PICKNIK ROBOTICS

MoveIt Studio

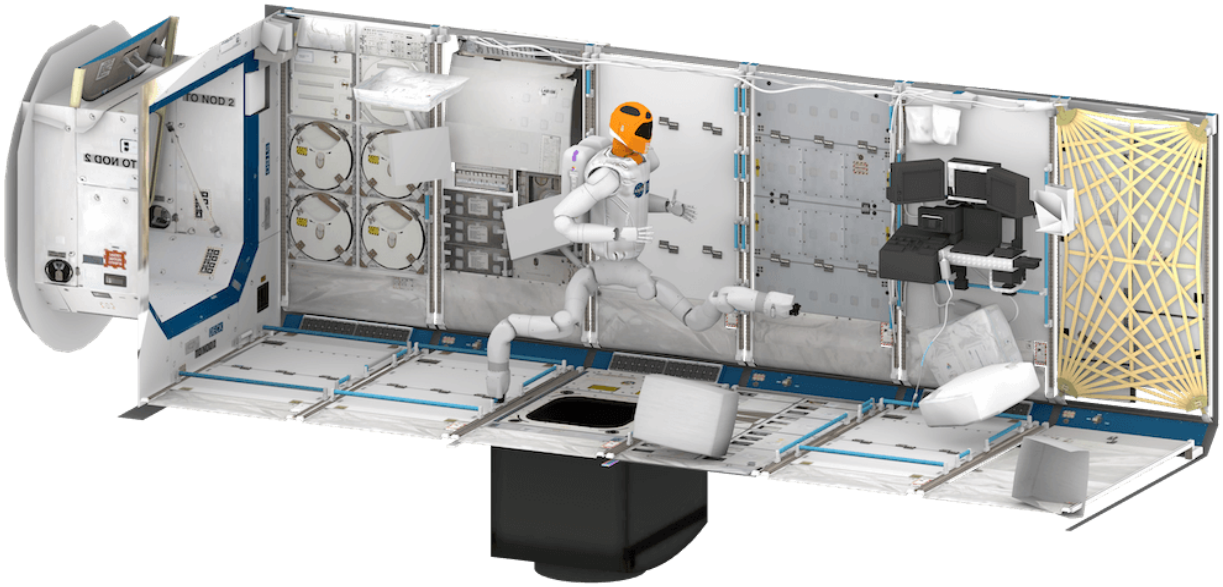
Specification Sheet

MoveIt Studio is a *mostly autonomous* software platform allowing robot arms to achieve complex manipulation tasks remotely, for use in a broad range of unstructured environments such as urban areas, inside buildings, and remote infrastructure domains. In addition, Studio can be used in microgravity and underwater.

In an ideal world robot arms would be fully autonomous, requiring no human interaction no matter the complexity or difficulty of the task at hand. However when taking robots outside of traditional factories, there are many domains that require a human in the loop to provide high level instruction, monitoring, and support for when the robot arms get stuck.

Our MoveIt Studio solution supports *hybrid autonomy*, putting you in full control of how much involvement is needed for the task at hand. From traditional drive-by-wire control to high level objective specification, Studio enables you to work with robot arms more efficiently.

Our goal is to increase the ratio of robots to human operators, relieving the need to babysit a single robot while it gets stuff done for you. We aim to create intuitive, simple interfaces that do not require highly trained roboticists to operate.



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Why Robot Arms

The world around us has been built and designed by humans, with human arms and hands. By enabling robots to do complex manipulation tasks with similar arms in unstructured, complex environments, the application space and versatility of robots explodes.

Not Just Teleoperation

We do not believe in simply giving an operator a joystick and video feed. MoveIt Studio aims to be mostly autonomous, meaning it can understand its environment, do complex motion planning around obstacles, and choose optimal grasp strategies for interacting with the world around it.

Still, robots do struggle in a variety of scenarios such as when the environment is unstructured, has unreliable lighting, or encounters something it hasn't seen before. MoveIt Studio enables humans to be on standby, monitoring task completion and providing assistance when plan execution fails.

Easy to Command

MoveIt Studio provides user interfaces for creating *objectives*, or complex sequences of tasks. These objectives can be pre-canned or created on the fly during operation, as new, never before seen needs for the robot arise that could not have been expected. *Tasks* are the primitives in which objectives are built, and an extensive library of tasks ensure that the robot can achieve new levels of capabilities.

Safer and More Reliable

Unlike traditional teleoperation approaches with limited situational awareness for human operators, MoveIt Studio largely removes the execution details from the human to the robot. This prevents human error from incomplete awareness of the remote operating environment, and reduces operator fatigue.

