MoveIt! Survey Results

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Reporting December 2013

(Available electronically from: moveit.ros.org)

Total no. of respondents: 105*

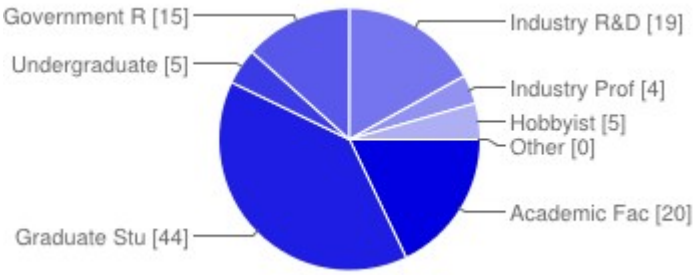
Total no. of different types of robots using MoveIt!: 65^

* - by survey deadline of Nov. 1, 2013

^ - see last two pages of this report for full list

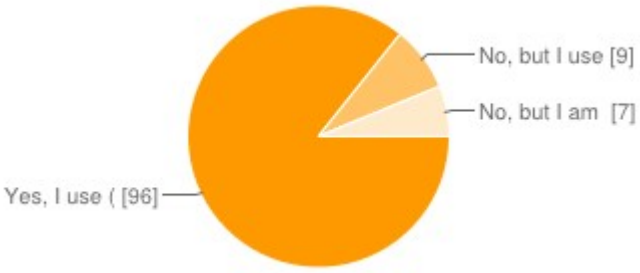
General Information

Which describes you best?



Academic Faculty/Post-doc	20	18%
Graduate Student	44	39%
Undergraduate Student	5	4%
Government Research Lab / Non-Profit R&D Lab	15	13%
Industry R&D	19	17%
Industry Professional	4	4%
Hobbyist	5	4%
Other	0	0%

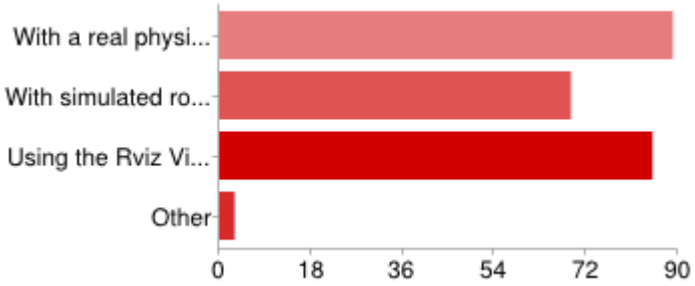
Do you use MoveIt!?



Yes, I use (or have used) MoveIt!	96	86%
No, but I use or have used Arm Navigation	9	8%
No, but I am interested in using MoveIt!	7	6%

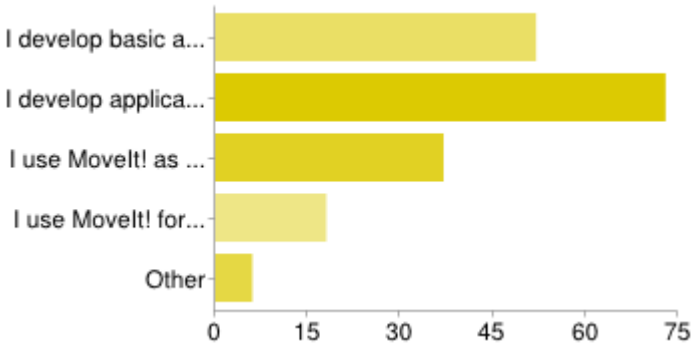
MoveIt! Usage

How do you use MoveIt!



