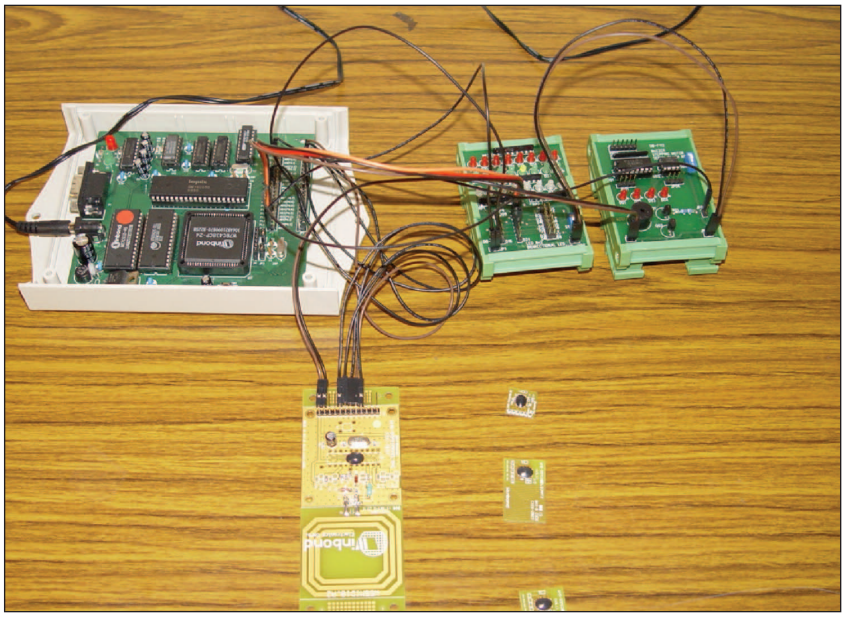
Embracing Higher Education in the 21st Century: The EECS Honors Program at National Chiao Tung University

Over the past few decades, the Science-Based Industrial Park (SBIP) in Hsinchu City, which functions as the heart of Taiwan's electronics industry, has greatly flourished, and the demand for electrical engineering and computer science graduates is extremely strong. National Chiao Tung University (NCTU) has played a major role by contributing vigorously to the high-tech development in SBIP, which can also be viewed as the "Silicon Valley of Taiwan." NCTU has been the main supplier of high-quality engineers, with more than 500 electrical engineering or computer science graduates into the job market every year. To illustrate the significant influence of NCTU on the modern electronics industry in Taiwan, note that 42% of the science-park integrated circuit (IC) manufacturing workforce consists of NCTU alumni. The EECS College has over 210 faculty members, contributing approximately 100 IEEE papers annually. The abundant resources in the University give the EECS College a unique opportunity to create the pioneering Electrical Engineering and Computer Science Honors Program (EECS-HP). One key reason to inspire the creation of the EECS-HP program is to create a natural progression from the talents program at senior high schools into the undergraduate studies. It is best for highly talented students to have a profound and in-depth study, lest they receive no meaningful challenge and slack off.



1. A special-topic project conducted by freshman students on RFID.

The EECS-HP program was established by NCTU President Chun-Yen Chang and EECS College Dean Peter Wu jointly. The EECS College Associate Dean Chin-Teng Lin is also instrumental to its success. Chair Prof. Bing Sheu helps tremendously with international cooperation from UC Berkeley and University of Illinois-Urbana. Since February 2004, Prof. Steve Chung has served as the chairman of the EECS-HP program.

ENRICHED CURRICULUM

The EECS-HP program offers a wide variety of exciting courses. During their junior year, students can choose to specialize in one of the following disciplines: electronics, communications, electrical control, computer engineering, information science, and optoelectronics. In their freshmen year, students can take courses from a broader scope than students in regular programs. It is not as demanding as doubling the study load, but having more challenging work to do compels students to make better use of their time. Because the scope of learning covers the entire EECS spectrum, the college selects the most suitable professors and arranges a unique curriculum for the students. Therefore, the students learn from the best of selected experts.

INNOVATIVE COMPONENTS

As a natural extension of the science fairs that high-school students participate in, EECS-HP students need to conduct a special-topic project starting in their freshman year. Each professor in the EECS College provides a project in his or her specialty area. Then, each student chooses a suitable project from the offering. For example, students can study the properties of some novel devices or design concepts that were reported very recently in IEEE journals or conference proceedings and design possible applications. Figure 1 shows a radio frequency identification (RFID) project. The students programmed an 8051 microcontroller to control a reader, several light-emitting diodes (LEDs), and a buzzer. It was full of fun for the students, and they learned a lot, gaining valuable experience that is not available in an ordinary classroom.

2. Students of EECS-HP at a track and field competition.

In the summer 2004, the EECS College arranged an internship for every student in the EECS-HP program. Students chose to work in a high-tech company in the science park or do research in a laboratory on campus. This gave them the opportunity to feel how engineers or graduate students work and think, effectively opening thier minds to new horizons.

In addition, during their junior year, the University plans to send the students to top electrical engineering research universities in the United States, such as UC Berkeley or University of Illinois-Urbana, for one semester. This will be a great chance for them to expand their views beyond Taiwan's industry and to understand and appreciate how students in other countries handle their undergraduate studies.

CAMPUS ACTIVITIES

Besides focusing on studying and projects, these students have rich campus lives. In fact, they are not much different from other students after class. Because the number of students in the EECS-HP class is pretty small, and students take most of their courses together, they have become very close friends. They regularly hold birthday parties, barbeques, hiking trips, karaoke parties, and whatever is popular with undergraduate students in the 21st century. Playing sports together takes up most of their free time. Their basketball team practices very hard, even during final-exams. NCTU is famous for its high-speed Internet. In the dormitory, students can surf the Internet or play online games without any noticeable lag. A student team even made it to the semifinals of a nationwide computer game tournament.

Up to now, the EECS-HP students think that studying at NCTU is very beneficial, enjoyable, and fruitful. The EECS-HP is an innovative program for students in the 21st century.

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