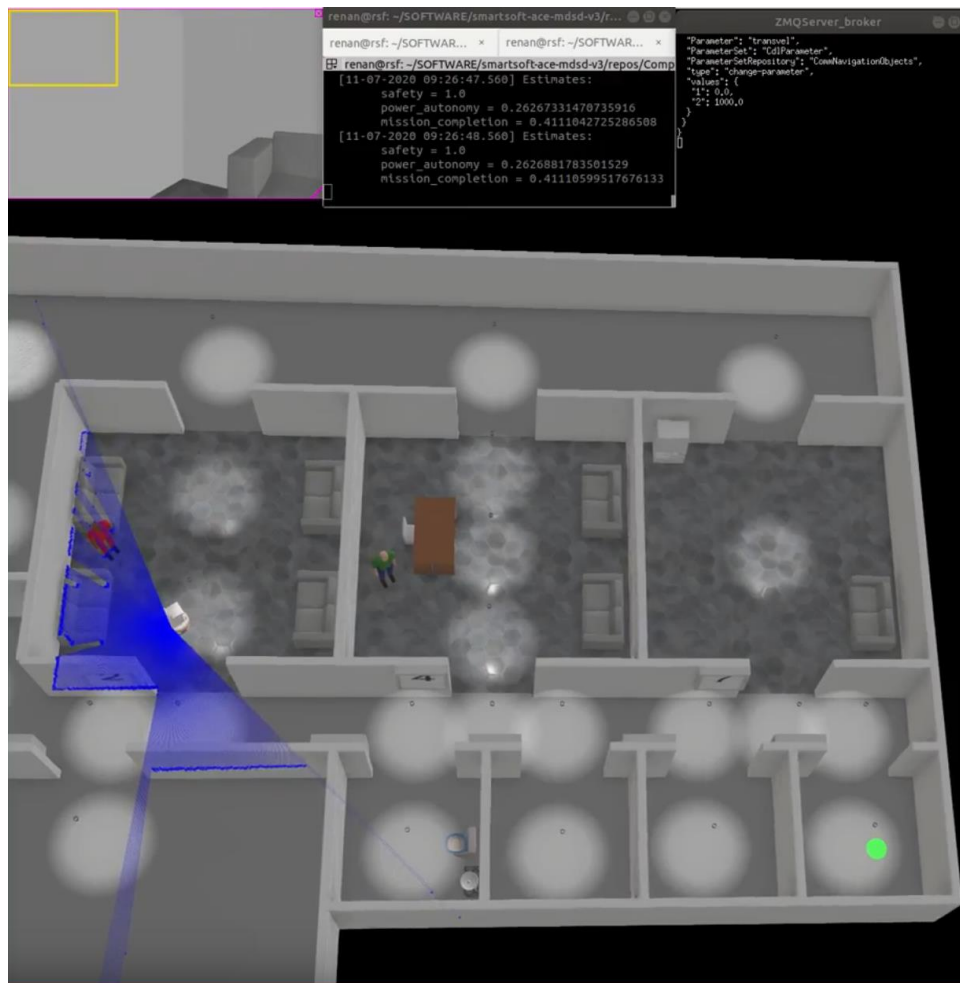
What is the MIRoN ITP about?

MIRoN contributes to **RobMoSys** a framework for dealing with adaptive robot navigation based on the systematic use of models for dynamically reconfiguring the robot behavior, defined in terms of Behavior Trees (BT), according to the runtime prediction and estimation of QoS metrics defined on NFPs.



- The **MIRoN Toolchain** includes:
 - A textual DSL enabling the specification of Behaviour Tree models (compatible with the XML-based syntax supported by the BT Executor);
 - A textual DSL enabling the specification of available variation points (and their corresponding variants) and of the adaptation logic; and
 - A set of model transformations supporting the automatic generation of the MIRoN Adaptation Engine and the infrastructure required for communicating the reconfiguration decisions both to the BT Executor and to the Flexible Navigation Stack.
- The benefits of MIRoN are being **demonstrated on two simulated scenarios**, developed using **Webots**, each one related with the two RobMoSys industrial pilots related to instrument #2 –topic 4: Navigation:
 - An Intralogistics scenario; and
 - An Assistive Robotics scenario.

Project outcomes



Project outcomes



- The MIRoN ITP has contributed to some of the **RobMoSys Technical User Stories**, e.g.:
 - **Composable commodities for robot navigation with traceable and assured properties.** MIRoN allows specifying user needs in terms of NFP (based on the **RoQME** metrics), trace and eventually predict the evolution of these properties, and adapt the robot navigation behavior (based on the **MOOD2BE** behavior trees) to guarantee the QoS level required by the user.
 - **Description of building blocks via model-based data sheets.** MIRoN exploits the variability defined both in components and in task-plots (by Component Suppliers and Behavior Developers, respectively) and not fixed at design-time by the System Builder as the decision space to be configured at runtime, according to the current situation.
 - **Management of Non-Functional Properties.** MIRoN allows matching the required NFPs at runtime via proper configuration of variation points.

- MIRoN tries to **raise awareness** not only about the ITP results, but also about the results previously achieved in RoQME and MOOD2BE and, overall, about the RobMoSys vision, models, software and tools.
- The MIRoN framework will be shortly made publically available in GitHub together with the corresponding documentation. Additional dissemination activities include:
 - The presentation of the ITP results at WAF 2020 (<http://waf2020.uah.es/>) => Paper selected for being extended and submitted to a special issue of *MTAP*.
 - Punctually communicating project achievements through dedicated accounts in Twitter, ResearchGate, LinkedIn, etc.
 - Creating and publishing videos of the demos developed on the two RobMoSys industrial pilots (in progress).

Thanks!

Follow us at:

 **@MIRoN_ITP** (https://twitter.com/miron_itp)
 <https://www.researchgate.net/project/MIRoN-ITP>