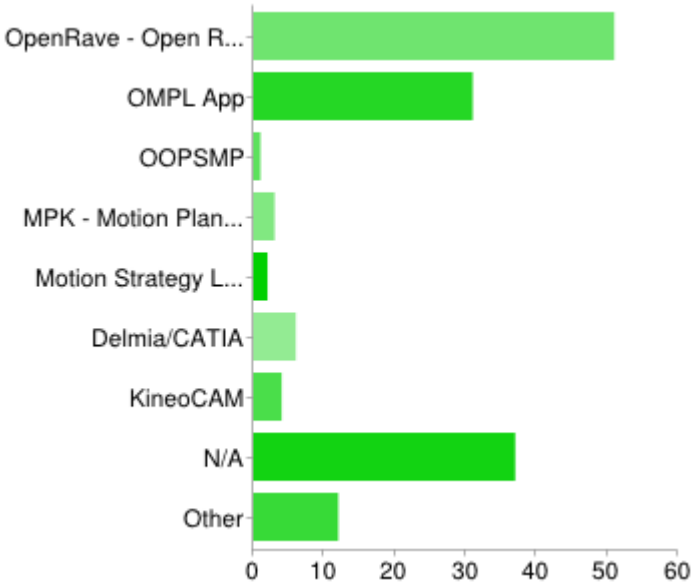
With a real physical robot	89	36%
With simulated robots	69	28%
Using the Rviz Visualizer	85	35%
Other	3	1%

How would you describe your use of MoveIt!?



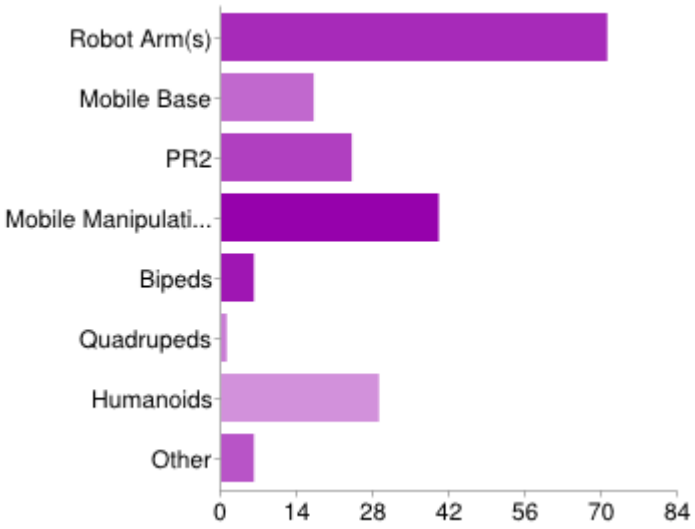
I develop basic algorithms (e.g. motion planning or collision checking) using MoveIt! as a platform	52	28%
I develop applications for my robot (e.g. pick and place, door opening, etc.) using the capabilities in MoveIt!	73	39%
I use MoveIt! as part of a large R&D program or project for integrated applications, e.g. search and rescue, logistics	37	20%
I use MoveIt! for industrial applications (e.g. painting, assembly, welding, etc.)	18	10%
Other: (Education, Fun)	6	3%

Please list the names of other software offering similar capabilities to MoveIt! that you may have used



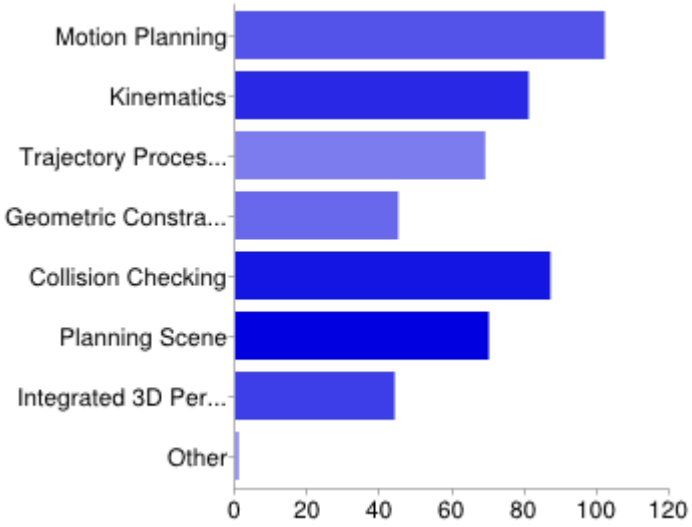
OpenRave - Open Robotics Automation Virtual Environment	51	35%
OMPL App	31	21%
OOPSMP	1	1%
MPK - Motion Planning Kit	3	2%
Motion Strategy Library	2	1%
Delmia/CATIA	6	4%
KineoCAM	4	3%
N/A	37	25%
Other: (Choreonoid, OMPL App, RoboStudio, GraspIt!, MPK, Karto, MSL, V-Rep, Kinematix, RoboGuide)	12	8%

What kind of robots are you using MoveIt! with?



