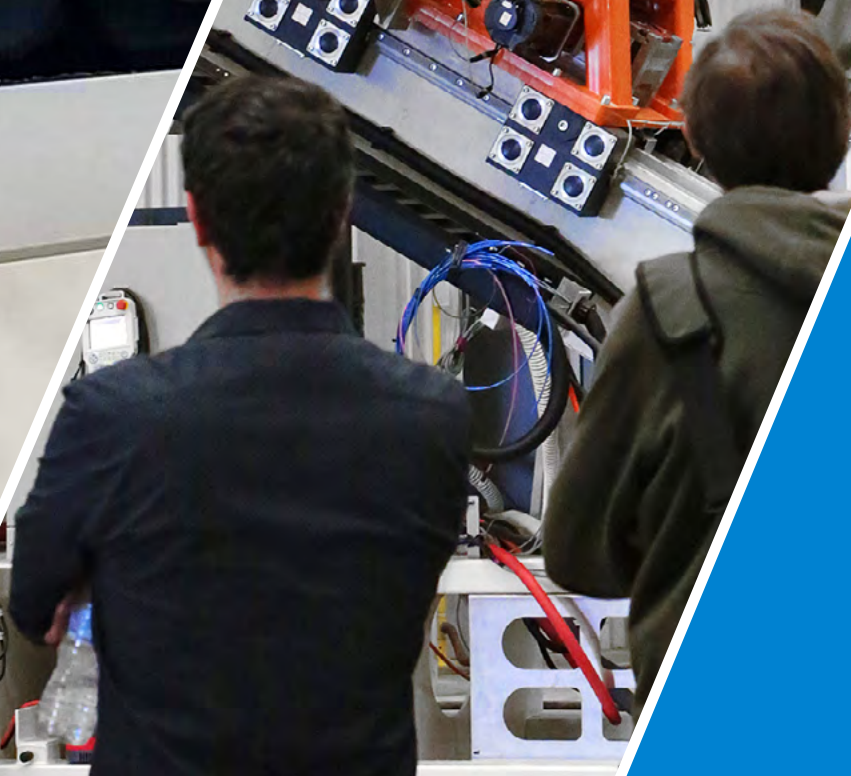
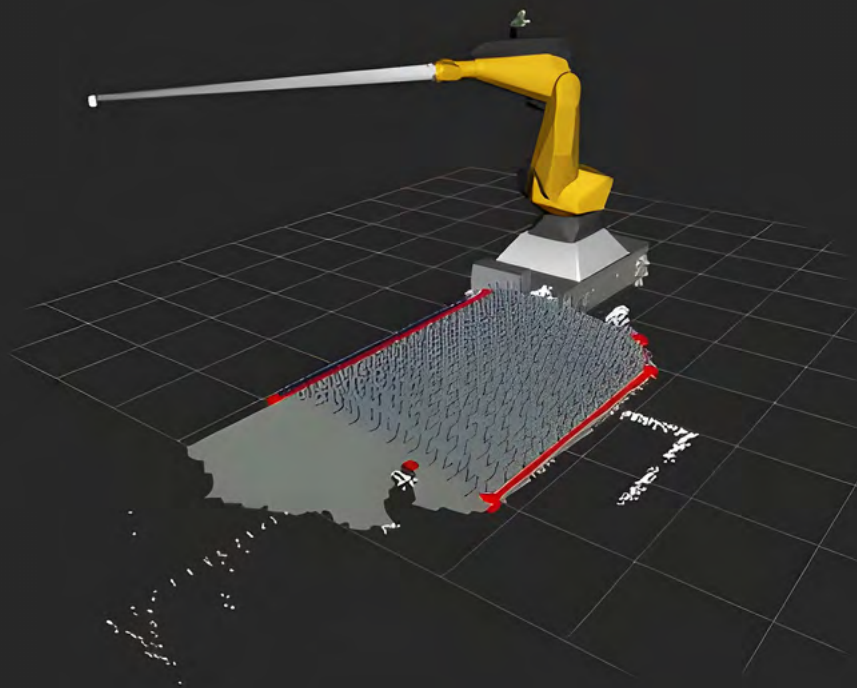




ROS-Industrial Consortium Americas  
**2022 Annual Meeting**  
**Detroit**



# ROS-Industrial Consortium Americas Annual Meeting 2022



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

# A decade of advancing capability through the leveraging of ROS

This is the 10th year of ROS-Industrial and we are excited to once again be at Automate and be back to an in-person event. A lot has happened since the ROS-Industrial open source project was launched, seeking to extend the advanced capabilities of ROS to industrial applications and hardware. However, now it is no longer simply “can we use ROS to build a hardened industrial application,” the focus is now how to enable applications that efficiently do new tasks, securely, and are easier to reconfigure and redeploy. We are excited to be bringing you this latest incarnation of the ROS-Industrial Consortium – Americas Annual Meeting and we hope you find the activities, resources, and the organizations and people that are passionate around the idea of open source as a foundation for industrial innovation a compelling reason to stay engaged.

