ROS-Industrial Consortium
Americas Community Meeting

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December 20, 2023
Q4 2023

Agenda

• 10:00 – Welcome

• 10:05 – ROS-Industrial Consortium Activities
  • Status on Activities and Initiatives
  • Training Update
  • Event Planning and Americas Annual Meeting
  • FTP – Collaboration Project Update

• 10:20 – Tech Updates
  • ROS-I Americas Tech Contributions/Developments – Michael Ripperger
  • Open Source Developments – tolerance for way points – Tyler Marr

• 10:45 – SWORD – Close to official release

• 10:55 – Open Forum
ROS-I Mission

• Mission
  • What do we work on?
  • How should our tools work?

• Where are we now?
• Where do we want to be?
Shaping a Roadmap - Feedback

- Workshops gathering need of community
- OEM outreach and more resources for education and enable more contributions and leverage on hardware
- Leverage events to create persistent tools
  - Reach Workshop

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Supporting ROS 2 and manipulators

- Inquiries regarding porting of industrial_core and use of legacy drivers
  - There is NO Plan to port industrial_core – NOTE: an initial port is working
- The goal is to leverage OEM provided external motion interfaces and incentivize OEMs to create interfaces between their interfaces and ROS 2
  - UR – via ros2_control
  - Yaskawa – MotoROS2 + micro-ROS (official supported release May ‘23)
  - Kuka driver support announced July ‘23
- Highlight OEM provided solutions to encourage more OEMs to offer an interface solution they can support
Supporting ROS 2

ROS 1

ROS GUI
- Plugin based GUI toolkit
- Rviz, Introspection, Web-browser

ROS Layer
- Anything in the ecosystem

Movelt Layer
- Planning
- Kinematics
- Pick & Place
- State

ROS-I GUI (Future)
- Generic Pendant
- Standard Industrial UI

ROS-I Application Layer (Future)
- Process Planner
- State Machines

ROS-I Configuration
- urdf
- parameters
- ROS-I conventions

ROS-I Interface Layer
Package: industrial_robot_client

ROS-I Simple Message Layer
Package: simple_message

ROS-I Controller Layer
Package: vendor specific

ROS-Industrial High Level Architecture - Rev 0.02.vsd
Moving Forward

- Additional paths to offering interfaces
- More OEMs offer external motion interfaces
  - Minimal interface development
  - Able to leverage tools like ros2_control & micro-ROS

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**ROS 2**

- **ROS GUI**
  - Plugin base GUI toolkit
  - Rviz, Introspection, Web-browser
- **Environment Layer**
  - Planning
  - Kinematics
  - Collision Monitoring
  - State
- **ROS-i Application Layer**
  - Process Planner
  - State Machines
- **ROS-i Configuration**
  - urdf
  - parameters
  - ROS-I conventions

**Bridge**

**Legacy Driver/Interface**

**Vendor Specific Packages**

**ROS 1**

**Reference Implementations to support Humble +**
Actions

• Create an Industrial Robot Driver Specification best practices for ROS 2
  • Planning phase – draft template early ‘24
  • Provide pathway for OEMs to build out

• Continue to add roadmaps to ROS-I repositories
  • Noether
  • Tesseract
  • TrajOpt
Training for 2024

• Planned three training events for ‘23
  • Feb 2024 – registration opening soon!, San Antonio
    • Advanced Topic: TBD (suggestions?)
  • July 2024 – Open to member hosting! Contact MR!
  • October 2024 – San Antonio, TX or member hosted

• Seeking options for additional training topics/workshops
  • Suggestions for lab exercises to Day 3 in ROS 2

• Bite Size Learning – recorded educational on a smaller topic –
  targeting 3-6 minutes in length – still seeking options
  • Submit topics to Matt Robinson, RIC Americas PM
Workshop(s)

• Seeking to set up a Scan-N-Plan workshop – possible in conjunction with Americas Annual Meeting

• Open to member hosted

• ROSCon23 Workshop
  • REACH - https://roscon.ros.org/2023/

• ROS-I AP Workshop – Tuning Motion planning parameters for manipulators
Updated to the website!

