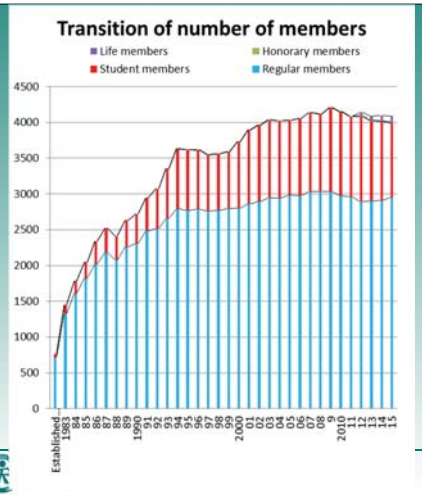
Introduction of Robotics in Japan & RSJ in 2016

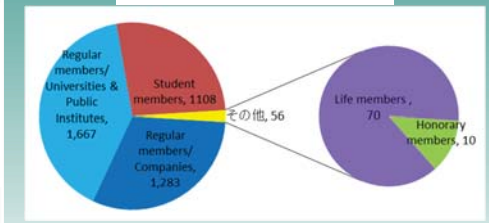
The Robotics Society of Japan (RSJ)

Number of Members (at Aug. 9, 2016)

■Number of individual members: 4,224
Regular members: 3,007, Student members: 1,158
Honorary members: 9, Life members (Since 2012): 91
■Number of Supporting members: 80

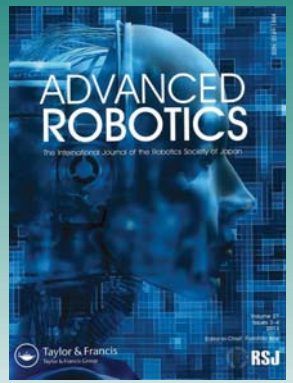


Breakdown of members



Journal

■Journal of the Robotics Society of Japan (in Japanese)
10 issues / a year
■Advanced Robotics (Int. Journal) 24 issues / a year



Reviews & papers are available on J-Stage.
53 submissions (2015)

Non-member can also submit papers for free of charge. 536 submissions (2015)

International activity of RSJ

●International conferences sponsored by RSJ
- IEEE/RSJ International Conferenceon Intelligent Robots and Systems (IROS)
- International Symposium on Robot and Human Communication (Ro-Man)

● Int. Conf. technically sponsored by RSJ: AROB, MFI, SMC, ICAR, ISR, et al

●International Robotics Forum for High School Students (IRH 2015)
Collaboration with International Robot Exhibition (iREX 2015)

5-4 / Dec. / 2015, at Tokyo Big Site
115 participants from 13 high schools
91 participants from foreign countries, Brazil, China, Korea, U.S.A., and Mexico (2)
Five companies supported this event.

●IRH 2017 will be held in Dec. 2017 !
We are looking forward to participation of your high school students.

Domestic conferences sponsored by RSJ

■Annual conference of RSJ (Sept.)
～1,200 participants, ～700 presentations

■Robotics Symposia (in collaboration with JSME and SICE) (Mar.)
～200 participants, ～100 presentations

■Symposium on Construction Robots (every 2 years) (in collaboration with Society of Civil Engineers , Architectural Institute of Japan, et al.)
～200 participants, ～60 presentations

■Robomech (The Robotics and Mechatronics Conference) sponsored by Robotics & Mechatronics Division, JSME (May～Jun)
～1,700 participants, ～1,200 presentations(poster)

■Annual conference of SICE System Integration Division (Dec.)
～1,200 participants, ～700 presentations

Committees

■Standard Committees (26)
- Steering Committees
- Information System Committees
- Journals Editorial Committees
- International Committee
- Awards Committees etc.
- Value Implement Committee
- Compliance Committee
- Event Planning Committees
- Executive Committee of Conference

■Special Purpose Committees (3)
- Committee on Decommissioning Robotics
- Committee on Extensive Technical Platform for Disaster Response
- Academia – Industry Cooperation Committee

■Temporary Committee (2)
- IRH2017 Executive Committee
- Technologies Archive Committee

■Special Interest Groups : (12 Groups are Supported by RSJ)
- Group on Car Robotics
- Group on Robot Philosophy
- Group on Robotics Young Researchers Network etc.

Contribution to Society: The Great East Japan Earthquake

■Coopetition for a response to the Great East Japan Earthquake:
- Establish of the Surveillance Committee on Tohoku Earthquake (2011. 3)
- Cooperation with Disaster Response Robotics Task Force (volunteer action of robotics researchers and engineers) (2011. 4)
- Joint statement by the Japanese academic societies concerning with robotics (2011. 4)