There have been significant recent developments and advancements as we reach the midpoint of 2022. Each region of the ROS-Industrial Consortium has been leading various initiatives and delivering capabilities. Most recently for example, OpenRMF, which has been a significant collaboration between Open Robotics, the Singapore government, and the ROS-Industrial Consortium Asia-Pacific, is finally getting a lot of attention as a means to facilitate interoperability.

In the European Union there has been a real push in making both ROS 2 more of the common starting point for new development, supporting start ups and large companies alike. The ROS-Industrial Consortium – EU has provided open source resources, relative to their specific training content, providing valuable resources to foster more adoption of ROS 2. Furthermore, interesting developments around hybrid planning and use of MoveIt Servo are enabling new applications around welding and other processes where a mix between global planning and low-level control is required.

Here in the Americas, we have been working diligently to also provide resources around ROS 2, in the context of training and working and deployed examples. Furthermore, improved open source tools such as a revamped Descartes, for Cartesian motion planning, enables more efficient solving for large work volumes, and the latest in industrial reconstruction allows for the creation, on the fly, of meshes for surfaces that typically may be difficult for sensors to accurately measure. These tools among others have been included in a teaching Scan-N-Plan repository that started with the ROSWorld 2021 workshop and now is the foundation for educational Scan-N-Plan repository that will be leveraged for workshops and advanced training topics moving forward.

As always, the ROS-Industrial Consortium Americas and the Consortia in Europe and Asia-Pacific seek to realize the promise of ROS-Industrial.

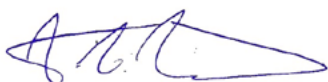
These goals include:

1. Provide a one-stop location for manufacturing-related ROS software
2. Strive toward software robustness and reliability to meet the needs of industrial applications
3. Combine the relative strengths of ROS and existing technology, combining ROS high-level functionality with the low-level reliability and safety of an industrial robot controller
4. Stimulate the development of hardware-agnostic software by standardizing interfaces
5. Provide an “easy” path to apply cutting-edge research to industrial applications, by using a common ROS architecture
6. Provide simple, easy-to-use, well-documented application programming interfaces

The Consortia and their memberships have been actively influencing this strategy. It is evident that this collaboration is leading to tangible benefits that move from university, into industry adopters.

Thank you for participating in the idea of open-source robotics for industry. As with any change, this takes a community to enable the realization of any vision, so thank you for being a part of the ROS-Industrial Community!

Matt Robinson



ROS-Industrial Consortium Americas

# Objectives of the ROS-Industrial Consortium Annual Meeting

The ROS-Industrial Consortium Americas Annual Meeting convenes Consortium members to review the latest in developments, stakeholder and partner initiatives, sister Consortia activities, as well as review and provide input into the vision and strategic direction of ROS-Industrial.

This event contains both public and non-public content to foster the means to drive awareness and grow the ROS-Industrial network through demonstrations, when possible, and compelling presentations that highlight the value proposition for what is going on within ROS-Industrial and how the Consortium enables that vision.

Additional objectives beyond a strategic direction and technical activities include:

1. Understand where ROS-Industrial is, technically and sustainably, what has happened in the last year, and what is proposed moving forward
2. Learn about the latest strategic non-technical initiatives that move the ball forward in use, adoption, and support of ROS-Industrial
3. Communicate and share what has been beneficial and what has been a challenge during workshops and networking sessions
4. Continue to provide inputs to the “problem-centric” roadmap to compliment the technical vision. Cast the capabilities of the technical vision against prioritized problems to address a matrix, to ensure resources are focused on the right things
5. Generate, based on the problems to solve, compelling project topics that can be championed and launched to address the biggest challenges to the membership
6. Take what has been learned and share it with your organizations. Provide feedback and continue to participate in these events, as well as other meetings that take place throughout the year and in the various regions. Without the engagement of the membership and community, ROS-Industrial will not realize its potential





