



# ROS-Industrial – Developers' Meeting – April 11, 2023

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Southwest Research Institute

[rosindustrial.org](http://rosindustrial.org)

[robotics.swri.org](http://robotics.swri.org)

# ROS-Industrial Dev Meeting Agenda

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- Current Events and Updates
  - ROS-I Annual Meeting
  - July 2023 Training
  - Reach and ROS 2
  - Robotic Blending Milestone 5
  - ROS-I EU [Conference](#) – July 2023, France

# ROS-I Annual Meeting

- May 25 – co-located at Automate
  - Talks, workshops, networking, etc
  - Welcome dinner the night before
  - 10<sup>th</sup> year the Americas has convened on open source for industry

<https://rosindustrial.org/events/2023/5/ros-industrial-consortium-americas-2023-annual-meeting>



# July 2023 Training

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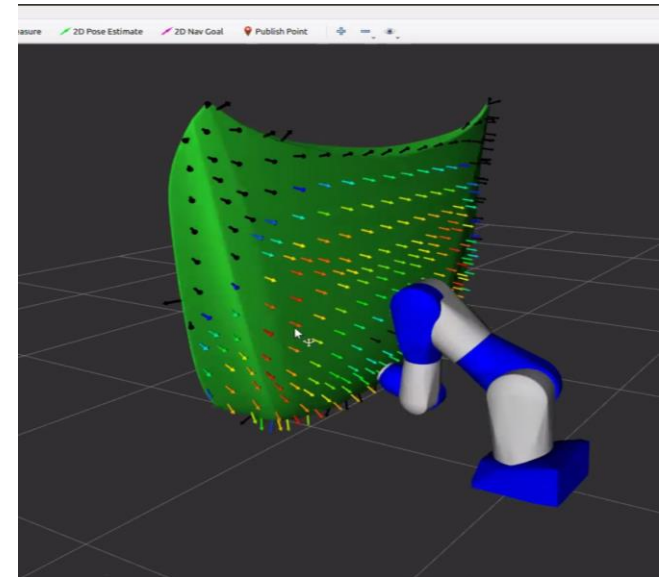
- July 18-20
- Registration is open
- Special Topic – Building a Motion Planning Pipeline

<https://rosindustrial.org/events/2023/ros-industrial-training-americas-2023-jul>



# Reach and ROS 2

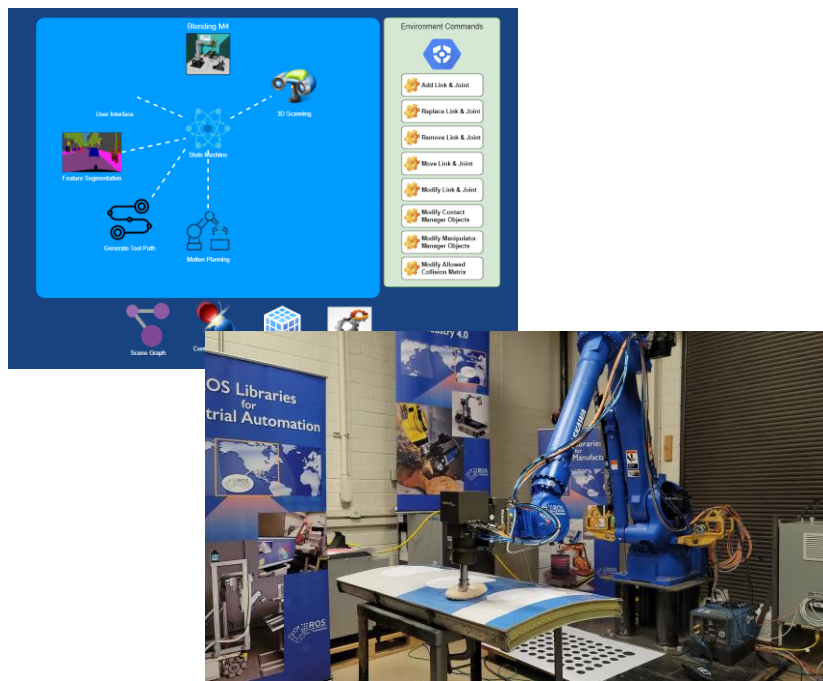
- Working via an ARM Institute collaboration to port Reach to ROS 2 in collaboration with the Ohio State University's CDME
- Targeting early fall for release



Heat map scoring of waypoints on a mesh –  
pose quality – new metrics! – available now!