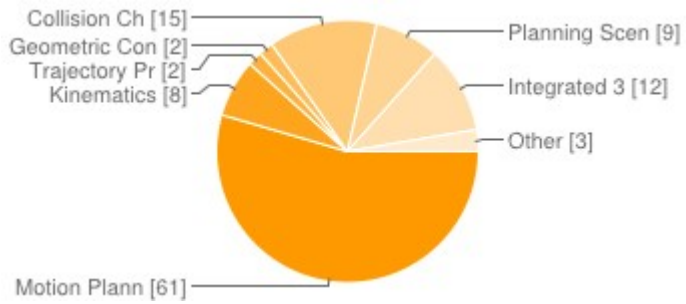
Robot Arm(s)	71	37%
Mobile Base	17	9%
PR2	24	12%
Mobile Manipulation Robots (Other than PR2)	40	21%
Bipeds	6	3%
Quadrupeds	1	1%
Humanoids	29	15%
Other: (UAVs, Lego NXT, Quadrotor)	6	3%

Which features of MoveIt! are you currently using?



Motion Planning	102	20%
Kinematics	81	16%
Trajectory Processing	69	14%
Geometric Constraints	45	9%
Collision Checking	87	17%
Planning Scene	70	14%
Integrated 3D Perception (e.g. Octomap, integration with object recognition, etc.)	44	9%
Other	1	0%

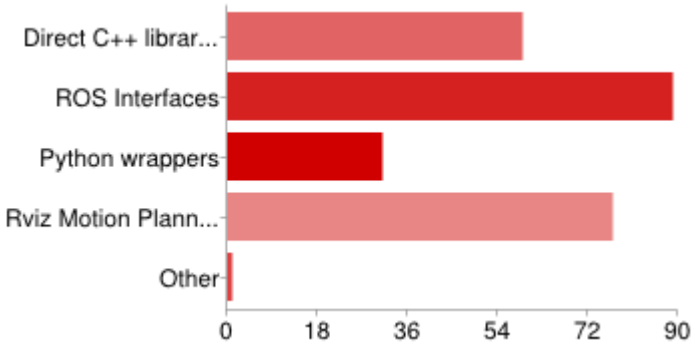
Which feature of MoveIt! do you find most useful?



Motion Planning	61	54%
Kinematics	8	7%
Trajectory Processing	2	2%
Geometric Constraints	2	2%
Collision Checking	15	13%
Planning Scene	9	8%

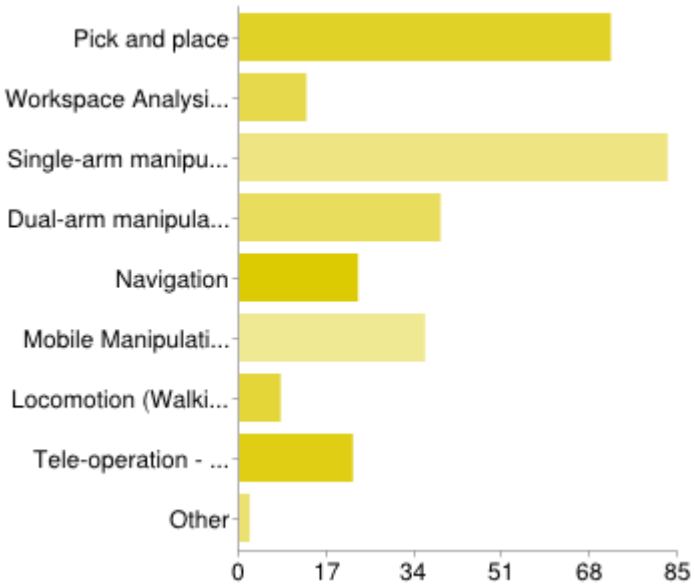
Integrated 3D Perception	12	11%
Other: (All)	3	3%

Which interfaces that MoveIt! provides are you using?



Direct C++ library interface	59	23%
ROS Interfaces	89	35%
Python wrappers	31	12%
Rviz Motion Planning GUI	77	30%
Other	1	0%

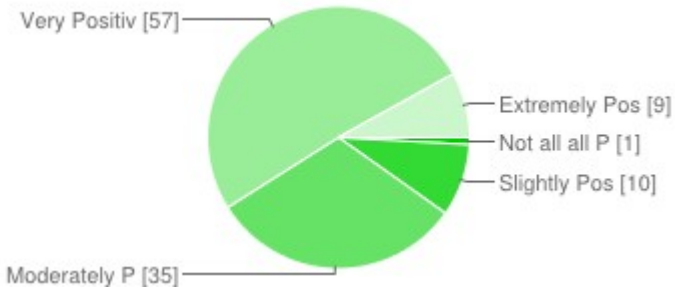
What kind of applications are you using MoveIt! for?