# Chairs

**Matt Robinson** – Program Manager, ROS-Industrial Consortium Americas

**Paul Evans** – Director, SwRI Manufacturing and Robotics Technologies Department

**Michael Ripperger** – Technical Lead, ROS-Industrial Consortium Americas

## Welcome & Networking Dinner

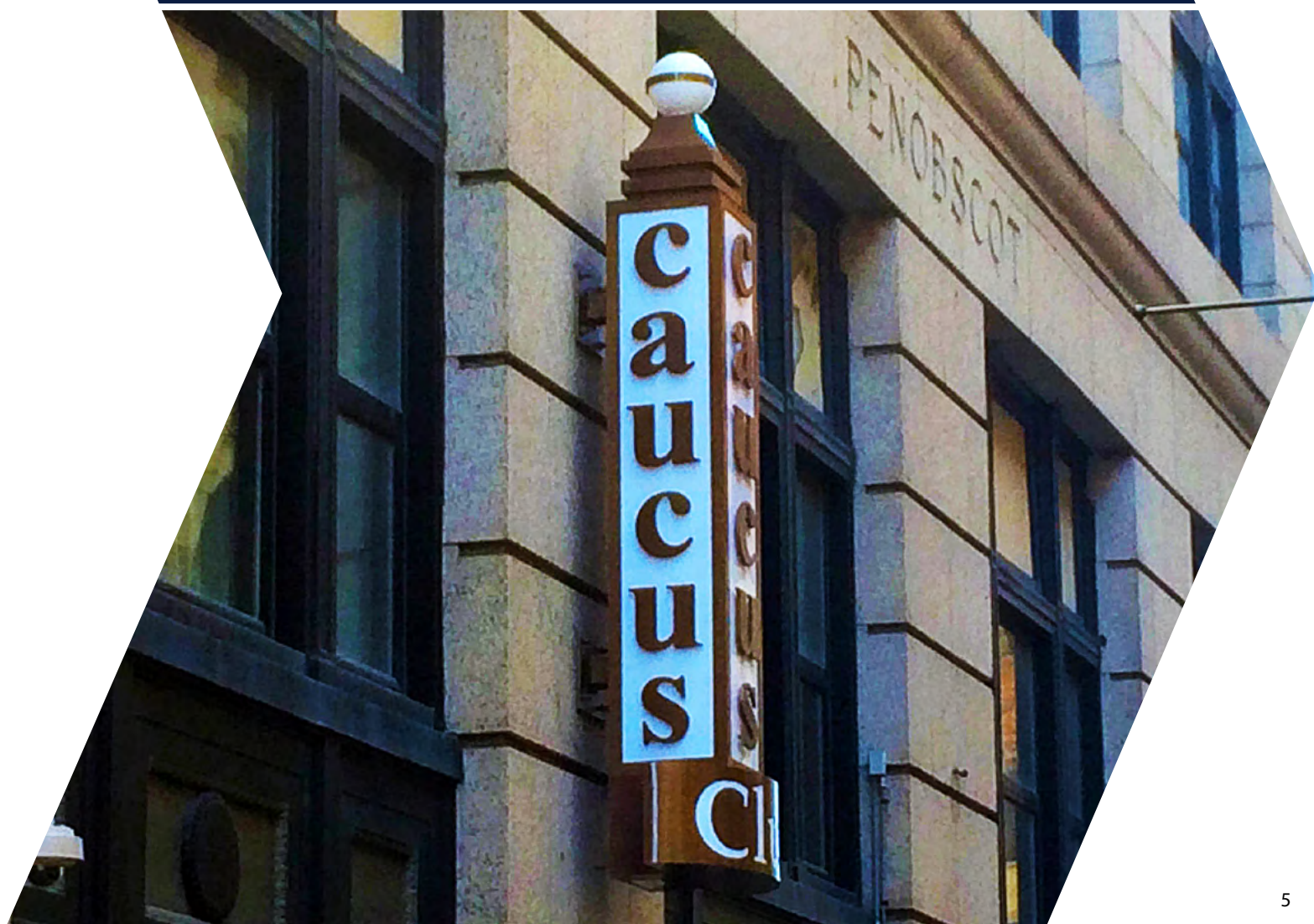
### The Caucus Club Detroit - Penobscot Building

150 W. Congress

Detroit, MI 48266a

313.965.4970

The welcome dinner is a chance for the membership and guests to network and socialize in a relaxed atmosphere. The dinner is included with registration, and open to all attendees, but advanced registration is required. Dinner start time is 7:00 p.m. Eastern.



