NEDO’s Activities in the Robotics and Artificial Intelligence Fields

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In June 2017, a cabinet decision was made to utilize **Growth Strategy 2017** to implement Abenomics policies.

**Fourth industrial revolution innovations** such as robots and artificial intelligence (AI) will be incorporated into every industry as well as social life to realize **Society 5.0**.

- Incorporation of innovative fourth industrial revolution technologies

  **Realize Society 5.0**

  - Hunter-gatherer society ➔ Agrarian society ➔ Industrial society ➔ Information society ➔ Society 5.0

  - Addressing social challenges by providing different services to meet individual needs through innovative technologies

  - Growth frontier (creating new demand and improving productivity)
Japan’s Policy: Connected Industries

- The Ministry of Economy, Trade and Industry (METI) proposed the concept of **Connected Industries** that will create new value by connecting people, things, technologies, and organizations in a variety of ways.

- In October, Mr. Hiroshige Seko, Minister of Economy, Trade and Industry, introduced the **Connected Industries’ Tokyo Initiative 2017** as a futuristic vision of Japanese industries.

**Five Priority Fields Tackled under the “Connected Industries”**

- **Automated Driving and Mobility Service**
  - Identifying approaches for data harmonization
  - Enhancing AI and related human resource development
  - Establishing future vision of mobility service concerning logistics and EVs

- **Manufacturing and Robotics**
  - International standardization of data rules including formats
  - Enhancing inter-company collaboration in harmonized fields (e.g., cyber security and human resource development)
  - Environmental improvement for the IoT introduction for SMEs, e.g., IoT tools

- **Biotechnologies and Materials**
  - Achieving joint utilization of data across companies in harmonized fields
  - Establishing an AI technology platform for commercialization
  - Obtaining public acceptance

- **Plant/Infrastructure Safety Management**
  - Improving technological capability for safety through utilizing IoT
  - Developing guidelines and other common rules for harmonizing data across companies
  - Promoting further reform of regulation systems

- **Smart Life**
  - Discovering potential needs and materializing possible services
  - Data collaboration through inter-company alliances
  - Developing other rules for further data utilization

*Developing cross-sectoral support measures that bolster these efforts.*
About NEDO

NEDO is one of the largest public R&D funding and management agencies in Japan. It was established on October 1, 1980.

Coordination with policymaking authorities

Combining efforts of industry and academia

Ministry of Economy, Trade and Industry

Industry Universities

Creation of Innovation

Promotion of technology development based on a flexible and agile project management scheme

Missions

- Addressing energy and global environmental issues
- Enhancing industrial technology
About NEDO

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Budget: Approximately 139.7 billion yen (US$ 1.5 billion) in FY2017
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About NEDO

The **Robot and Artificial Intelligence Technology Department** was created in **April 2016** by renaming the Robot and Machinery System Technology Department. The **AI Promotion Division** was established at the same time.
Overview


- Infrastructure maintenance and disaster response robots
  - Development of Systems for Infrastructure Maintenance
    - (1.5 billion yen)
  - Strategic Innovation Promotion Program (SIP), Technologies for Infrastructure Maintenance, Renewal and Management
    - (0.85 billion yen)

- Industrial/service robots
  - Project for Energy Saving Society Using Robots and Drones
    - (3.3 billion yen)

- AI/elemental robot technologies
  - Promotion of Market Implementation by Applying Robotics (MARC)
    - (1.75 billion yen)
  - Strategic Advancement of Multi-Purpose Ultra-Human Robot and Artificial Intelligence Technologies (SamuRAI)
    - (4.35 billion yen)

- Mobility technologies
  - Project for Practical Application of Advanced Aircraft System
    - (0.44 billion yen)
  - SIP/Automated Driving for Universal Services
    - (1.69 billion yen)

*( ) Budget for FY2017
Robots and Sensor Systems for Infrastructure Maintenance and Disaster Surveys

Technology development to accurately **inspect infrastructure** in order to build and maintain safe and secure infrastructure and **respond to disasters** that occur frequently.