Better than the Competition

While many companies are providing cloud services for monitoring fleets of AMRs (autonomous mobile robots), PickNik is taking an arm-centric and autonomous-first approach to human in the loop. We are the creators of the popular MoveIt platform, and understand the unique challenges of high degree of freedom, non-linear robot arms. Originally developed for NASA, we've created an intelligent solution that understands its environment and can auto-generate its plan for achieving multi-step tasks.

PickNik believes in a "mostly autonomous" approach, reducing the cognitive load of human operators and increasing their productivity. This methodology reduces, and eventually eliminates, the need for users to take over manual control of the arm operation.

Keep Your Work Environments Human-Centric

The past decades of robotics has been all about restructuring workspaces for robots, rather than humans. With the advanced capabilities of MoveIt Studio, keep your unstructured environments while still enabling robotics to help your workflow.

Get to Market Faster

When embarking on a new robotics product or startup, time to market is crucial. Studio allows you to deploy solutions that aren't yet 100% reliable, by having a human backup at the ready.

Built on Open Standards

MoveIt Studio is built on top of the open source MoveIt platform, an industry standard for robotic arm control that uses the Robot Operating System (ROS). Through MoveIt's plugin architecture, many aspects of Studio can be customized and optimized.

MoveIt Studio also provides an SDK for developers to create custom tasks in C++ that are unique to their applications, if required.

Key Features & Benefits

Robot Agnostic
Runs on any ROS-compatible robot, and can be integrated with non-ROS compatible robots.

User Interface Device Support
Support for laptops, touch screens, and game controllers.

Simulation and Preview
Review and approve behaviors before they are run in a 3D visualizer.

Local Network Operation
For guaranteed reliability when it matters, Studio can operate locally without internet connectivity.

Remote Operation
Command for across the world or from the moon.

Low Latency Support
Works in environments with unreliable or slow connections with significant delays.

Object Detection and Grasp Generation
Automatically chooses ideal grasp points using machine learning algorithms.

Breakpoints and Step-Throughs
Specify points when the human operator should be prompted to monitor the task more carefully.

Logging and Introspection
Allow operators to tag and report undesired behavior for continuous improvement and diagnosis.

Mobility Support
Uses standard SLAM and navigation capabilities to allow mobile manipulation and general mobility.

Keep Out Zones
Specify no-go areas that the robot should avoid at all costs for safety.

Control Modes

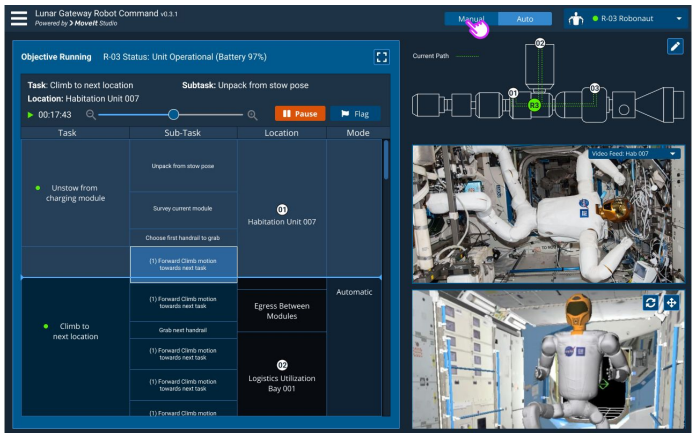
Automatic Objective Execution
Choose from a library of pre-canned objectives and sit back as your robot arm autonomously executes the task.

Direct Control Mode
Cartesian-based realtime jogging

Plan Approval Mode
Preview proposed Cartesian motion before executing

Affordance Mode
Recommends suggested actions and/or grasp points using AI engine

Diagnostic Mode
Low level, individual joint control for debugging



Flexible User Interfaces
Use only the user interface modules you need for your users and application. Whitelabel our platform as needed.

MoveIt Studio Technical Specifications

Supported Operating Systems	Ubuntu 20.04, Windows 10 (coming soon)
ROS Version	ROS 2 Foxy
MoveIt Version	2.1 Foxy
User Interface Framework	Qt4, Unity
Recommended User Interface Devices	PS2, Xbox, SpaceMouse Pro, Generic Keyboard, Generic Mouse
Remote Connectivity	Cyclone DDS + Zenoh bridge
Latency on Wifi	TBD
Recommended Processor	TBD

Ongoing Upgrades and Maintenance

As part of your subscription to MoveIt Studio, you are eligible for continuous upgrades as we improve the platform's autonomy capabilities and feature sets. Overall time your robot's manipulation capabilities will continue to improve.

Maintenance such as compatibility with the latest operating systems and software libraries is also handled by us, decreasing your company's development and operation costs.

Support

To ensure you and your robot operators have a stellar experience, support during normal business hours is included in your subscription. Simply call 720-513-2221 or email support@picknik.ai.