<https://github.com/ros-industrial/reach>

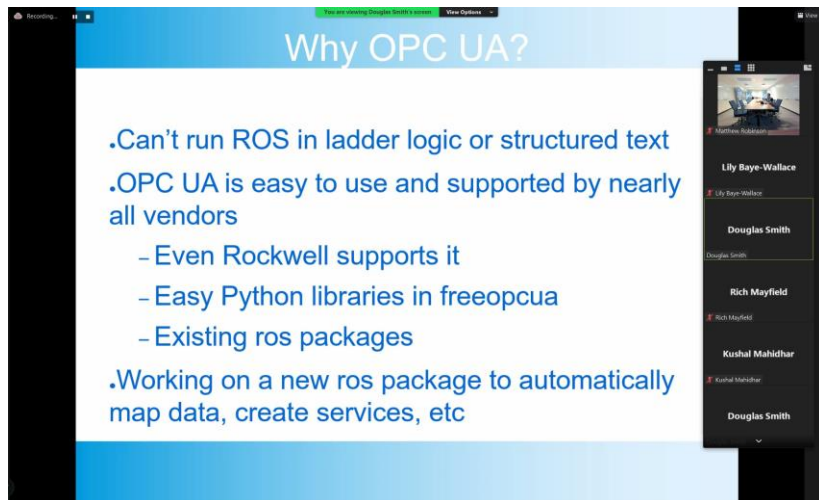
# Robotic Blending M5



- Champion: Steel Founders' Society of America
- Targeting an end-user site
- Team comprised of
  - Yaskawa
  - PushCorp
  - Iowa State
  - EWI
  - ARIS Technology
- Mid 2023 foundry demonstration
  - Merging work from Godel plus recent Scan-N-Plan collaborative workshops
  - ROS 2
  - Multiple replications on hardware

Based on: [https://github.com/ros-industrial-consortium/scan\\_n\\_plan\\_workshop](https://github.com/ros-industrial-consortium/scan_n_plan_workshop)

# OPCUA and ROS-based Systems



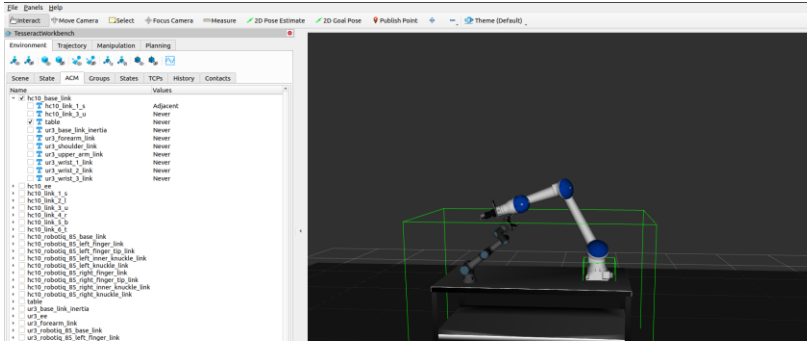
Why OPC UA?

- .Can't run ROS in ladder logic or structured text
- .OPC UA is easy to use and supported by nearly all vendors
  - Even Rockwell supports it
  - Easy Python libraries in freeopcua
  - Existing ros packages
- .Working on a new ros package to automatically map data, create services, etc

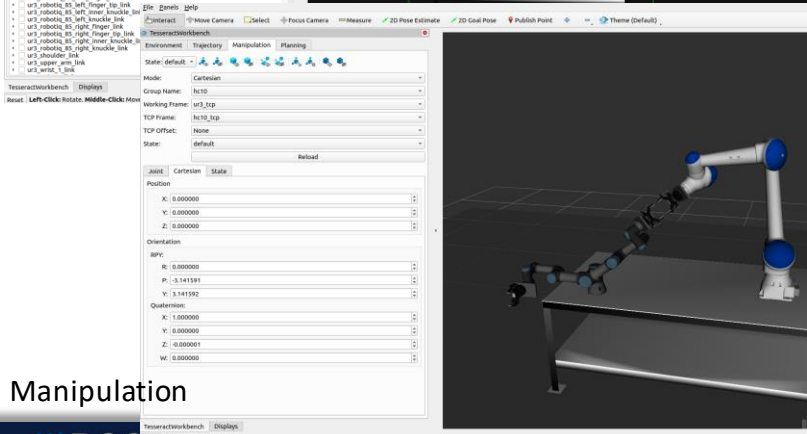
The screenshot also shows a video player overlay on the right side of the slide, displaying a list of names: Lily Baye-Wallace, Douglas Smith, Rich Mayfield, Kushal Mahidhar, and Douglas Smith.

