

Bio-Robotics and Human-Mechatronics (BRHM) laboratory

Graduate School of Information, Production and Systems,
Waseda University

<https://sem-matsumaru.w.waseda.jp/>

Takafumi MATSUMARU

<https://matsumaru.w.waseda.jp/>

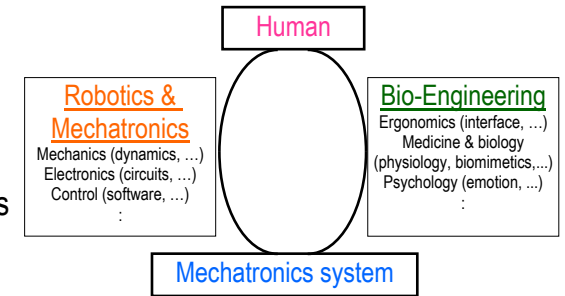
matsumaru@waseda.jp

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Bio-Robotics and Human-Mechatronics (BRHM) Laboratory

- Various subjects between **human** and **mechatronics systems** (robots and other systems).
- To make mechatronic systems more **useful / friendly** for users.
- Developing **original** functions and producing **real-world** systems.
- **Integrating** various knowledge and technologies **into systems** (selection / combination are based on engineering sense).
→ **System Integrator (Sler)**.
- Work on elemental technologies by ourselves if necessary.



Better interaction / relationship between human and robots

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Questions

- What is your **purpose** of admission?
 - Tourism in Japan. ×
 - Earning a degree. △
 - Personal growth. ○
- Suggestion --- Change your **Mindset**.
 - Passive. × Waiting, Being given, ..
 - Active. ○ Act, Acquire, ..

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Graduate vs. Undergraduate

- | | |
|--|--|
| <ul style="list-style-type: none"> • <u>Graduate school.</u> <ul style="list-style-type: none"> • Research. • Unknown issues. • Chaotic, Trial and error. • Propose. • novelty, uniqueness, • Different result. • because of you (individuality). • No correct answer. • make it correct. | <ul style="list-style-type: none"> • <u>Undergraduate school.</u> <ul style="list-style-type: none"> • Learning. • Existing facts. • Systematized, Formulaic. • Memorize. • certainty, responsiveness, • Same result. • no matter who does (uniform). • A correct answer, • always same |
|--|--|

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Schedule

- 1S --- **Setting** your research topic.
 - Deepening the research idea/proposal, Collecting information (literature survey, etc.), Acquiring skills (algorithms, tools, etc.)
- 2S --- **Implementation and Experiment.**
- 3S --- **Implementation and Experiment.**
 - Experimental setup.
 - Results and analysis.
 - Writing **full-length manuscript**.
- 4S --- **Update.**
 - Additions and revisions.
 - Thesis completion.

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Applicants

- Materials.
 - Resume/CV (Educational history/background, etc.)
 - Transcripts
 - Past experience (Bachelor's degree project, etc.)
 - Research plan
 - Supplements (What you can do? What you have learned? What is your future career plan? What is your interest? Motivation, etc).
- E-mail to Prof. Matsumaru.
 - matsumaru@waseda.jp

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Biographical information

- 1985 B.S., Mechanical Engineering, Waseda University.
"Development of articulated manipulator aiming at force control",
(Supervised by late Prof. I.Kato).
- 1987 M.S., Mechanical Engineering, Waseda University.
"Basic theory of multi d.o.f. compliance control on articulated manipulator",
(Supervised by late Prof. I.Kato).
- 1987-99 Corporate Research & Development Center, Toshiba Corporation.
 - Research on robots for specialized operations.
 - Developing mechatronics systems using robotic technologies.
- 1998 Ph.D., Mechanical Engineering, Waseda University.
"Research on structure and control of working robot in a narrow space",
(supervised by Prof. S.Sugano).
- 1999-2010 Associated Professor, Shizuoka University.
 - Education and Research on Bio-Robotics and Human-Mechatronics.
 - Invited Professor (2003). LSC - CNRS, Evry France, Visiting Fellow (2002). Shizuoka Industrial Research Institute, Shizuoka Japan, etc.
- 2010- Professor, Waseda University.
 - Research and Education on Bio-Robotics and Human-Mechatronics.