• Hoping to launch in Jan 2024
• Easier ties to the repos and resources – both open source and for Consortium members
ROS-I Annual Meeting – March 2024

• Two Day Event in San Antonio
• Demonstrations/Lab Tours
  • Members can exhibit
  • Will contact each member regarding interest
• Workshops
  • Collaboration ideas/initiatives
  • Technical workshop
    • Motion Planning
    • Application Configuration
    • Other ideas?
  • Add on day for hands on workshop (?)
FTP Update - Robotic Blending M5

• Progressing toward demonstration in a foundry – mid Feb ‘24

• Contributions to:
  • https://github.com/ros-industrial/noether - sub mesh visualization
  • https://github.com/ros-industrial-consortium/scan_n_plan_workshop
    • Dynamic scan trajectory execution
    • Additional Python Nodes
    • Docker
Tech Updates

• Michael Ripperger – ROS-I Americas
• Tyler Marr – Cartesian Tolerance Waypoints
Tech Updates

• REACH
• Noether
• Industrial Calibration
• Usability
REACH

- ROSCon2023 Workshop Introduction to reach studies with REACH
- 2 demos for running reach studies for non-standard applications
- https://github.com/marip8/reach_roscon_2023
Noether
Industrial Calibration

• History
  • industrial_calibration-> robot_cal_tools-> ???
  • Want to support ROS 1 and ROS 2
  • Need slight reorganization of libraries and applications

• Updates
  • https://github.com/ros-industrial/industrial_calibration/tree/main

• Future development plans
  • Data collection pipeline (Python –ROS 1, ROS 2)
  • Calibration applications (GUI-based)
Usability

• ROS1 Bridge
  • Patch to support actions
    • [https://github.com/ros-industrial/ros1_bridge](https://github.com/ros-industrial/ros1_bridge)
  • Noetic <-> Foxy
    • Docker image
    • docker pull ghcr.io/ros-industrial/ros1_bridge:noetic-foxy
  • Noetic <-> Humble
    • ROS1 for Humble via conda
    • Working on Docker image creation
Usability

• Updated Docker images for Tesseract
  • Considerably smaller size
  • Easier to use than previous ICI-generated images

• Working on propagating Docker images to Scan 'n Plan Workshop application(s) for easier deployment
Custom Tesseract Tasks Using Plugins

Tyler Marr
Using Custom Tasks in Tesseract Motion Planning Pipelines

- Implemented 2 custom tasks in the Scan-N-Plan workshop repo: https://github.com/ros-industrial-consortium(scan_n_plan_workshop/tree/master/snp_motion_planning/src/plugins/tasks

- Constant TCP Speed
- Kinematic Limits Check
Using Custom Tasks in Tesseract Motion Planning Pipelines

- Allows for developing and easily incorporating custom/proprietary motion planning tasks
- Used at SwRI for a project, easy to drop into our motion planning pipeline
Cartesian Tolerance Waypoints in a PR for TrajOpt

Tyler Marr
Cartesian Tolerance Waypoints in a PR for TrajOpt

- Currently Cartesian waypoints must reach the exact position
  - Often requiring accuracy beyond manipulator capability
- Almost all real applications have available tolerance
- This allows users to specify the tolerance
Failed TrajOpt Plan
Successful TrajOpt with Tolerance

- 1.5 cm (x,y)
- 0.15 cm (z)
- 0.01 rad (r/p)
- Free z rotation
SWORD

• ROS-I planning tools in a CAD environment
• Alpha release planned for early January 2024
• Upcoming new features
  • Export to robot-native files (via RoboDK)
  • CAD to path
  • Integration with Noether
  • Raster planning
  • Meta-planning integration
  • Remote TCP
• Sandbox for motion planner configuration training
Open Forum

• Topics?
Resources for the Community

• ROS-Industrial
  • Home: rosinustrial.org
  • Documentation: wiki.ros.org/industrial
  • Code: https://github.com/ros-industrial; https://github.com/ros-industrial-consortium
  • Training: http://ros-industrial.github.io/industrial_training/
  • ROSin: http://rosin-project.eu/
• Upcoming Events (https://rosindustrial.org/events-summary/)
Thank You!

• Provide feedback
• Seek out ways to collaborate
• Engage your supplier/partners on ROS use
• Reach out if you need help

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