- [https://github.com/smith-doug/pushcorp\\_opcua](https://github.com/smith-doug/pushcorp_opcua)
- [https://github.com/smith-doug/pushcorp\\_opcua\\_twincat](https://github.com/smith-doug/pushcorp_opcua_twincat)

# ROS 2 and Tesseract

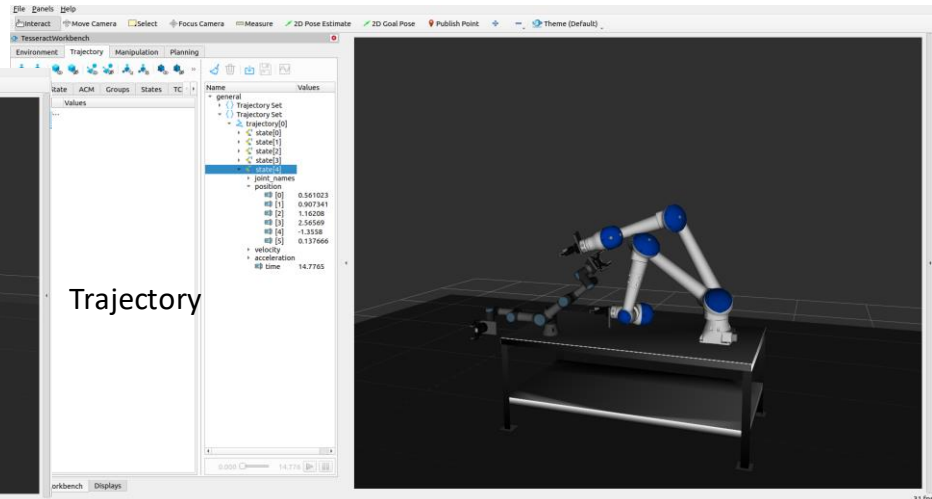


Allowed Collision



Manipulation

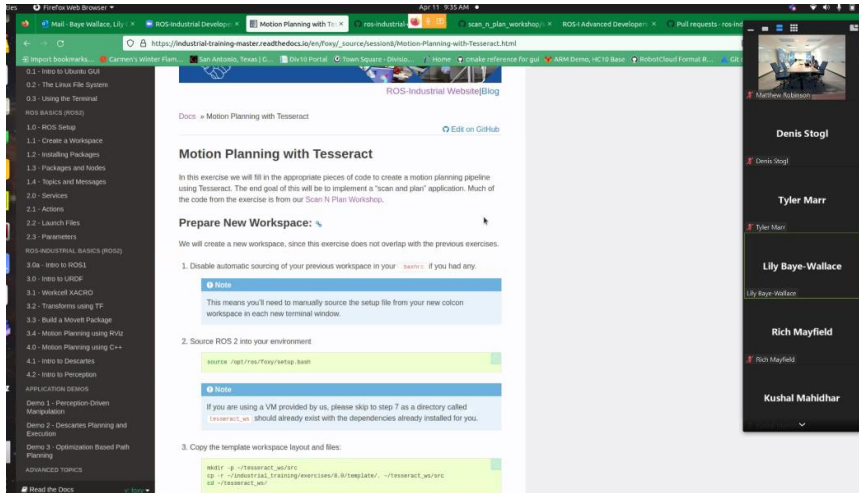
- ROS 2 Working!
- Qt Widget Updates
- [https://github.com/tesseract-robotics/tesseract\\_ros2](https://github.com/tesseract-robotics/tesseract_ros2)



Trajectory



# Training Updates



- <https://industrial-training-master.readthedocs.io/en/foxy/source/session/8/Motion-Planning-with-Tesseract.html>
- [https://github.com/ros-industrial-consortium/scan\\_n\\_plan\\_workshop](https://github.com/ros-industrial-consortium/scan_n_plan_workshop)
- [https://github.com/ros-industrial-consortium/scan\\_n\\_plan\\_workshop/tree/master/snp\\_automate\\_2022](https://github.com/ros-industrial-consortium/scan_n_plan_workshop/tree/master/snp_automate_2022)

