

## □ Areas of Research

### 1) Nano/Micro Systems Technology

Nano/micro Systems technology, which features high integration and high precision, has risen as a key technology. The important role of mechanical engineering in the development of the Nano/Micro Systems Technology is to develop and to apply the related components and system technology in the sub-areas listed below.

- Nano-mechatronics system design
- Nano-precision measurement/actuation
- Micro-electro-mechanical-systems
- Micro-fabrication/machining
- Micro-electronic packaging
- Micro-thermo-fluids
- Nano-particles engineering

### 2) IT-based Intelligent Mechanical Systems

IT-based Intelligent Mechanical Systems which implants intelligence to machine systems, is an interdisciplinary area combining conventional mechanical technology and new information technology. The main goal of IT-based Intelligent Mechanical Systems is to develop fundamental technologies and to apply them to the industry field.

- Intelligent Robot Systems
- e-Manufacturing
- Intelligent Manufacturing System
- Entertainment Engineering
- Virtual Manufacturing System
- Core Parts and Devices for Intelligent Systems
- Smart Structure
- Intelligent Transportation Systems

### 3) Thermofluid and Energy System

Thermofluid and Energy System deals with energy and environment problems such as new power/energy generation and conversion, and thermofluid flow. The study of Thermofluid and Energy System covers physical phenomena related to heat and fluid in the microstructures such as nano particle control, micro fluid flow, and micro coolers used in next generation key technologies such as BT, NT and IT.

- New Energy System

The study of New Energy Systems develops eco-friendly energy systems with high efficiency and low pollution and new energy system technology such as substitute energy, fuel cell, and hydrogen energy

- Micro Thermo-Fluid System

The study of Micro Thermo-Fluid Systems covers the heat-transfer and flow control technology for micro-systems such as Micro-fluidics and PCR (Polymerase Chain Reaction.)

- Environmental Control System

The study of Environmental Control Systems covers the control of air pollution and micro-particles in order to control the global environment as well as interior environment and to develop super clean technologies.

- Cryogenic Engineering and Applied Superconductivity Technology

The study covers the direct utilization of very-low-temperate technology and vacuum technology and the

development of low-temperature cooler/refrigerator for use in the superconductivity system.

#### 4) Biomedical System Engineering

The goal of Biomedical System Engineering which has an academic basis in life science and biomedical engineering, is to discover the mechanism of living bodies in motion, and to utilize the mechanism in the diagnose of diseases, to invent new diagnosis methods, and to develop artificial organs, new treatments and nursing techniques using medical-purposed robots. All of the activities are for the benefit of human beings.

- Biomechanics

The field of Biomechanics covers implant, artificial arms and legs, medical- and welfare-purposed robots, rehabilitation engineering, sports medical science, etc.

- Biofluids

The area of Biofluids develops artificial organs such as hearts and blood vessels and studies diagnosis of the diseases related to the artificial organs

- Biomaterials

The study of Biomaterials deals with the bioengineering of artificial material for artificial organs

- Bioinstrumentation

Bioinstrumentation covers measurement equipment for observation of living bodies.

- Cell mechanics

Cell mechanics studies the analysis and control of cell motion

- Biomimetics

The study of Biomimetics discovers and utilizes the mechanism of the motion of the living body.

#### 5) Mechanics & Design Innovation

The objective of Mechanics & Design Innovation is to develop creative and innovative technologies of the design and analysis for future-oriented machine, mechanism, software and machine system. The study covers the development of new design theory and technology, mechanics, the innovation of analysis method, and the development of advanced-materials and design database.

- Computational engineering science

- Design optimization

- Machine diagnostics & reliability

- Advanced materials

- Nonlinear stability

- Design methodology

- Nanomechanics

- Sound, vibration and shock

- Design of experiment

- Bionic mechanism

#### 6) Pro Human Engineering

The goal of Pro Human Engineering is to implement a human-centered engineering approach and to design the machines that benefit humanity.

The activities include the study of human emotional response toward sound, vibration, vision, and touch and human reactions to machines, and the realistic implementation of human senses.

- Human Perception-Sound, Vibration, Vision and Haptic

- Human-machine interaction

- Ride Comfort and Safety

- Virtual Reality and Entertainment

- Tactile Sensors and Actuators
- Welfare Engineering