# Agenda

Time	Topic	Speaker
Thursday June 9		
700	ROS-I Consortium Americas Welcome Dinner – The Caucus Club Detroit – Advanced Registration is Required	
Friday June 10		
800	Light Breakfast, Check In	
830	Welcome and ROS-I Americas State of the Consortium	Matt Robinson, ROS-I Consortium Americas Program Manager, SwRI
850	ROS-Industrial Consortium Americas Technical Updates	Michael Ripperger, ROS-I Americas Tech Lead, SwRI
910	ROS-Industrial Consortium European Union Update	Christoph Hellmann Santos, ROS-I Consortium EU Program Manager, Fraunhofer IPA
925	ROS Industrial Consortium Asia-Pacific Update	Darryl Lee, ROS-Industrial Consortium Asia-Pacific Program Manager, ARTC
940	The Latest Advances In ROS 2	Kat Scott, Developer Advocate, Open Robotics
1005	Movel2: The developer experience on Humble and beyond	Nathan Brooks, CTO, PickNik
1030	Break	
1040	Agility Performance of Robotic Systems	William Harrison, Research Scientist, NIST
1105	Automated ROS code and ros_control generation	YJ Lim, Sr. Technical Robotics Product Manager, Abhijeet Gadkari, Sr. Embedded Software Engineer, Murat Belge, Consulting Engineer, MathWorks
1130	Making waves with Hawksbill and Jellyfish: 22.04 and core news	Gabriel Aguiar Noury, Product Manager, Canonical
1155	Lunch – Provided for In-Person Attendees Keynote – Oil and Gas Robots and Automation (Part 2) Justin Kinney, Senior Technical Manager Robotics and Mechatronics, NOV	
1310	Panel – Successes and roadblocks to broader ROS 2 adoption in industry	
1340	Workshop Rotating break out sessions – Feedback on ease of use approach, training needs/updates, gaps in adoption of ROS-based tools (Technical and/or Support-wise)	
1440	Break	
1450	An analysis of how the ARM projects have used and benefited from using ROS-I during their development	Arnie Kravitz, CIO, ARM Institute
1515	Lessons Learned Leveraging ROS on the Floor	Mark Haynes, Digital Manufacturing and Future Factory Manager, Spirit AeroSystems
1540	Robot Raconteur: an Interoperable Middleware for Robotics and PyRI Open Source Teach Pendant	John Wason, Sole Proprietor, Wason Technologies
1605	Using ROS as an Interface Layer as an Integrator	Aaron Feick, Network Engineer, Aerobotix
1630	Closing Remarks	Matt Robinson, ROS-Industrial Consortium Americas Program Manager, SwRI
1640	Adjourn	

## Welcome & State of the ROS-Industrial Consortium Americas

Matt Robinson will cover the latest developments out of ROS-Industrial Consortium Americas, what resources have been provided, and what are the upcoming initiatives that are of interest or aligned with the Consortium objectives.



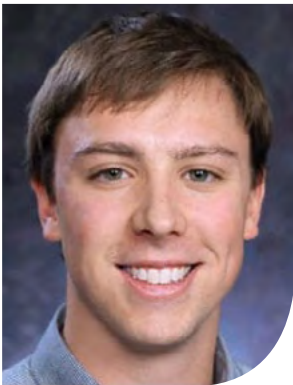
### **Matt Robinson – Program Manager, ROS-Industrial Consortium Americas**

Matt Robinson is the Program Manager for the ROS-Industrial Consortium - Americas, an industry-driven open source program bringing advanced manufacturing solutions for the industrial robotics community. Prior to his current role, Mr. Robinson was team leader for Caterpillar's Manufacturing Technology Automation Research where he led development and deployment of automation tools to improve the performance and productivity of Caterpillar manufacturing facilities around the globe.

Mr. Robinson also led manufacturing value stream design initiatives that led to the deployment of over 50 robotic/automated manufacturing systems around the world.

## ROS-Industrial Consortium Americas Technical Updates

Michael Ripperger will be sharing the latest technical developments within the ROS-Industrial Consortium Americas, focusing on updates to repositories, and capabilities, and what is upcoming relative to ease of use, and performance in the space of planning.



### **Michael Ripperger – ROS-I Americas Tech Lead, SwRI**

Michael Ripperger is a Senior Research Engineer at Southwest Research Institute. He leads the development, design, and deployment of advanced "scan and plan" robotics systems, which use sensor data to autonomously perform various manufacturing tasks with minimal user guidance. In these efforts he has developed software for the perception, tool path and motion planning, hardware interface, and user interface components of these applications. He currently serves as the software lead for several automation projects in a variety of fields, including the Advanced Automation for Agile Aerospace Applications (A5) program.

## ROS-Industrial Consortium European Union Update

Christoph Hellmann Santos will present about recent projects and activities in the ROS-Industrial Consortium Europe. He will also talk about new activities and opportunities.