# Open Forum

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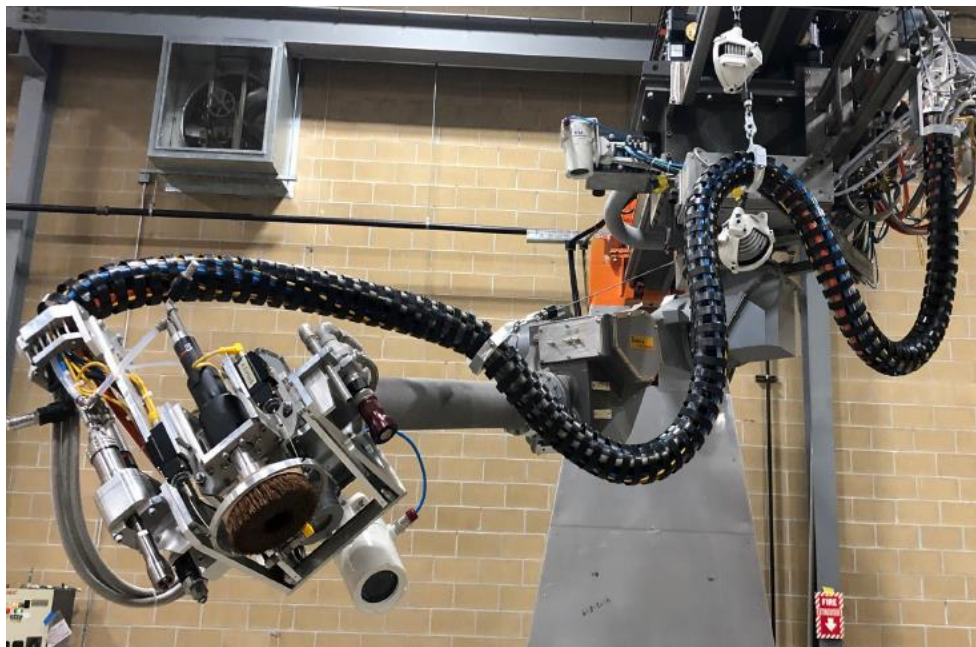


# Discussion

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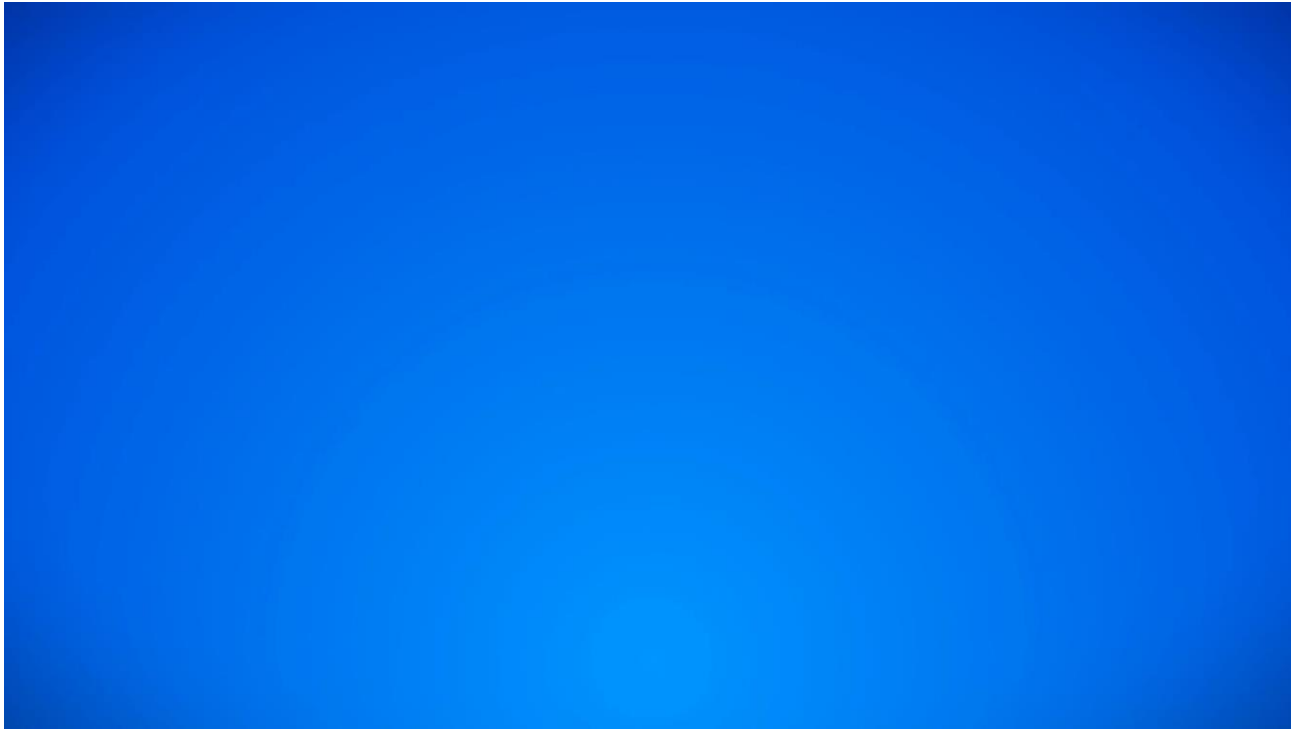
- FreeCAD Plug-In
  - Plans for 22.04 – Denis S. What have been reactions to tool so far? And what are plans for 22.04.
  - Plans for licensing? MR to get details/plans from the SWORD team to share with community.

