

Research topics for graduate students for 2024

Lecturer Yuki Asano

Department of Mechanical Engineering

Acceptable course(s)

- Master's Degree
- Doctoral Degree



Research Topics

The main research topic is interdisciplinary field of robotics and materials. This includes technology of robotics, robot system integration, mechanical design, mechatronics, and materials development through lab-automation. We are trying to develop novel robots from materials utilizing the previous background of the development of human-mimetic humanoids [1] as shown in right figure.

1. Modular robotic element development

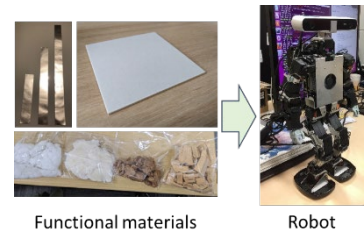
Robot module is basic and integrated component of robots. It includes assembly design of actuator module [2], joint module with sensors and so on. Since it is essential element of robots, wide range of applications from humanoid to prosthesis can be considered.

2. Application of functional materials to robot design

Materials are fundamental elements in robot design. To develop novel robots with high effectiveness, application of materials with high functionality to actual robot design is important.

3. Lab-automation using robotics and machine learning

Toward autonomous development of materials, lab-automation system is expected to be developed. Robotic system, machine learning and those system integration is essential research challenge for this purpose. We are developing lab-automation system for polymer materials development [3].



Functional materials

Robot



Articles Related to Research Topics

[1] Yuki Asano et al., "Design principles of a human mimetic humanoid: Humanoid platform to study human intelligence and internal body system", *Science Robotics*, **2**, 13, eaaq0899, 2017. [DOI: 10.1126/scirobotics.aaq0899]

[2] Yuki Asano et al., "A Sensor-driver Integrated Muscle Module with High-tension Measurability and Flexibility for Tendon-driven Robots", in *Proc. of the 2015 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 5960–5965, 2015. [DOI: 10.1109/IROS.2015.7354225]

[3] Yuki Asano et al., "Robotic Automation System of Polymer Press Process for Materials Lab-Automation", 2024 IEEE/SICE International Symposium on System Integration (SII), Ha Long, Vietnam, 2024, pp. 351-356. [DOI: 10.1109/SII58957.2024.10417660]

Lab. Web page: <http://www.phonon.t.u-tokyo.ac.jp/?lang=en>