### **Christoph Hellmann Santos – ROS-I Consortium EU Program, Manager, Fraunhofer IPA**

M.Sc. Dipl.-Ing. Christoph Hellmann Santos (M) obtained his master's degree in mechanical engineering from the Karlsruhe Institute for Technology in 2016. In the same year, he received a diplôme d'Ingenieur from Arts et Métiers ParisTech. From 2016 - 2019 he worked as research fellow and as project manager at Fraunhofer IPA in the Department for Robots and Assistive Systems. Since June 2019, he manages the research group for Software Engineering and System Integration. In 2020 he started as program manager of the ROS-Industrial Consortium Europe.



## ROS Industrial Consortium Asia-Pacific Update



Darryl will present the recent highlights on the technical development of ROS2 based perception and manipulation solutions. He will also share some success stories in implementation and ROS training efforts.

### **Darryl Lee – ROS-Industrial Consortium Asia-Pacific Program, ARTC**

Darryl manages the ROS-Industrial Consortium Asia Pacific, where he aims to proliferate ROS adoption and advanced robotic applications in industrial and commercial applications. Darryl graduated from Nanyang Technological University, Singapore, with a bachelor's in mechanical engineering (BME) specializing in Mechatronics and a Master's of Science (MSc) in Systems and Project Management.

## The Latest Advances in ROS 2



In this talk Open Robotics' developer advocate Katherine Scott will discuss the on-going ROS 1 to ROS 2 transition, we'll also cover new and notable ROS projects and packages from the ROS community.

### **Kat Scott – Developer Advocate, Open Robotics**

Kat has spent her career building innovative computer vision and robotics applications at various startups and organizations. She co-founded SightMachine, where she was working on a data platform for manufacturing, and later Tempo Automation, where she built software to automate the design of PCBs. After that, Kat led image analytics teams at Planet (satellite imagery for the world's most prominent organizations) and 3Scan (insights based on medical imagery). Presently, she is the Developer Advocate at Open Robotics, the stewards of the ROS and Gazebo open source projects. Kat holds a master's degree in computer science from Columbia University and undergraduate degrees in electrical engineering and computer engineering from the University of Michigan. Kat serves on the board of the Open Source Hardware Association and serves as its Open Hardware Certification Chair.



## Movelt 2: The developer experience on Humble and beyond



This presentation will highlight features launching in the ROS 2 Humble release of Movelt, including hybrid planning, jerk smoothing, and ROS 2 configuration utilities. It will also cover new features in Movelt Studio, including manipulation focused behavior trees and debugging tools that amplify the capability and productivity of roboticists.

### **Nathan Brooks – CTO, PickNik**

Nathan Brooks is the CTO of PickNik Robotics and holds a Ph.D. in robotics from Carnegie Mellon University. Nathan's graduate research focused on improving operator supervision and practical field deployment of large robot teams. At PickNik Robotics he works to expand the commercial use of manipulators on land, underwater, and in space. Hardware Association and serves as its Open Hardware Certification Chair.

## Agility Performance of Robotic Systems



The application of robotics in manufacturing is hindered by their lack of agility, including their large changeover times for new tasks/products and their limited reusability. The Agility Performance of Robotic Systems project is developing the measurement science, which will enable manufacturers to assess and assure the agility performance of their robot systems. This includes robot agility performance metrics, test methods, machine learning applications, and agility competitions – all of which are accomplished using a combined virtual and real testing environment.

### **William Harrison – Research Scientist, NIST**

William S. Harrison III is a Mechanical Research Engineer in the Department of Commerce's National Institute of Standards and Technology (NIST). William works in the Intelligent Systems Division on the Robot Agility Framework project. William's specialty within the project is Virtual Fusion; which is the mix of simulated and real approaches for process validation and machine learning. His interests include virtual reality, game engines, augmented reality, and CG modeling.

## Automated ROS code and `ros_control` generation

Robot Operating System (ROS) has become increasingly popular in industry, especially in the development of autonomous robotics. Engineers with limited coding background, such as mechanical or control engineer, are now keen to use ROS for prototyping and validating their robot applications. ROS, however, is a rather complex programming framework, encompassing a robot library, robot specification language, pose estimation, localization and mapping, navigation, sensor drivers, etc. Handwriting code for ROS requires using ROS's package build system and compiling against its dependencies. This talk discusses automated C++ code generation for ROS / ROS2. It also covers automated `ros_control` plugin generation from a Simulink model.