# Reference Material



# ROS-I is 10!

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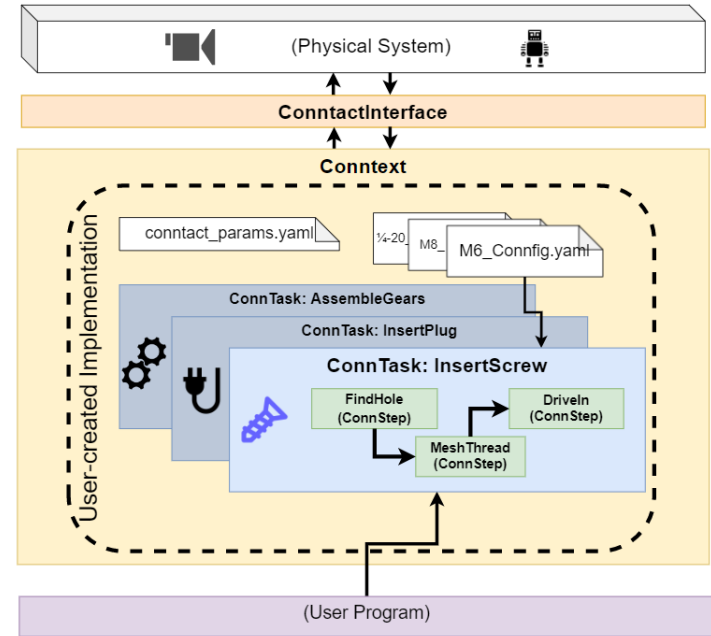
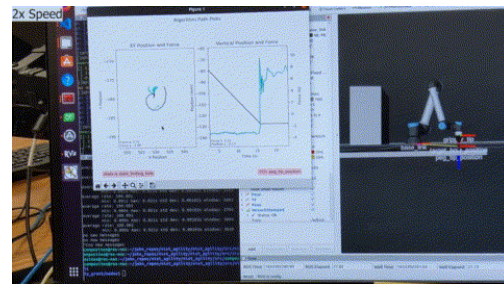
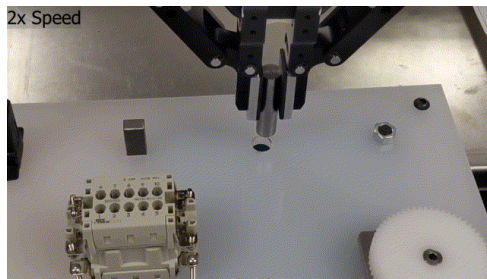
# Resources for the Community

