MoveIT 2 Progress & Roadmap
MoveIt 2.0 Alpha
Initial implementation by Acutronic

Announced: June 2019
ROS2 distro: Dashing Diademata
OS: Ubuntu 18.04 and Mac OS X 10.14
MoveIt 2.0 Alpha - Progress

- Most of moveit_core moveit_ros ported to ROS2
- 11 external dependencies have been ported
- Functional CI infrastructure: moveit_ci
- Capability for simple planning to joint-state goal
- Example ROS 2 control framework for Acutronic’s MARA robot
- Engaged PickNik to help advise them
- PickNik and the maintainers helped significantly with porting the dependencies, and porting MoveIt CI to ROS 2
Future development

Goal: Beta version by Q1 2020

Initial Project Funding: ROSin FTP + PickNik

Two developers working half time for limited development of MoveIt 2

Additional resources still needed for full ROS 2 conversion
MoveIt 2.0 Future Development

Roadmap and Milestones
**Milestone 1**

**Straight Port to ROS 2**
- Fully migrate existing Movelt packages to ROS 2
- Wrap up Acutronic's work porting core Movelt functionality
- Leverage ROS 2:
  - Build system (ament), middleware, launch parameters
  - Cleanup Movelt 2 codebase

**Milestone 2**

**Realtime Support**
- Reactive, closed-loop control to sensor input
  - Visual servoing, octomap updates
  - Preempt motion if new collision detected
- Separate global and local planner (hybrid planning)
  - Global planner (full collision checking): 30hz
  - Local planner (IK-based, field-based): 300hz
- Zero-memory copy integration to controllers (ros_control)
  - Tighter integration to ros_control
  - Integrate pilz_industrial_motion

**Movelt Survey Results**
- 91% most excited about ROS 2 realtime control
- 55% reactive planning and closed loop control
- 48% better integration with lower level realtime control
- 48% planning with dynamics

**Milestone 3**

**Fully Leverage ROS 2**
- Lifecycle management of Movelt nodes
  - Deterministic startup, reset, & shutdown sequences
- Leverage ROS2 component nodes
  - Ability to run Movelt as single or multi-process
  - Replace pluginlib with components
  - Cleanup API
  - More generic and standalone interfaces

**Movelt Survey Results**
- 47% excited about component nodes
Realtime Support

- Reactive, closed-loop control to sensor input
  - Visual servoing, octomap updates
  - Preempt motion if new collision detected
- Separate global and local planner (hybrid planning)
  - Global planner (full collision checking): ~30Hz
  - Local Planner (IK-based, field-based): ~300Hz
- Zero-memory copy integration to controllers (ros_control)
  - Tighter integration to ros_control
- Integrate pilz_industrial_motion
PickNik's Vision

MoveIt is a globally recognized, highly capable open source manipulation platform that enables organizations of all sizes to leverage robotics for their applications.
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**Future Milestones**

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<th><strong>Machine Learning</strong></th>
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<td>Deprecate the Pick and Place pipeline</td>
<td>Neural-network based motion planning - new plugins</td>
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<td>Tune or replace OMPL, BIT*</td>
<td>Fully support the MoveIt Task Constructor</td>
<td>General near-optimal heuristics for path planning e.g. MPNet</td>
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<td>Further optimize / smooth paths</td>
<td>First class support of state machines</td>
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<td>Default use TOTG, TOPP time parameterization</td>
<td>Non-ROS C++ API</td>
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<td>Use post-processing optimization (STOMP, TrajOpt)</td>
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<td>Fully featured Cartesian Planner</td>
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<td>Like Descartes but better and fully integrated</td>
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<td>Force-torque control</td>
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Group Roadmapping This Afternoon

More to come!