### **YJ Lim – Sr. Technical Robotics Product Manager , MathWorks**

YJ Lim is a Senior Technical Product Manager of robotics and autonomous systems at the MathWorks, Natick MA. He has over 20 years of experience in robotics and autonomous systems area. YJ's responsibility in MathWorks includes long-term strategy development and product management of robotics and autonomous systems. Before joining MathWorks, YJ worked on various robotics projects at Vecna robotics, Hstar Technologies, SimQuest, Energid Technologies, and GM Korea. YJ received his Ph.D. in mechanical engineering from Rensselaer Polytechnic Institute (RPI) and his Master from KAIST in S. Korea. [yjlim@mathworks.com](mailto:yjlim@mathworks.com)



### **Abhijeet Gadkari – Sr. Embedded Software Engineer , MathWorks**

Abhijeet Gadkari is a Sr. Embedded Software Engineer at MathWorks. During his 13 years at MathWorks, he has worked on a wide range of areas including auto code-generation for ROS, targeting embedded Linux and VxWorks RTOS, CPU-FPGA interface design for heterogeneous multicore SoC platforms, Linux kernel and user-space device driver design, Linux kernel debug and tracing, embedded Linux firmware and bootloader firmware customization. Abhijeet received his M.S. in Electrical Engineering from Illinois Tech, Chicago and B.E. in Electronics and Communications from Gujarat University in India. [agadkari@mathworks.com](mailto:agadkari@mathworks.com)



### **Murat Belge – Consulting Engineer , MathWorks**

Murat Belge is a consulting engineer at the MathWorks. He is the technology team lead for ROS Toolbox. He worked in MathWorks for over 15 years in various areas, including code generation for embedded systems, networking protocols, middleware representation and integration, IOT, device driver abstraction and integration, targeting embedded Linux systems, embedded vision and motor control. His experience includes developing embedded vision algorithms for SIMD processors and developing time domain reflectometry diagnostics systems for digital subscriber lines. Belge received his Ph.D. from Northeastern University, M.S. and B.S. from Bilkent University in Turkey, all in electrical engineering. [mbelge@mathworks.com](mailto:mbelge@mathworks.com)

## Making Waves with Hawksbill and Jellyfish: 22.04 and Core News



Join us and explore all the tools for robotics development and industrial deployment that come with the new release of Ubuntu 22.04 and Ubuntu Core 22. From real-time kernel, containerization, and security for robotics, to snapcraft support for ROS 2 Humble and security maintenance for Kinetic, Melodic and Foxy. Plus, discover the latest robotics utility snaps for the community.

### Gabriel Aguiar Noury

Gabriel is a mechatronic engineer, former entrepreneur and Ph.D. in Robotics, now working on the development of open-source robotics at Canonical, the publisher of Ubuntu.

Working in different ERDF initiatives and open-source companies for the last 5 years, he has been supporting the development of innovation ecosystems for the robotic market through the creation of industry-wide platforms. This included running business incubator programs and providing robotics SMEs with access to state-of-the-art technology, UX and UI evaluation services, and software security and deployment tooling.

## LUNCH Keynote: Oil and Gas Robots and Automation (Part 2)

NOV has long been a leader in the design and manufacturing of oilfield drilling equipment. A large and successful part of their product portfolio has been the design, manufacturing, and supply of heavy mechanized pipe handling equipment. As the industry has evolved, and various technologies have accelerated and converged (electronics, communications, sensors, actuators, big data, machine learning), there have been rapidly increasing demands for drilling equipment manufacturers like NOV to bring technological solutions to the market to meet industry wide desires to make the process safer with lower risk, while at the same time with improved performance and efficiency.

Through continuous innovation, NOV Robotics has introduced to market a fully modular system with multiple functionalities. The NOV RTX system is built on the backbone of ROS-I which enables for our continued rapid development and deployment. Currently, the RTX system is capable of doping pin/box, mud containment, tailing pipe, and gripping and spinning small tubulars. Based on the modular design philosophy, each robot can function as virtually any tools listed above by connecting any end effectors easily without complexities of connect/disconnect of utility supply due to a pure mechanical quick disconnect technology. All robot functionalities can be utilized either through pre-planned paths from ROS or through a live command feed from the operator with mule mode. All planned paths can be stored to and loaded from a database which is useful mostly for repetitive tasks with limited variance while some custom paths can be taught and saved on the fly using the teach mode.



### Justin Kinney – Senior Technical Manager Robotics and Mechatronics, NOV

Justin is a Controls Engineering professional who has held numerous posts within oil and gas and controls engineering companies throughout his career. He graduated from Texas A&M University in 2005 with a B.S. in Computer Engineering, before starting his career with National Oilwell Varco as a controls Field Service Engineer. Justin rapidly moved into Software Engineering working on NOV's proprietary distributed control system (Amphion) as a lead engineer before moving into roles as a Commissioning Manager for many of the major drilling contractors in South Korea shipyards from 2010 through 2016. In this role he helped deliver several the most technically advanced drill ships in the busiest ever build cycle in oil and gas on time and on budget.

