

Improving ROS Support in Webots

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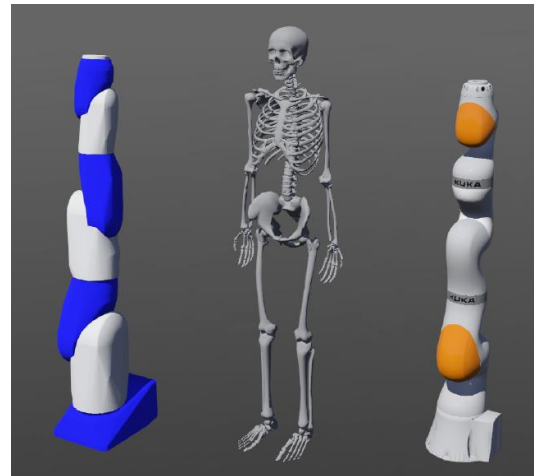
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Robot simulators have proved their efficacy since many years by lowering the time and the cost to develop algorithms and robot models. The open-source Webots robot simulator is one of these software and proposes an interface for the Robot Operating System (ROS) framework. ROS being more and more used in industry and constantly receiving new features, the necessity to improve the interface between Webots and ROS was evident.

Upgrades were implemented on the interface of the first version of ROS (ROS 1) to increase the performance of several devices, such as the lidar (now publishing only one message with all the measures instead of one message per layer) or the recognition camera (which was publishing empty messages). Enhancements have been made to easily test all the devices when any change is made in Webots or in the ROS 1 interface. As

The focus has been placed on developing and extending the interface for the second version of ROS (ROS 2). The maintenance of the code for each sub-version of ROS 2 (called distributions) has been simplified and new tutorials to introduce the capabilities of Webots with this ROS 2 interface have been created. A new and easy way to import robots modeled in Unified Robot Description Format (URDF) files in running simulations has been implemented and the control of vehicles robot has been simplified. Several devices have also been improved such as the recognition camera (which was not correctly enabled and the messages published were not correctly written) or the range finder (which can now publish PointCloud2 messages).



Three examples of robot modeled in URDF files using mesh files imported in Webots. From left to right: a robotic arm with STL meshes, a human skeleton with OBJ meshes and another robotic arm with DAE meshes.

A lot of effort has been invested on improving an already existing tool (urdf2webots) permitting to use URDF files in Webots (the same tool involved in the ROS 2 interface to import URDF robots in running simulations). The support of Xacro files used to generate URDF files has been further developed by correctly converting links without mass, collision or inertia (which is not directly supported in Webots), the tool is now able to convert the URDF files into different robot formats to be inserted in running simulations and the incorporation of mesh files has been revisited to allow quick iterations with URDF robots.

Finally, the ROS 1 and ROS 2 interfaces and the converter tool have been updated to stick to the new axis system (with the Z vector defined as the vertical axis) introduced in Webots R2022a. Moreover, fixes have been made directly in Webots to correct measures made by the range finder and the lidar close to the near plane.