Major in Human Support System

Learning objectives

To train people with the ability to develop human technology that fuses an understanding of humanity with information engineering and mechatronics.

In an aging society, technology development based on a deep understanding of humanity is essential in achieving a society where everyone can have a peace of mind and a comfortable lifestyle. This major fosters the sensitivity to systems and foundational skills required for science and technology to perform its original mission of providing solutions to these issues.

In the Human Support System major, research and teaching pursues the science of understanding humanity, including physiology and psychology, integrated with engineering and science. Our aim is to foster people who research and develop robots and software that support humans, based on a deep understanding of humanity.

Points

- Learn a broad array of foundational science necessary for developing human support systems, such as information science, electronic engineering, and machine engineering.
- We provide a curriculum that includes subjects for understanding humanity such as physiology and psychology.
- We prioritize global career building through internships and overseas practicum programs.

Ideal student

- A person with a strong interest and concern in science and technology relating to the development of human support systems
- A person who wants to be involved in research and development of human support systems in the future

Pathways after graduation

- Medical welfare machinery development related companies
- Home electronics, automobile and housing related companies
- Control related equipment development companies
- Teaching in science, IT, technology and manufacturing related areas

Student's Voice

I want to focus on understandable communication broadcasting and usable system building.

For the first year after entering the program, I touched on the surface of the three majors and my honest response was *they are all difficult*. But when things are difficult, I want to know how far I can get. I felt that the most challenging topic was information. Computer programming languages is a field that most people give up if they don't understand it straight away, just like in the movie, The Matrix. I was overwhelmed as well, but through the support of teachers and senior students, I somehow managed to complete my report. The world has become very convenient with the spread of computers, but depending on the person or the situation, I believe there are many hard-to-use systems out there. Thinking about how I was going to help people, I wanted to build systems that are easy to use for people in various situations, and therefore I chose the Human Support System major. Looking at designing websites that are easy for even elementary school students to understand, as just one example, I believe there are many different ways of transmitting information that think about the receiver-end of things. Right now, I have to make something tangible before graduation, so I'm contemplating a few plans.

Fourth Year Human Support System Student
Aisa Yanai
(From Fukushima Prefecture, Asaka Reimei High School)

Third Year First Semester Timetable

	Mon	Tue	Wed	Thu	Fri
1	English B Ⅰ	Programming Ⅱ		Algorithm and Data Structure	Psychophysiology
2	Control Systems Engineering	Psychology of Learning	English B Ⅱ	Software Design and Development Theory	Programming Language Theory
3				Support System Experiment	Occupational Psychology
4	Biology Systems Experiment	Database Systems		Support Systems Experiment	
5	Biology Systems Experiment			Electronic Circuitry	Systems Physiology

Human Science Domain

- Overview of Psychology
- Ergonomics
- Biology Systems Experiment
- Psychology of Learning
- Cognitive Psychology
- Psychophysiology
- Neuroscience
- Systems Physiology
- Soundscape
- Psychophysics
- Biological Psychology
- Human Interface

Example of the Courses

Research on the soundscape of Fukushima after the earthquake disaster

A certain park within Fukushima city used to be popular among children before the earthquake and you could always hear children playing. But after the nuclear power plant incident, high levels of radioactivity were found in the area and all you could hear were birds, even on a sunny warm spring holiday. In the autumn the area was decontaminated and after enduring the cold winter, finally, in the warmer months children's voices returned to the park. The WHO defines health as *a state of physical, mental and social well-being*. How can Fukushima claim to have a healthy lifestyle when children's voices are absent from the parks? Enquiry of this nature through the issue of sound is an important role of soundscape research.

Example of the Courses

Research on how the brain regulates sleep

We are researching how the brain makes humans and animals fall asleep. For humans and animals, the body rests during sleep but the brain is actively functioning. Because the brain is active, dreams occur. In our lab, we study brain waves and neural activity of rats and mice to clarify how sleep is regulated by the brain and why sleep disorders occur. Rats and mice teach us how we can sleep soundly every night by giving us a number of clues for solving sleep disorders.

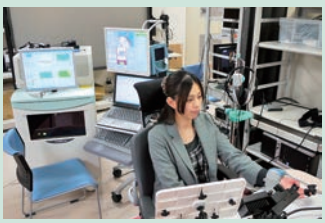
Mechatronics Domain

- Mechatronics
- CAD / CAM Practice
- Electronic Engineering
- Electronic Circuitry
- Digital Signal Processing
- Mechanisms
- Control Systems Engineering
- Machinery Materials and Processing
- Power Electronics
- Materials and Rigid Body Dynamics
- Support System Experiments
- Quantum Mechanics
- Statistical Mechanics
- Fluid Mechanics
- Experimental Physics

Example of the Courses

Research on measurements, control and analysis of biological circulatory systems

We mainly conduct research into measurements, control and analysis of biological circulatory systems, such as *the development of appropriate control methods for the artificial heart*, or *development and application of new methods to analyze the functions of the autonomic nervous system*. Living bodies regulate a variety of functions through the autonomic nervous system. Because it is affected by psychological factors, this can be useful in the objective assessment of stress and psychological impact.
These research topics require knowledge of engineering as well as physiology and medicine. New discoveries can be made through approaching the living body as a system. We are also developing signal-processing methods for electrocardiograms and ultrasound topographical image diagnosis used in clinical settings.



Example of the Courses

Development research of sine wave output inverters utilizing magnetic oscillation

To supply direct current electric power from solar power generators or fuel cells to existing alternating current electrical systems, the current method is to use a Pulse Width Modulation (PWM) Inverter. At our lab, we are developing sine wave output inverters using magnetic oscillation to supply electrical power directly into alternating currents, allowing for simpler configurations and construction. Magnetic oscillation is a self-exciting oscillation, which utilizes the magnetic saturation phenomenon in the magnetic core to toggle semiconductor-switching elements like transistors and MOSFETs. This phenomenon has been applied to electrical systems from early days in DC-DC converters. We are researching and developing new formats for control apparatus and measuring devices related to magnetic oscillation.

Computer Science Domain

- Overview of Information Science Theory
- Information Theory
- Computer Programming Ⅰ & Ⅱ
- Discrete Mathematics
- Algorithms and Data Structure
- Computing Systems Theory
- Programming Language Theory
- Formal Languages and Compilers
- Software Design and Development Theory
- Database Systems
- Artificial Intelligence and Knowledge Processing
- Network Systems
- Multimedia Systems Theory
- Mathematical Modeling

Example of the Courses

Research on extracting and visualizing useful information

For humans to carry out research or learn effectively, it is important to aptly discover, store & manage and utilize useful information. Useful information is hidden in all manner of locations from conversations with collaboration partners, the Internet, or within the process of trial and error in previous activities. Search engines are convenient but no longer sufficient. This is why we are involved in research on cross-media useful information extraction algorithms, to discover useful information regardless of its location, and on information transition process visualization systems, to visualize how useful information was created and altered.

Example of the Courses

Research on support systems for next generation software design

Software (programs) play a vital role in computers as well as operating a variety of electronic equipment. Software design and development is a difficult operation involving the work of many people and comprising a number of processes, and thus it is really an artisan skill requiring a high degree of craftsmanship. In recent years, software application and usage is diversifying at a tremendous rate, increasing the importance of accurate and efficient software design and development. To respond to this situation, we are developing systems to make complex software systems easier to design, and support systems that allow experiential learning of cooperative software design skills.