From 2016 until 2018 Justin spent time outside of oil and gas working as a Lead Controls Engineer and Project Manager in controls and automation projects, before returning to NOV. Justin is currently leading NOV's efforts in deployment of the productized solution to several NOV's customers as the Senior Technical Manager for Robotics and Mechatronics.

## Panel: – Successes and roadblocks to broader ROS 2 adoption in industry

A discussion about some of the recent challenges and experiences in developing with ROS 2. What are some lessons learned? What are some practices to ensure a smooth transition to ROS 2? When is it time to migrate?

### Panelists



**Dr. Mark Haynes** - Digital Manufacturing and Future Factory Manager, Spirit AeroSystems

Dr. Mark Haynes leads the Digital Manufacturing and Future Factory Team at Spirit AeroSystems. The team research and develops next generation and future state manufacturing systems and processes to replicate across a broad range of aerospace manufacturing needs. The team's objective is combining automation with application in a manner that has broad impacts across the manufacturing system.



**Lou Amadio** – Principal Development Lead, Core Operating Systems group, Microsoft Corporation

Lou Amadio is Principal Development Lead in the Core Operating Systems group working on 'Edge Robotics' at Microsoft Corporation. Amadio has worked on consumer and enterprise robotics products, including Microsoft Robotics Studio. The Edge Robotics team is building software to help customers and system integrators create safe, secure, and manageable robotics solutions using Open Source Robotics Stacks with Microsoft Client and Cloud Technologies.



**Mingu Kang** – CEO ARIS Technology

Mingu Kang is the founder and Chief Executive Officer at ARIS Technology based in Chicago, Illinois. Mingu and his team at ARIS Technology have been leading in bringing intelligent metrology solutions that merge advanced robotics with detailed analytics to enable new applications that leverage high fidelity metrology data. Mingu also sits on the Technical Advisory Committee of the ARM Institute.

## Workshop - Rotating break-out sessions

Feedback on ease-of-use approach, training needs/updates, gaps in adoption of ROS-based tools (Technical and/or Support-wise)

### Moderators

**Jeremy Zoss** – Ease of Use

**Paul Evans** – Roadblocks to Adoption

**Michael Ripperger** – Technical Capabilities



## An Analysis of How the ARM Projects Have Used and Benefited from Using ROS-I During Their Development

Arnie Kravitz Chief innovation officer will go over how the 345 Members of the ARM Institute Consortium have used ROS I to accelerate the development of robotic solutions for use by robots working in manufacturing facilities, supply chain operations and distributions centers. Arnie has analyzed which modules are used for the different applications developed as part of ARM projects.



### Arnie Kravitz – CIO, ARM Institute

Arnie Kravitz is the ARM Institutes Chief Innovation Officer. He leads the effort of identifying innovative opportunities for increasing U.S. global competitiveness by accelerating innovative technologies that make robots more accessible to U.S. manufacturers. He builds the teams and raises the funds to support these efforts.

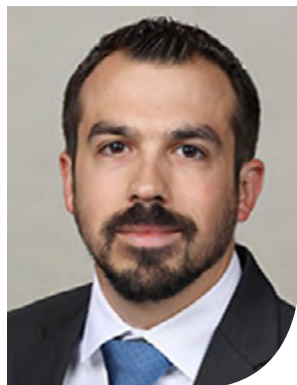
His goal is to invigorate the US industrial base through the shepherding of an eco-system that develops and uses, ai enhanced robotic equipment to improve the safety, efficiency, proficiency and yields of supply chain operations, manufacturing facilities and distribution centers. With over 40 years of experience designing, developing, and manufacturing a large portfolio of products,

Arnie can draw from a broad portfolio of experiences and relationships. These experiences include business: startups, growth companies, and recovery efforts. These efforts involved the envisioning, development and use of advanced technologies such as AI and expert systems, vision systems; mapping systems, for aquatic robots, autonomous vehicles, and industrial robotics, commercial consumer electronics, cyber secure communications and data handling devices, that serve the aerospace, space, security, military, automotive, textile, marine, renewable energy, mobile power-generation/distribution and the consumer electronics industries.

In addition to his role at the ARM institute, Arnie serves on several corporate board of directors and corporate advisory boards of companies such as Involta, Walmart ,the Secure America Institute, and several startups. Arnie served as an Adjunct Professor at The Johns Hopkins University and has significant success rapidly transforming new ideas into manufactured products. Arnie holds a master's degree in Electrical Engineering from Rensselaer Polytechnic Institute.