Pick and place	72	24%
Workspace Analysis for Robot Design	13	4%
Single-arm manipulation tasks	83	28%
Dual-arm manipulation tasks	39	13%
Navigation	23	8%
Mobile Manipulation Tasks	36	12%
Locomotion (Walking, etc.)	8	3%
Tele-operation - Human in the loop	22	7%
Other	2	1%

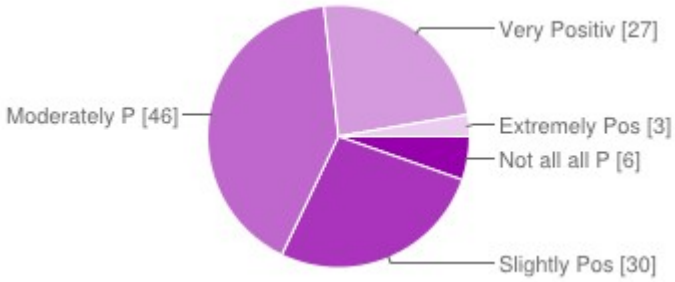
MoveIt! Setup Assistant

What was your overall experience with the MoveIt! Setup Asssistant



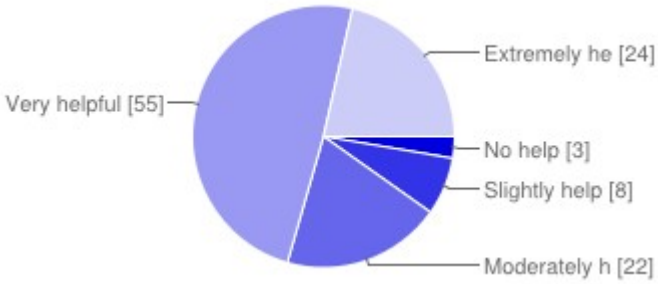
Not all all Positive	1	1%
Slightly Positive	10	9%
Moderately Positive	35	31%
Very Positive	57	51%
Extremely Positive	9	8%

What was your overall experience with setting up MoveIt!, including the additional steps AFTER the Setup Assistant such as setting up controllers and sensors?



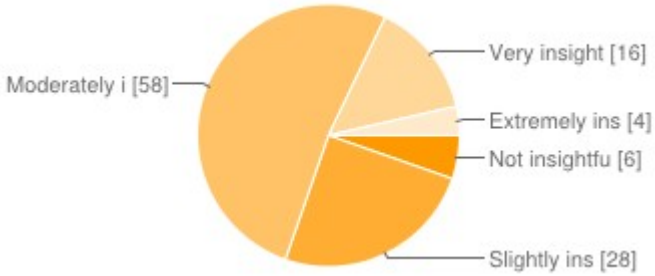
Not all all Positive	6	5%
Slightly Positive	30	27%
Moderately Positive	46	41%
Very Positive	27	24%
Extremely Positive	3	3%

How much do you think the Setup Assistant helped in speeding up the setup of your robot for MoveIt!?



No help	3	3%
Slightly helpful	8	7%
Moderately helpful	22	20%
Very helpful	55	49%
Extremely helpful	24	21%

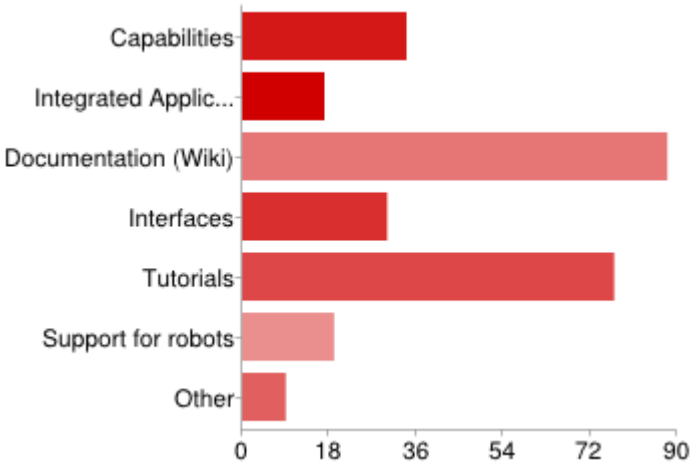
How much insight into various MoveIt! concepts did you gain by using the Setup Assistant?



