Session 5: Panel Answers

*Masayuki OKUGAWA
Aichi Institute of Technology
Dept. of Mechanical Engineering

Tetsuya KIMURA
Nagaoka University of Technology
Dept. of System Safety
1. Where and how are robots tested?

[Where]

- Most frequently: the developer’s site. Big companies have the resources to do this properly. Small companies can find this difficult.
- Next: the user’s site. The user’s knowledge of robot can be limited so the validity of the site can be unclear.
- If very suitable/cost effective/required: public site (e.g., for certification)

[How]

- For scenario test, the result varies depending on the test developers.
- For technical specifications, on engineering and standards (mostly durability, e.g., MIL-STD-810)
2. Where and how are robot operators trained?

[Where]
• Similar to the case for robot testing.
• More training in the user’s site.

[How]
• Similar to the case for robot testing.
• A competition could be used to motivate the training if more robots are used.
3. How can these testing and training programs be incorporated into a certification program recognized by industry and government?

[basic]

- **the necessity of certification** should be recognized by industry and government.
- The necessity could be explained from the viewpoint of social effectiveness, e.g.: scenario and moc-up based test/training are solid but less generally applicable. Certification based on standards clarifies basic performance and is more generally applicable.

[substantial measure]

- Concrete examples should be used to convey the concept.
- Consensus standards are developed across communities – robot developers, robot users, standards developers.
4. How do industry-developed standards (e.g., ASTM International, American Society of Mechanical Engineers) gain regulatory acceptance?

• Explain the necessity of the standards
  • Especially for mid- and long term cost-effectiveness and innovation promotion.

• Explain the validity of the standards
  • Really “standard?” They should be free of industry bias.
    • Reproducibility and repeatability with solid evidence.

• Explain the workability of the standards
  • Cost, place, human resource, ...

• Explain the maintainability of the standards.
5. What are the procedural and regulatory challenges that need to be addressed?

Accountability after an accident.

• Suppose: Class-A robot with Class-A operator has trouble and cause an accident. Who should be blamed? The robot developer? The operator? The boss of the operator? The certification organization? The regulatory authority?”
• Existing big industry has a system for the accountability (e.g., National Transportation Safety Board in US with related standards).
• For the accountability after an accident, all information should be clear and transparent, but in some situations, the information is not fully opened and biased, e.g. medical accident.
• A well-examined system for the accountability is needed, or an accident collapse the system.
For further information contact:
E-Mail: kimura@mech.nagaokaut.ac.jp