**Imaging technology**

**Sensing technology**

**Robotic technology**

- Infrastructure maintenance
- Disaster surveys
- Bridge inspection
- Underwater inspection
- Drone inspection
- Nondestructive inspection
Robots and Sensor Systems for Infrastructure Maintenance and Disaster Surveys

Robot for surveying landslides and volcano eruptions

Robot for inspecting bridges

Explosion-proof inspection robot

Robot for surveying landslides and volcano eruptions

Robot for inspecting bridges

Explosion-proof inspection robot
Development of criteria for evaluating the performance of drones and terrestrial/underwater robots which can be used for distribution and infrastructure inspection

Performance evaluation of robots and drones using the Fukushima Robot Test Field (image)

Drone during flight of about 12 km

Drone delivering hot soup to surfers

The world’s first success in long-distance air freight delivery by a fully autonomous drone
Robot Commercialization Applications

- Technology development for robot commercialization in manufacturing and service fields
- Technology development for building a robot platform in order to reduce the cost of introducing more small-sized robots by 20%

Manufacturing field

Service field

- Robot handling soft objects and recognizing different shapes
- Robot moving inside a small-diameter tube and traveling through a u-bend of 1D (a bending radius equal to tube diameter)
The World Robot Summit (WRS) is a “Challenge and Expo” that brings together robot excellence from around the world to promote a world where robots and humans can successfully live and work together.

World Robot Challenge (WRC)
A total of eight challenges will be held in four categories: Industrial Robotics, Service Robotics, Disaster Robotics, and Junior.

World Robot Expo (WRE)
In conjunction with WRC, an expo will be held to present cases of applied robotics to the world.
### World Robot Summit 2018
**TOKYO**
@Tokyo Big Sight
October 17-21

- **Name**: World Robot Summit 2018
- **Venue**: Tokyo Big Sight East 7/8 Halls
- **Schedule**: October 17-21, 2018
  *Held alongside Japan Robot Week 2018 10/17-10/21 @Tokyo Big Sight*
- **Hosts**: Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO)

### World Robot Summit 2020
**AICHI/FUKUSHIMA**
@Aichi International Exhibition Centre
Robot Test Field located in Fukushima Pref.
August and October

- **Name**: World Robot Summit 2020
- **Venue**: Aichi International Exhibition Centre
- **Schedule**: Early October 2020 for one week
  *Held alongside RoboCup Asia-Pacific Open and Japan Robot Week 2020 (tentative)*
- **Hosts**: Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO)

Two of the challenges in the Disaster Robotics category are scheduled as follow:

- **Venue**: Robot Test Field located in Fukushima Prefecture
- **Schedule**: Mid-August 2020 for about 3 days
- **Hosts**: Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO)
Next-Generation Artificial Intelligence (AI)

(1) Fundamental Research Targeting Large-Scale Real World Applications

(2) AI Framework and Advanced Core Modules

(3) Standard Tasks and Benchmarking

Bringing AI researchers and engineers together at the Artificial Intelligence Research Center (AIRC) to promote globally-advanced AI research

Examples of Applications:
- Decision-making support
- Forecasting
- Language understanding
In March 2017, the Strategic Council for AI Technology developed an AI technology strategy and AI R&D objectives and an industrialization roadmap.

NEDO contributed to creation of the roadmap as the secretariat of the responsible task force.
The automated driving system of the Cross-Ministerial Strategic Innovation Promotion Program (SIP) is undergoing large-scale field operational tests. More than 20 automakers and relevant organizations from Japan and other countries are participating in order to accelerate commercialization of the technology.

Six themes

- Dynamic maps
- Human machine interface (HMI)
- Information security
- Reduction in pedestrian accidents
- Next-generation urban transportation
- Promotion of public acceptance

Planned demonstration site on expressways
Fostering of Human Resources Capable of Next-Generation Technology

For social implementation of robots and AI technology as well as industrial development, NEDO encourages development of human resources capable of next-generation technology and industry-academia collaboration for personnel exchanges.

Fostering of human resources for creating innovation toward social implementation of robots (FY2016-FY2017)

Seminar on AI using actual examples of data (FY2017-FY2019)
Robots & AI for Happiness

**Industrial**
- Responding nimbly to changing production demand!

**Service**
- Robots giving birth to new values!

**Infrastructure / Disaster**
- Social infrastructure providing safety and comfort for everyone!

**Junior**
- Harnessing children’s curiosity for the future!

**AI**
- Robotic partners for the next generation!
NEDO Booth

Robots & AI for Happiness
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