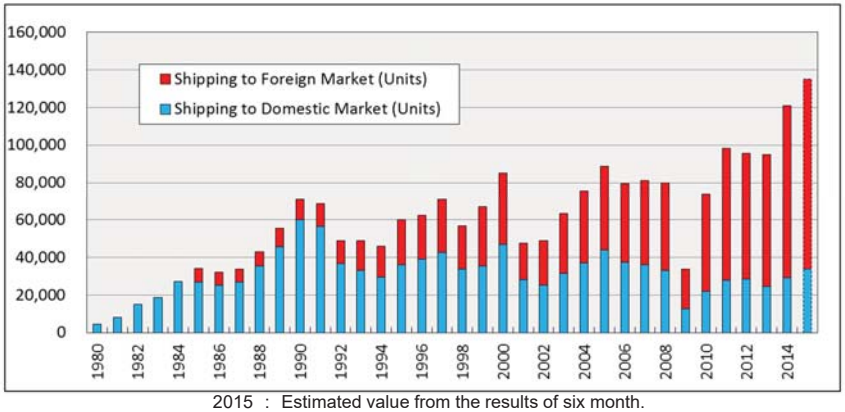
"Joint statement for application of Japanese robot technologies to the disaster responses for the Great East Japan Earthquake and the nuclear disasters of Hukushima "
The Japan Robotics Society
The Japan Society of Mechanical Engineers: Robotics and Mechatronics Division
The Society of Instrument and Control Engineers: System Integration Division
IEEE Robotics and Automation Society, Japan Chapter
IFToMM, Japan Council

■Action of the Surveillance Committee on Tohoku Earthquake:
●Subcommittee for recording nuclear disaster response technologies:
- Final report (in Japanese) (2014.10)
http://www.rsj.or.jp/databox/committees/141001saigaikiroku_fainal_zanntei.pdf

● Subcommittee for recording general disasters response technologies:
- Interim report at the 30th Annual Conference (2012.9)

Annual Shipment of Japanese Robots

(Japan Robot Association)

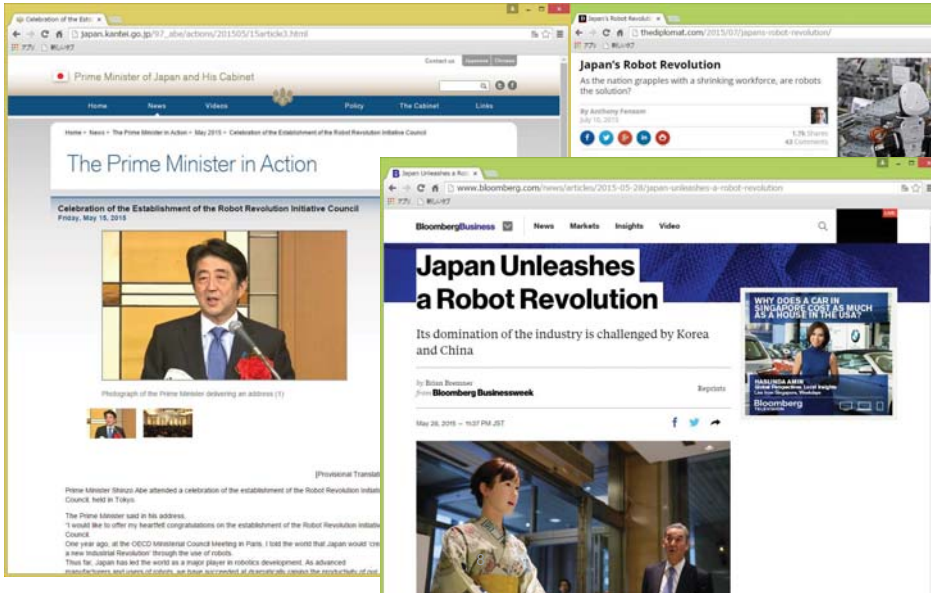


2015 : Estimated value from the results of six month.

Changes of the expectations for Industrial Robots

1980-1990 Initial Growth	Good Robots
1990-2000 Slow Growth	Good Application
2001- re-Growth(Across the Lehman Crisis)	Good Solution

Robot Revolution Initiative



Robot Revolution Initiative

- Manufacturing Business Reform WG(JMF/RRI Secretariat)
  - Industry4.0 SWG(140+ Companies/180+ Members!)
- Robot Use WG(JARA)
  - Business Matching SWG
  - Robot Business Support Organization Establishment SWG
  - Robot Use Extension SWG
  - Robot Use Extension Environment Establishment SWG
  - Non-Bilateral Information Problem Solving/Co-Recognition SWG
- Robot Innovation WG(NEDO)
  - Robot Platform SWG
  - Robot Use Safety Standard/Guideline SWG
  - International Robot Competition SWG

ImPACT: Tough Robotics Challenge (TRC)

Satoshi Tadokoro - Program Manager (PM)

1984 M-Eng., Univ. of Tokyo
1993-2005 Associate Professor, Kobe Univ.
2002 Established International Rescue System Institute
2002 -2006 MEXT DDT Rescue Robotics PM
2005- Professor, Graduate School of Information Sciences, Tohoku Univ.
2006 -2010 NEDO Strategic Advanced Robot Component PI
2011 Deployed Quince for the Fukushima-Daiichi Accident
2012 Assistant Dean, 2014 Vice Dean
2014 IEEE Robotics and Automation Society President-Elect
2014 – ImPACT Program Manager
(Joint appointment between Tohoku University and JST; Effort: 80%)
Awarded METI Robot Award, FDMA Commissioner Award, etc.