Not insightful	6	5%
Slightly insightful	28	25%
Moderately insightful	58	52%
Very insightful	16	14%
Extremely insightful	4	4%

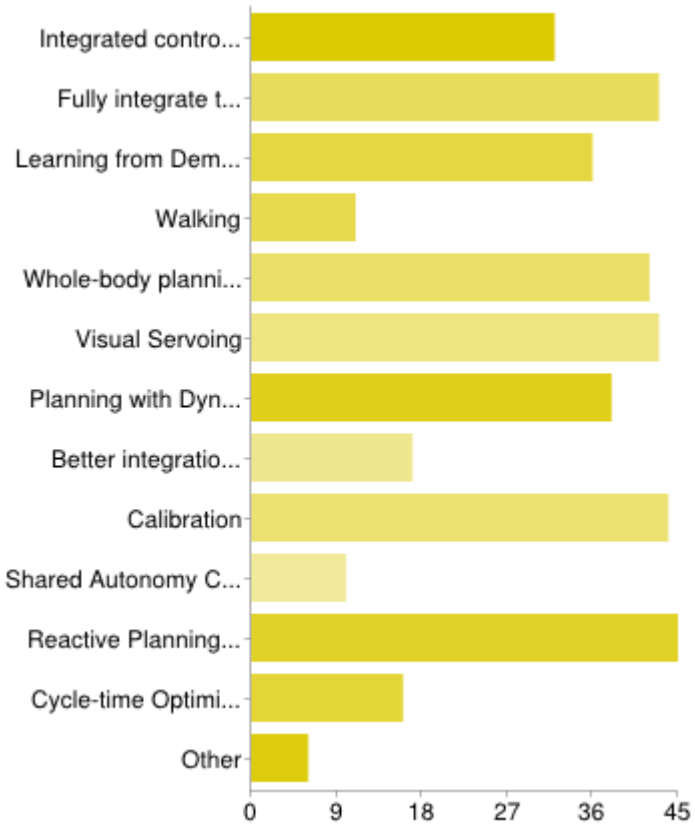
Future Developments

What should be improved about MoveIt!?



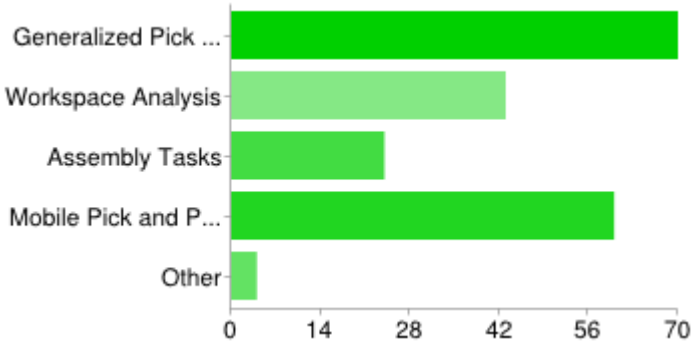
Capabilities	34	12%
Integrated Applications	17	6%
Documentation (Wiki)	88	32%
Interfaces	30	11%
Tutorials	77	28%
Support for robots	19	7%
Other	9	3%

What capabilities would you like to see in MoveIt!?



