We welcome questions about all sorts of design problems regarding casting, liquid transfer, etc.
**Research Targets**

**MECHATRONICS LABORATORY**
Department of Mechanical Engineering, Faculty of Engineering, Mie University

**Creation of Social Support Systems for Human-Machine Coexistence**

Intelligent robots exist that have the human abilities of “judgment” and “learning.” Human support robots provide backup in dangerous and difficult work environments with machines that realize symbiosis between humans and machines. In the Mechatronics laboratory, we aim to develop human-centric robot-control technologies that achieve human-machine cooperation, as well as to create machine systems and intelligent robots that contribute to society. Our research ranges from basic to practical studies. Basic studies include development of human-machine interfaces using biological signals and haptic systems that improve the force-sensing and touch-sensing abilities of humans. Moreover, we develop medical and welfare robots that aim to enable self-support and rehabilitation for people with disabilities. Practical studies include personal mobility robots to assist with farming and daily activities to support an aging society. We study optimization in producing processes of Sokeizai such as auto parts and human support robots in the field of medical services and welfare by forming collaborative project teams with companies. We especially focus our efforts on industry-academia collaborative research. In future, we will further focus our efforts on: in the medical field, development of medical services and welfare robot technologies to overcome the challenges of the aging society that we will soon face; in the field of production, development of support technologies that provide world-class quality and performance.To achieve the goal of creating new industry, we will particularly focus on expanding our original technologies for the optimization of fluid behavior into the field of life and medical sciences, such as regenerative medicine and the drug discovery process, as well as into the field of design optimization of molds and products, which are the core of manufacturing technology.

**Research Projects**

**Wearable Robot Group**

The Motion-Assist Robot for Upper Limb Movement

We develop wearable robots that support daily life of people with upper limb function disabilities. We have also developed a power assistant robot as a labor-saving device.

Robotic Orthoses to Establish QOL (Quality of Life)

We develop robotic orthoses to improve QOL; Quality of life and locomotive ability of patients who have neural disorders such as ALS or have had cerebrovascular accidents with cerebral infections, etc.

**Human Centric Robotics Group**

Self-Support Type Welfare Robots

We develop welfare robots to support the independence of severely disabled people. We also develop robotic prosthetic limbs to achieve smooth and beautiful walking and electric wheelchairs for people with brain dysfunction.

Collaborative Support Robots

We develop robots that work with humans in the fields of health, welfare, and industry. We also develop surgery support systems that create cooperation between humans and robots using tremor suppression technologies.

**CFD Optimization Group**

Optimization and Automatic Control of Casting Process

We develop optimization systems using computation fluid dynamics (CFD) and study the casting process to realize high-quality, high-functionality, and high-durability molds. We also study casting system plan optimization of mold designs.

Bio System for Medical Devices

We develop drug delivery systems to mobile early treatment with cellular sorting systems that create cooperation between human and robots using microfluidic devices.

**Mobile Robot Group**

Development of Autonomous Mobile Robots

We develop communication robots, autonomous robots, images and sound recognition, and language education robots using the small-size autonomous mobile robot “MieCe” that we developed.

Development of Next-Generation Personal Mobility

We develop irregular ground responsive personal mobility for farming and working on daily activities by onewill assists the society of the aged. We also develop remote controlled Mobile Robots that can work in dangerous and adverse environments.

**Members**

**Professor:** Dr. Ken’ichi Yano

**Associate Professor:** Dr. Norihiko Kato

**Assistant Professor:** Dr. Hirokazu Matsui

**Technical assistants:**

Dr. Ken’ichi Kanazawa, Takeshi Oishi

**Secretary:**

Naoto Mizutani (3rd year), Yuto Takagi (1st year)

**MS students**

(2nd year)

Hiroki Ito

Masahiro Tanaka

Tadashi Shioda

Yukari Tanaka

Tomoya Takata

Shogo Tomozato

Naruki Hiraoka

**Graduate students**

(1st year)

Takuma Ikuma

Kohki Okino

Eiji Yahata

Ryo Yamamoto

**Undergraduate students**

(4th year)

Yuya Ikeda

Yuya Ishida

Tomoko Ogura

Makoto Katsuyama

Yuka Kamiyama

Shoda Shiozawa

Keigo Soujima

Masato Tomogai

Kiyotaka Nagai

Atsushi Hijikami

Yuki Matsubara