Disruptive Innovation

✓ Keys to breakthrough

Advance three technologies of active robustness, large-scale real time information, and bio-machine Fusion. Integration with five types of robot bodies. Establish remote autonomous robotics that can operate robustly in extreme environments, implement commercialization and create a foundation for social implementation.

The Challenges for the PM and the Impact of Success

✓ Overview of TRC

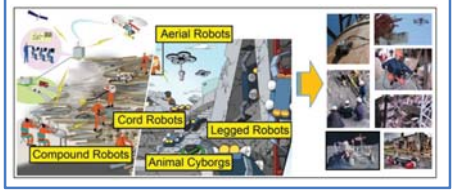
Jointly research and develop the key fundamental technologies for outdoor robots (accessibility, sensing and perception, recovery from failure, and environmental compatibility) in a cooperative competitive environment, with the aim of achieving remote autonomous robots that can work robustly without faltering even in the unknown, time-varying extreme disaster environments. Conduct focused field evaluations to make robot technologies and their performance visible, and lower the barriers to social application.

✓ Background

In recent years, large scale disasters have occurred frequently. Application of robot technologies to improving disaster response, recovery, preparedness and mitigation capabilities, improving efficiency, and at the same time ensuring the safety of responders is an urgent issue. However, current robots are delicate goody-goodies that cannot show the same performance of work in the extreme environment of disasters as they can indoors. Their ability to respond to unexpected situations is low.

✓ Impact on industry and society in the event of achievement

Application of robots to emergency response, recovery, preparedness and mitigation of disasters to contribute the world safety and security. Furthermore, pave the way to commercialization of advanced outdoor robot services by promoting technology spillover.



Scenario for Success and Achievement Targets

✓ Achievement targets

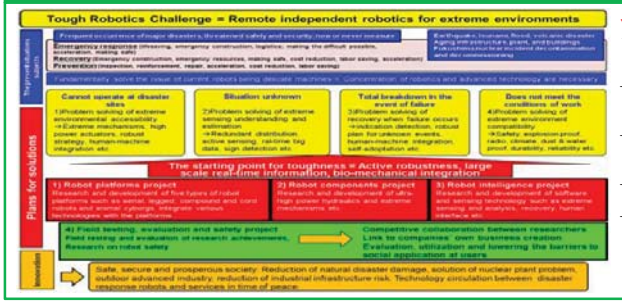
Technical target: Establish tough robotics that is fully capable even in a disaster environment.
Industrial target: Create a new business for component service robots. Disaster robot technology and business environment.
Social target: Provide disaster mitigation solutions that enable information gathering and work under environmental conditions that hitherto has been impossible.

✓ Scenario for success

Conduct research into active robustness, large-scale real time information, bio-machine fusion. Systemically integrate the solution into five types of robot bodies and evaluate the systems in a simulated disaster field. Promote modest competition between researchers and voluntary information exchange through the field evaluation. Encourage fundamental research that meets user needs by reflecting the user opinions in the research planning. Seek integration with the companies' own business plans through business matching, as well as the disaster prevention applications.

Tough Robotics Challenge (TRC)

Overall R&D Program Structure Created by the PM

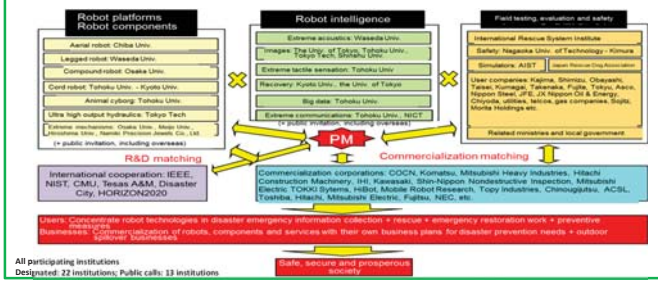


✓ Key points of implementation

- Create mechanisms that promote win-win cooperation between all of the participants including researchers, companies and users.
- Identify disaster application scenarios and maximize the outputs through review and exploration of the research content.
- Promote business matching actively reflecting user and company needs, using field testing & evaluation and joint research.
- Encourage and support utilization and commercialization of ImPACT research fruits.
- Periodically publicize the field testing and evaluation meetings and make the research achievements visible.

Total R&D Program Cost
JPY3.5 billion

Implementation Structure as Assembled by the PM



✓ Keys of the implementation structure

- Integrate five types of robot body developed in the platform project with the hardware developed in the component project and the software and sensing technologies developed in the intelligence project. They are evaluated in the field testing, evaluation and safety project, seeking to match the research fruits with users and business operators.

✓ Approach to selection of researchers and institutions

- Invitations for participation have been sent to top-class research organizations in Japan that are most likely to deliver R&D results in each technology field. Additionally, nascent technologies will be gathered through public calls and from overseas. Enthusiastic businesses will commercialize the output.

See The Web Page:

http://www.jst.go.jp/impact/en/program/07.html