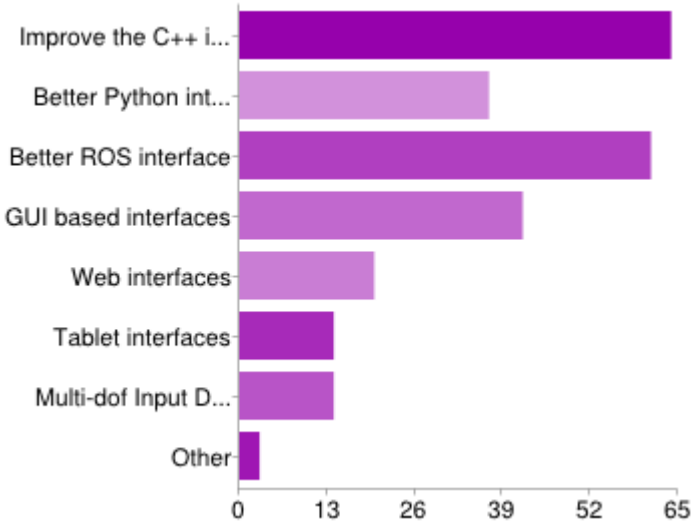
Integrated controller stack	32	8%
Fully integrate the ROS navigation stack	43	11%
Learning from Demonstration	36	9%
Walking	11	3%
Whole-body planning and control	42	11%
Visual Servoing	43	11%
Planning with Dynamics	38	10%
Better integration with other types of Sensing (e.g. proprioceptive, etc.)	17	4%
Calibration	44	11%
Shared Autonomy Capabilities	10	3%
Reactive Planning and Control for safer operation in human environments	45	12%
Cycle-time Optimization for Manipulation Tasks	16	4%
Other: (Gazebo/Bullet support, Multi-robot)	6	2%

What kinds of integrated applications would you like to see in MoveIt!?



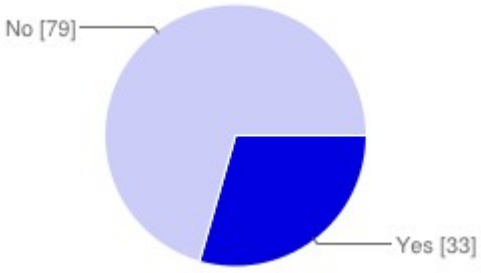
Generalized Pick and Place	70	35%
Workspace Analysis	43	21%
Assembly Tasks	24	12%
Mobile Pick and Place	60	30%
Other: (Constrained paths, high-precision paths)	4	2%

What kind of user interfaces would you like to see in MoveIt!?



Improve the C++ interface	64	25%
Better Python interfaces	37	15%
Better ROS interface	61	24%
GUI based interfaces	42	16%
Web interfaces	20	8%
Tablet interfaces	14	5%
Multi-dof Input Devices (e.g. Razer Hydra, etc.)	14	5%
Other	3	1%

Would you be interested in a cloud-based implementation of MoveIt!



Yes	33	29%
No	79	71

Keep Scrolling Down:
Next two pages contain full list of robots using MoveIt!

Robots Using MoveIt!

Compiled list of robots running MoveIt! based on survey responses. The list is in alphabetical order and figures in brackets indicate the number of respondents who reported using MoveIt! with that particular robot.

Total Number of different robots: 65

ABB IRB2400
ABB IRB6640
Aldebaran Nao (2)
Aldebaran Romeo
Arbotix PhantomX Pincher
Barrett WAM
Boston Dynamics Atlas (7)
BioRob Arm
Cerberus
CKBot
ClamArm
CloPeMa Robot
Comau NM45
Cyton Veta
Demining robot
Denso robot (vs060)
DIY Mobile Manipulator
DLR-HIT Hand
Dr. Robot
Fanuc m10ia
Fraunhofer Care-O-bot
Fraunhofer Rob@Work
HDT arm with Base for RCTA project Rescuer
Hiro (Nextage)
Hoap3
HRP-4 (simulation) (3)
HRP2
Hubo
iarm ABB
iCub
IRB2400
Kawada Hiro
Kinova Jaco (3)
Korus Homemate robot
KUKA LBR (3)
Kuka Leightweight Arm (7)
KUKA LWR4
KUKA OmniRob
KUKA youBot (2)
Lego NXT
Lyncmotion servo erector set

Meka M3 Robot (2)
Motoman SIA10d (2)
Motoman SIA20 (2)
Motoman SIA5
Neuronics Katana (2)
PAL Robotics REEM (2)
PAL Robotics REEM-C
Pi Robot
Pioneer P3AT
Pisa Velvet Gripper
Willow Garage PR2 (16)
Rethink Robotics Baxter (8)
Robonaut
Robonaut2
Schunk 7DOF
Schunk Dextreous Hand
Schunk LWA (3)
Schunk Powerball
Shadow Robot Arm and Hand
Summit XL-Terabot
TUM Rosie
Universal Robots UR10 (2)
Universal robot UR5 (7)
X-WAM