Ichiro Kato
1926-1994

TOSHIBA



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Research

- <Definition>
 - Reveal something **unknown or new** (in some sense) based not only on the person himself but also based on the accumulation of previous research.
- <Basis of judgment>
 - **Critical** examination of previous research and conventional technology.
- <Resources/accumulation>
 - Emphasis on **facts**/theories,
 - Utilization of **data**/theories.
- <Action/attitude>
 - **Logical/critical** examination,
 - **Hypothesis-testing** examination,
 - **Logical** reasoning,
 - **Critical** analysis.
- <External Attitude>
 - Explanation of the process,
 - Ability of expression and persuasion.
- <Research activities>
 - Cultivation of professionals with a **research mindset** and **research methods**.

Activities

- Advises and suggestions in response to proposals and reports:
 - Students need to be active.
 - Things do not progress while waiting for instructions from others.
 - First, think thoroughly and prepare your own answer.
- Lab meetings are the main venue for reporting and discussion.
 - Present and share with all members, learn from each other, and advance.
 - One-on-one individual guidance and support will not be provided.
- Daily activities such as discussion/consultation, mutual learning, and mutual checking among lab members (**persuasiveness**).
 - A training to explain to others and make them to understand and agree.
 - Activities to increase the number of consenters and supporters.
- Skills to report (**expression**)
 - Main points in appropriate few words in a short time.
 - From essential matters,
 - Firstly outline/conclusion, then details such as grounds, causality, and so on.

Laboratory

A place for research and learning.

1. "Learning Community".

The presence of **seniors** and **peers** in addition to **advisors**.

- A) You can learn as many times as you want.
 - You can listen to explanations and review them many times, and you can have a simulated experience. We look at other people's behavior and correct ourselves.
 - B) Peer review.
 - Critical review by peers (classmates).
 - C) Support.
 - They encourage yourself to study hard together. Train each other to think critically with attention to details.
2. You can learn not only "research **methods**" but also "the significance and value (**goals**) of research" and "the **process** of research refinement".
- The presence of an advisor who conducts research on his own and shows you the "ability to **persevere**" and the **way of thinking**".¹⁰

Thesis for a degree

- Master's thesis = Research paper.
 - Both research content (uniqueness/novelty and usefulness/benefit) and expressions with enough information.
 - not an activity report (a list of your actions).
 - To think items (information and grounds) by yourself, and to constantly collect and accumulate them.
- Emphasizing arguments and conclusions.
 - Visualize = Write it down. Use it to organize your thoughts.
 - Actual tasks, evidence information, structure of persuasive logic, etc. required will be different depending on the conclusion to be asserted.
- Guidance (instruction, advice, suggestion) can be given after the information on the grounds for your assertions and conclusions and your persuasive logic are presented.
 - If you think out your claims and conclusions well, you will be improved by the advice and suggestions obtained.
 - Only on the midway progress, no one can discuss to determine whether adequacy/insufficient or pass/fail.
- Ability to persuade.
 - Ability to think about the necessary ground information and collect and record it,
 - Ability to critically analyze the resulting data, etc.
- Approved by professional examination.
 - Such as acceptance at international conferences and academic journals. A peer-review experience valuable.
 - Claims for originality/novelty and usefulness/benefit must be the same both inside and outside the school.
 - Utilize experts outside the school.
- Guidance (correction of sentences, detailed comments, etc.) will not be provided for the details of your documents (including doctoral dissertations).
 - A degree is given for individual ability. A thesis is an object for judging your abilities.
 - Apply your items in the guidelines by yourself, consider them, and create your own draft answer.