

# Movelt Workshop

## At ROS-I Fall'19 Workshop

Michael Görner, Henning Kayser

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# The Lecturers



Henning Kayser



Michael Görner

# The Lecturers

## Maintainers

Movelt maintainers, commonly referred to as "committers" in other open source projects, are the seasoned experts of the Movelt project and the only ones who can merge pull requests.

Name	Organization	GitHub ID
Dave Coleman	PickNik Robotics	<a href="#">davetcoleman</a>
Robert Haschke	CITEC, Bielefeld University	<a href="#">rhaschke</a>
Michael Görner	University of Hamburg	<a href="#">v4hn</a>
Isaac IY Saito	Plus One Robotics	<a href="#">130s</a>
Ian McMahon	Toyota Research Institute	<a href="#">IanTheEngineer</a>
Gijs van der Hoorn	Delft Univ. of Tech / ROS-I	<a href="#">gavanderhoorn</a>
Jorge Nicho	SwRI / ROS-I	<a href="#">jrgnicho</a>
Bence Magyar	Heriot-Watt University	<a href="#">bmagyar</a>
Mike Lautman	PickNik Robotics	<a href="#">mlautman</a>
Jon Binney	Iron Ox	<a href="#">jonbinney</a>
Henning Kayser	PickNik Robotics	<a href="#">henningkayser</a>
Bryce Willey	Realtime Robotics	<a href="#">BryceStevenWilley</a>
Mark Moll	PickNik Robotics	<a href="#">mamoll</a>

# Your Background?

Who ...

- ▶ actively uses ROS/Movelt?
- ▶ actively uses ROS2?
- ▶ integrated a system with Movelt before?
- ▶ found (and resolved) problems there before?
- ▶ contributed to a related upstream project?

Feel free to interrupt at any point  
for questions and further discussion!

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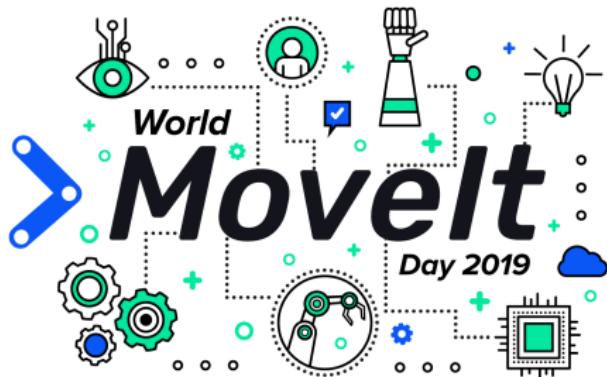
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# Participate! - World MoveIt Day

Open Source succeeds through community contributions!



- ▶ November 20th, 2019
- ▶ More than 9 locations world-wide
- ▶ German event in Hamburg University
- ▶ Participate on site or from your office

# Participate! MoveIt Workshop (Macau)



**First annual MoveIt Workshop hosted by PickNik**

**When?** Saturday, Nov 2 (day after ROSCon)

**Where?** Sheraton Grand Macao Hotel

**Questions?** projects@picknik.ai

<https://picknik.ai/moveit/ros/2019/09/20/moveit-workshop-macau.html>

# What's The Plan?

Schedule for Today:

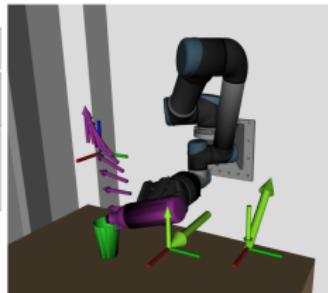
1. General introduction
2. Overview over Movelt's Architecture
3. Planner Alternatives & Tweaks
4. Movelt for ROS2 - Current Developments and Roadmap
5. Movelt Task Constructor
6. Hands-On: From Hardware to Pick&Place

# TAMS - Technical Aspects of Multimodal Systems



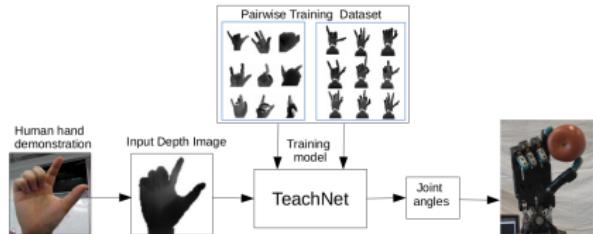
BitBots RoboCup kid size league

pouring task  
  ↑ current state  
  ↓ pick bottle  
  ↑ ...  
  ↓ grasp  
  ↑ ...  
  ↓ ...  
∅ move to pouring start  
  ↑ compute ik  
    ↑ bottle above glass  
  ↓ pouring  
  ↓ place bottle  
  ∅ move to place  
    ↑ set down bottle  
    ↑ compute ik  
      ↑ bottle place location  
  ↓ release bottle  
  ↓ open gripper  
  ↓ detach object  
  ↓ forbid object collision  
  ↓ retreat gripper



Multi-step motion planning

Michael and Henning – Movelt Workshop Fall'19



End-to-end robot control



Grasp planning and picking unknown objects

# TAMS (2)



Robotic Bartender (student project)

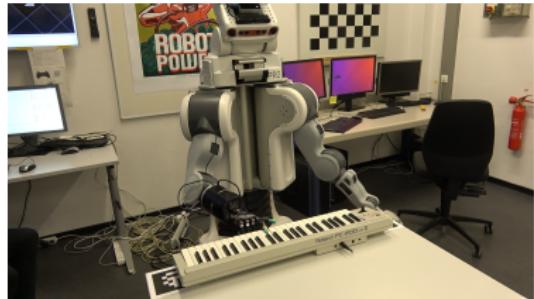


Mobile robotic bartender - 1st place, IROS2018 MMH



RL-based local navigation

Michael and Henning – Movelt Workshop Fall'19

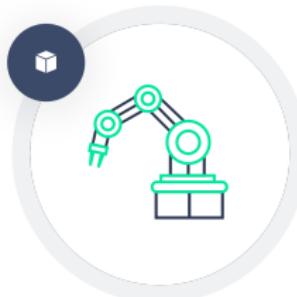


Autonomously playing the piano

- ▶ Team size 14+, 7 PhDs, 2 masters
- ▶ Founded in 2017



- ▶ Lead maintainer organization of MoveIt
- ▶ Strongly focused on ROS, contributing to:
  - ▶ ROS Control and Real-time Systems
  - ▶ ROS Navigation Stack
  - ▶ Open Motion Planning Library (OMPL)
  - ▶ Gazebo Simulation
- ▶ Custom Development
- ▶ Robotics Consulting
- ▶ MoveIt Support



- ▶ Movelt 2.0 Alpha
- ▶ Released Movelt Grasps
- ▶ Working on MoveltCpp interface
- ▶ Integration of TrajOpt (Alpha) into Movelt
- ▶ Integration of Bullet Collision Checker
- ▶ SolidWorks URDF Exporter
- ▶ Improved Benchmarking