Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

July 2014
Overview of Tohoku University

Campuses

- **Katahira** (Headquarters, Research Institutes (4), Graduate School of Life Sciences, Professional Graduate Schools)
- **Aobayama** (Graduate Schools of Engineering/Science/Pharmaceutical Sciences/Information Sciences/Biomedical Engineering, etc.)
- **Kawauchi** (Graduate Schools of Art and Letters/Education/Law/Economics and Management/International Cultural Studies, etc.)
- **Amamiya** (Graduate School of Agricultural Science)
- **Seiryo** (Tohoku University Hospital, Graduate Schools of Medicine/Dentistry, Institute of Development, Aging and Cancer)

Students

17,852 (16,667 Japanese students, 1,185 international students)

Faculty and Staff

6,379
### Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

Tohoku Univ. (1907-)  

<table>
<thead>
<tr>
<th>Tohoku Univ. (2014 Spring)</th>
<th>RIEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>886 Professors</td>
<td>24</td>
</tr>
<tr>
<td>737 Associate Profs.</td>
<td>18</td>
</tr>
<tr>
<td>1202 Assistant Profs.</td>
<td>25</td>
</tr>
<tr>
<td>11,060 Undergrad. Students</td>
<td>56</td>
</tr>
<tr>
<td>4,106 MC Students</td>
<td>125</td>
</tr>
<tr>
<td>2,651 DC Students</td>
<td>38</td>
</tr>
</tbody>
</table>

Total 67  
Total 219
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

Brief History of RIEC

1935 Establishment of RIEC as a research institute affiliated with Tohoku Imperial University

1994 Reorganized as National Centre for Cooperative Research

2010 Reorganized as Joint Usage / Research Center

1950 Three elements of optical communication technology
1950 Static induction transistor
1958 Parametronic computer SENAC-1
1958 Metal particle magnetic tape
1975 SAW filter
1977 Perpendicular magnetic recording

Prototype in 2005
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

IEEE Electrical Engineering Milestone for Yagi-Uda Antenna
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Archives Room

Yagi-Uda Antenna (1929)

Split Anode Magnetron (1927)

AC-Bias Magnetic Recorder (1937)
The Fact of RIEC

Budget Shift

単位: 百万円 / million yen
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

External Funds

単位: 百万円／million yen
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

Current Research Organizations in RIEC

4 Research Divisions, 2 Research Laboratories & 1 Research Centre

Research Divisions
Kernels for long-range basic research

- Information Devices Division
  Creation of nanoelectronics information devices based on physical phenomena

- Broadband Engineering Division
  Creation of next generation system for Ultra-Broadband communication

- Human Information Systems Division
  Creation of information system harmonizing human with environment

- Systems & Software Division
  Creation of system and software supporting information society

Research Center for 21st Century Information Science

- Creation of new ICT industry by industry-university cooperation
- Prototype development with short-term (5 yrs.) horizon

Laboratories
Next generation technology research with middle-term horizon

- Laboratory for Nanoelectronics and Spintronics
  - Creation of base nano-spin technology for future ICT
- Laboratory for Brainware Systems
  - Technology mixing real and virtual world seamlessly
The Fact of RIEC

Information Devices Division

Quantum media conversion from a photon to an electron/nuclear spin

(Edamatsu Gr.)

An achievement of the recording density of 4 Tbit/inch\(^2\) in actual information storage

(Cho Gr.)
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

Broadband Engineering Division

Experiment on ultrahigh-speed optical transmission

A large-scale storage system with parallel HDD operation

Superradiant THz lasing with giant gain in population-inverted graphene-metal ribbon arrays

(Nakazawa-Hirooka-Yoshida Gr.)

(Muraoka Gr.)
Human Information Systems Division

Wireless magnetic motion capture system

( Ishiyama-Hashi Gr. )

Accurate sound space communications system based on higher order Ambisonics by using 157ch loudspeaker array

( Suzuki-Sakamoto Gr. )
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

Systems & Software Division

SML#, a state of the art compiler

Conducting comprehensive research on a variety of interactive content which creates new value

（Ohori Gr.）

（Kitamura Gr.）
(LEFT) Probability of successive back-and-forth switching by the application of voltage pulses of 0.9V as functions of pulse duration and magnitude of an external magnetic field along 21° from film normal. (Applied Physics Letters 2012)

(RIGHT) Cross sectional transmission electron microscope image of perpendicular anisotropy magnetic tunnel junction with double interface MgO/CoFeB/Ta/CoFeB/MgO recording layer. (Applied Physics Letters 2012)

(Ohno Gr.)

(Niwano Gr.)
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

Laboratory for Brainware Systems

Ophiuroid robot that enables omnidirectional locomotion
( Ishiguro Gr. )

Microchip of a neural network
( Nakajima Gr. )

High performance LSI for mobile applications
(Nonvoltage TCAM chip)
( Hanyu-Natsui Gr. )
Research Institute of Electrical Communication, Tohoku University (Sendai, Japan)

The Fact of RIEC

Research Center for 21st Century Information Technology

Highly-Available Storage System

(Muraoka Gr.)