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- ROS-Industrial
  - Home: [rosindustrial.org](https://rosindustrial.org)
  - Documentation: [wiki.ros.org/industrial](https://wiki.ros.org/industrial)
  - Code: <https://github.com/ros-industrial>;  
<https://github.com/ros-industrial-consortium>
  - Training: [http://ros-industrial.github.io/industrial\\_training/](http://ros-industrial.github.io/industrial_training/)
  - ROSin: <http://rosin-project.eu/>
- Upcoming Events (<https://rosindustrial.org/events-summary/>)

# Agility in advanced assembly applications

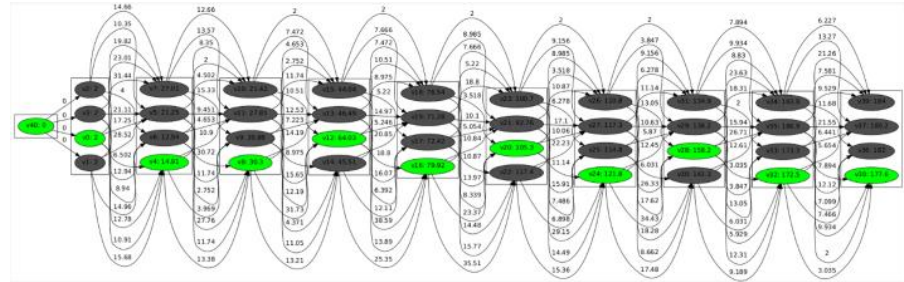
- The ConnTact Assembly Framework
  - Ability to enable researchers to simply implement and test learning algorithms to test extensibility
  - Supported by NIST and the Agility Working Group



<https://github.com/swri-robotics/ConnTact>

# Improving Large Volume Motion Planning

- Extra degrees of freedom in large robots like rail systems or mobile bases increase work volume
- Intros challenges in process planning; the limitation of the “useful” motion of a robotic system that is constrained by the application at hand
- The new improvements in process planning allow for branching “depth first” searches, which will quickly find a solution for every position in the trajectory, instead of search “breadth first” to find the optimal configuration at each pose



Full Dijkstra graph find the optimal path through the graph by exploring every edge



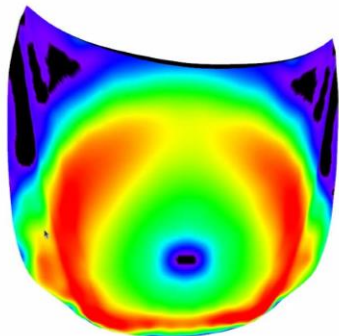
Typical rail based system with large volume

[https://github.com/swri-robotics/descartes\\_light](https://github.com/swri-robotics/descartes_light)

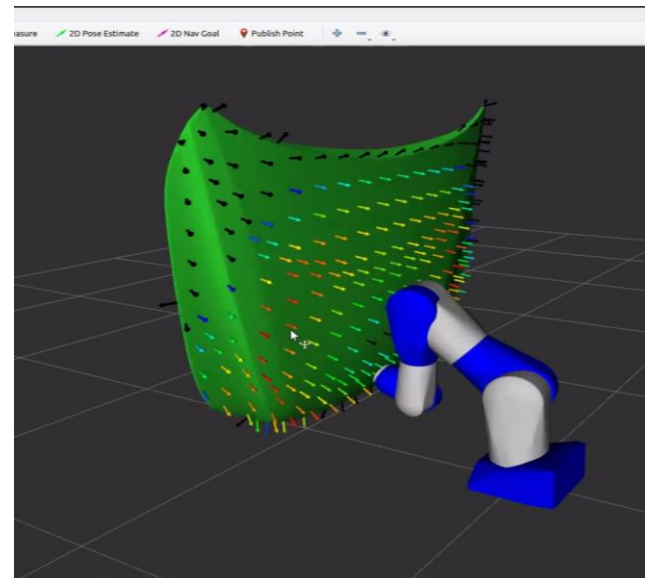


# Quantitative Robot Reach Analysis

Updates on the Reach Repository - The REACH repository is a tool that allows users to visualize and quantitatively evaluate the reach capability of a robot system at a given base position for a given workpiece. See the ROSCon 2019 [presentation](#) and [video](#) for a more detailed explanation of the reach study concept and approach.



Heat map for reachability – coming soon!



Heat map scoring of waypoints on a mesh – pose quality – new metrics! – available now!

<https://github.com/ros-industrial/reach>