Safety Issues with Component-based Software Frameworks

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Abstract

Robot software is traditionally proprietary and it is kept secret. The reasons of it are twofold: On one hand, companies are aimed at protecting their intellectual properties and in robotics significant (and growing) part of the know-how is implemented in software. On the other hand, security and liability factors are much more manageable using proprietary codebase. Despite of this stubborn practice, in the early 2000's research institutions and robotics communities started to develop open source middleware frameworks and functional components powered by the passion of scientists and enthusiastic engineers. The first major system were the RT-Middleware developed by Noriaki Ando (AIST, Japan), supported by the OMG RTC specification. The trend has became continuously stronger and until today the open source robotics community produced millions lines of code available for almost every segments of robot control (e.g., SLAM, path and trajectory planning, inverse kinematics, etc.). The strongest legal entity of the community is the Open Source Robotics Foundation that maintain ROS and Gazebo.

Such software repositories are now very appealing for the robot industry as well, since these are evolving very quickly and provide more or less out of the box solution for a large variety of problems in different fields. In 2013, the ROS Industrial consortium were established that involves the major robot vendors, some of them are providing robotic arms for medical applications.

Not surprisingly, opens source robot software mainly serves early phase R&D purposes and thus, operational and information safety are not the top priority in their design. The talk go through the brief history of component-based frameworks, then discuss some important safety aspects of utilizing open source component frameworks in different phases of medical robot development and give projections how the recent developments (e.g., ROS 2) effects the safety challenges.

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