## ROS in Aerospace Production: Spirit's Feature Inspection System

Spirit Feature Inspection system (Spifi) enables a semi-automated inspection process that reduces the workload for inspectors in the inspection and reporting process of Skin Quality defects. The level of automation and flexibility makes Spifi ideal for replication across multiple programs for aerostructure inspection. From Spifi, numerical recording of 100% of hand installed fasteners and their associated skin defects is possible. This enables an unprecedented ability to perform statistical process control and root cause corrective action for Skin Quality inspection. Escapements can be prevented and any potential disputes can be cross verified with the detailed documented historic record. Future applications will include autonomous mobile robot guidance and control. Spifi is a system capable of cross-program functionality and high replication across work cells. The future of aerospace manufacture is poised to evolve globally with the capability that Spifi has to offer the manufacturing process. All powered on ROS.



### Dr. Mark Haynes - Digital Manufacturing and Future Factory Manager, Spirit AeroSystems

Dr. Mark Haynes leads the Digital Manufacturing and Future Factory Team at Spirit AeroSystems. The team research and develops next generation and future state manufacturing systems and processes to replicate across a broad range of aerospace manufacturing needs. The team's objective is combining automation with application in a manner that has broad impacts across the manufacturing system.

## Robot Raconteur: An Interoperable Middleware for Robotics and PyRI Open Source Teach Pendant

Easy, rapid, and secure integration of robots, sensors, peripherals, and simulation software from multiple vendors and platforms has been the holy grail for industrial robots. Robot Raconteur® (RR) is a middleware technology developed over the past decade towards that goal. RR is a powerful open-source communication framework for robotics, automation, build control, and the Internet of Things. RR has been previously presented at ROS-I; this presentation will provide updates on recent developments, including standardized interoperability. The PyRI (Python Restricted Industrial) Open Source Teach Pendant is an open-source project designed to allow simplified high-level programming of advanced technologies such as path planning and computer vision. These technologies are available from open-source ecosystems, including ROS, but are often too difficult for industrial users. PyRI provides programming focused on simplicity using state machines, Blockly, and Restricted Python. It builds on top of the RR middleware interoperability for discovering and connecting to devices.



### John Wason – Sole Proprietor, Wason Technology, LLC

John Wason is the founder of Wason Technology, LLC. He received his Ph.D. in Mechanical Engineering from Rensselaer Polytechnic Institute in 2011. He has worked on numerous projects involving complex, distributed, multidisciplinary systems. He specializes in the development of automation control software, mechatronic interfaces between mechanical hardware and computer control systems, dynamic simulation, microtechnology, and control design.

## Using ROS as an Interface Layer as an Integrator



Aerobotix's Software team works on projects that deal with Data Collection, Point Cloud Analysis, Object Registration, and Coating Thickness Measurement. One example of our work is Part Localization – Finding a part with a vision system and relating that information to the robots so what we can understand where the part is and adapt our robot programs to paint.

### Aaron Feick – Network Engineer, Aerobotix

Aaron is the Software Development Team lead at Aerobotix, Inc. Aerobotix is a Fanuc Robotic integration who specializes in robotic painting. Aaron has been involved with industrial control systems since joining Aerobotix 4 years ago. Aaron has experience with PLCs, Robots, and all sorts of sensors that we integrate with our robotic work cells. Aaron manages a team of 4 software developers, and we work on complex problems that you cannot solve with just a PLC and some sensors. Aaron is an Auburn University graduate, with a degree in Wireless Engineering

Being co-located with Automate 2022 has given the opportunity to highlight ROS-Industrial members that are exhibiting on the show floor. The below list are the ROS-Industrial members that are exhibiting and showcasing capabilities offered through their products or services. For the latest exhibiting info please refer to: <https://www.automateshow.com/exhibitors>

- 3M - Booth #3144
- ABB - Booth #1832
- ADLINK - Booth #2054
- ARM INSTITUTE - Booth #1352
- KEBA - Booth #5140
- NIST - Booth #140
- PANASONIC INDUSTRIAL DEVICES - Booth #3307
- PEPPERL & FUCHS - Booth #4749
- PILZ AUTOMATION SAFETY, LP - Booth #4713
- PLUS ONE ROBOTICS - Booth #4745
- PUSHCORP - Booth #1415
- SIEMENS - Booth #2040
- SOUTHWEST RESEARCH INSTITUTE - Booth #1707
- UNIVERSAL ROBOTS - Booth #1432
- YASKAWA AMERICA - Booth #4432



# Thank you to our Members

ROS-I is supported by an international Consortium of industry and research members. The ROS-Industrial Consortium Americas Annual Meeting is supported by the membership. Thank you to all of the members for their continued support of ROS-Industrial and the open source industrial robotics community!



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