

Summarizing the October 2020 Terminology Harmonization Meeting

By Craig Schlenoff

On 26 October 2020, the Industrial Activities Board of the IEEE Robotics and Automation Society (RAS) organized a virtual Terminology Harmonization Meeting in conjunction with the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). The goal of the meeting was to begin developing a shared robot terminology document that will identify relations and mappings between terms and definitions in robot-related standards documents formulated by the various standards development organizations, including those outside of IEEE. The mappings in this document will help to identify synergies among the standardization efforts, with the aim of facilitating future collaborations.

Thirty-two attendees participated in the meeting and included many of the RAS working group (WG) chairs; representatives from the International Organization for Standardization (ISO), the Robotic Industries Association (RIA), the American Society of Mechanical Engineers (ASME), and ASTM International; and experts in various robotics fields including autonomous vehicles and industrial robotics. The meeting started with a set of presentations by the participants to provide context and then moved on to a more open discussion. A summary of the presentations (in order of their appearance) is included here.

Digital Object Identifier 10.1109/MRA.2021.3051865
Date of current version: 22 March 2021

- RAS overview
 - *Presenter:* Craig Schlenoff, RAS associate vice president of standardization
 - *Summary:* This presentation summarized previous and new standards efforts within the RAS. They include the following:
 - Published standards
 - Core Ontologies for Robotics and Automation (published 2015) (<https://standards.ieee.org/standard/1872-2015.html>)
 - Robot Map Data Representation for Navigation (published 2015) (<https://standards.ieee.org/standard/1873-2015.html>).
 - Active WGs (that are developing standards) (<https://www.ieee-ras.org/industry-government/standards>)
 - Ethically Driven Robotics (standard expected 2021)
 - Robot Task Representation (standard expected 2021–2022)
 - Autonomous Robotics (standard expected 2021–2022)
 - 3D Map Representation
 - Ethically Driven Nudging
 - Guidelines for Verification of Autonomous Systems (new—formed in 2020)
 - Robot Agility (new—formed in 2020).
 - Active study groups
 - Metrology for Human–Robot Interaction (new—formed in 2020)
 - Robotic Hand Grasping and Manipulation (new—formed in 2020).
- RIA overview
 - *Presenter:* Carole Franklin (director of Standards Development)
 - *Summary:* This presentation gave a brief overview of recent RIA efforts.
 - The RIA is in the final stages of publishing R15-08 (Industrial Mobile Robot Safety) (comment stage ended November 2020).
 - R15-08 (Industrial Mobile Robot Safety) Part 2 (Safety Requirements) is targeted to come out within a year or two of Part 1 (Requirements for Industrial Mobile Robots).
 - The RIA is waiting for the ISO to update the base standard on which R15-06 (Industrial Robots and Robot Systems—Safety Requirements) is based.
- ASTM International overview
 - *Presenter:* Adam Norton [assistant director of the New England Robotics Validation and Experimentation (NERVE) Center at the University of Massachusetts Lowell]
 - *Summary:* Relevant standards efforts include
 - E54.09 Response Robots
 - E57 3D Imaging Systems
 - F45 Driverless Automatic Guided Industrial Vehicles
 - F48 Exoskeletons/Exosuits.
 - All efforts are in developing test methods rather than specifications of activities/behaviors.
- ASME overview
 - *Presenter:* Angel Guzman (Standards and Codes Project Engineering)
 - *Summary:* Relevant standards efforts include the following:

- Subcommittee on Robotic Arms (Manipulators) Within the Manufacturing and Advanced Manufacturing (MAM) Committee
- Registration and Calibration Performance Test Methodology for Manipulators.
- ISO overview
 - *Presenter:* Roberta Nelson Shea (Global Technical Compliance officer)
 - *Summary:* Relevant standards efforts include the following:
 - ISO Technical Committee (TC) 299 WG 3 for Industrial Robotics Safety
 - ISO 10218 (Collaborative Industrial Robots) Parts 1 and 2 are still under revision (originally expected summer 2021, slipped to spring 2022, then slipped further because COVID-19 stopped in-person meetings).
 - Collaborative Robots Technical Specification is being rolled into ISO 10218.
 - Technical reports on end effectors and manual load/unload stations are being rolled into ISO 10218.
 - Study Group 1—Common Safety Standard for TC 299 WG 2 (Service Robot Safety) and WG 3 (Industrial Safety) (nonmedical robot domains and sectors).

After the presentations, the group began to discuss the three terms on which to focus for the harmonization effort, namely, *action*, *task*, and *environment*. Only *environment* and *action* were discussed. An initial analysis, prior to the meeting, of numerous standards within the ISO indicated that these words were not formally defined in any of the standards explored, even though they were used in definitions of other terms. It was noted that any term used in a standard that does not deviate from a typical dictionary definition is not formally defined in that standard. However, other robot standards, such as some ASTM standards, do define these words in detail. Specific discussions about each of these terms are described next.

- *Environment:*
 - Within IEEE, some WGs see the concept of *environment* as the


ground truth (what is known to be true about the world), while others see it as the state of the world from the robot's perspective, which could represent only a segment of the world or only the aspects relevant to the task at hand.

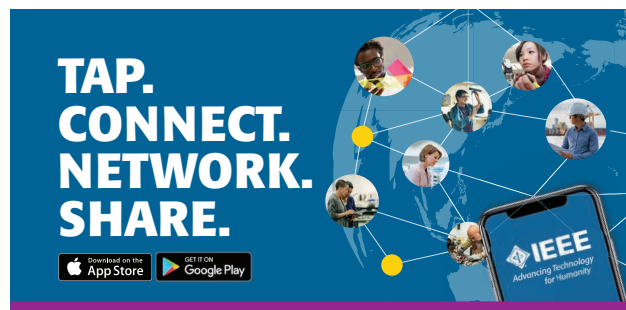
- The ASME is not yet looking at *environment* but might use an ASTM E57 (3D Imaging Systems) definition to document the environment in terms of how it will affect data collection.
- *Action*
 - An initial analysis did not yield terms similar to *action* in the other standards. This analysis resulted from a limited search (mostly through the ISO).
 - ASTM International has *repetitions* and *activities* (which are the closest matches to this term).

After discussion of the terms, the group explored the next steps. Meetings will be planned at the 2021 Interna-







tional Conference on Robotics and Automation in China (likely virtual) and IROS 2021 in Prague. The following action items were assigned:

- Examine a wider array of standards, including those from ASTM International, the ASME, and the RIA, to identify those that define the terms *activity*, *task*, and *environment*.
- Review the ISO web-based glossary of all terms in ISO standards (<https://www.iso.org/obp/ui/>).
- Once relevant terms in the various standards are identified, small groups of representatives from the respective standards organizations will be assigned to reconcile the definitions. Reconciliation could include mapping definitions among the terms in the various standards or, at a minimum, noting the differences in the definitions of these terms.

For more information about this effort, please contact Craig Schlenoff at craig.schlenoff@nist.gov. 



Connect to IEEE—no matter where you are—with the IEEE App.

-  Stay up-to-date with the latest news
-  Schedule, manage, or join meetups virtually
-  Get geo and interest-based recommendations
-  Read and download your IEEE magazines
-  Create a personalized experience
-  Locate IEEE members by location, interests, and affiliations

Download Today!

