SDM
System Design and Management
NEWS

July 2010

Crash Course "Reliable Embedded Systems"

Message from the Director and Dean

The explosion of BP's oil rig in the Gulf of Mexico and the subsequent oil spill was one of the largest and most catastrophic accidents with large-scale systems in recent years. As of early July 2010, over 200 million barrels have already spilled and there will be more. I would like to discuss this accident from three viewpoints. First of all, BP, one of the biggest oil companies in the world, has had several such accidents in recent years. Their slipshod work in building the rig and their lack of foresight in the first actions after the accident were to blame this time. Secondly, how effective was the education that their executives and engineers received in the BP school that BP commissioned MIT to administer for a couple of years? The third issue is not unique to BP but common to many engineering companies and their engineers. The accident revealed the fact that the technological level of robot operations 1500m below sea level is still quite low. It is obvious that operating robots in deep water is a challenging task so sudden accidents could have been predicted. From a systems engineering viewpoint, it is BP's fault that they were not prepared for such a predictable accident.

A lot of people are disappointed with the level of BP's remotely-operated robot technology. Is there a difference between the technological levels of remote robot operation this time and the craning of the main engine of the H-II rocket 3000m below sea level off Ogasawara over a decade ago? I can't emphasize enough the importance of what we teach at SDM: "see both the details and the big picture."

Yoshiaki Ohkami
Director, SDM Research Institute
Dean, Graduate School of
System Design and Management

News

TOPIC 1 Article by Prof. Takano featured in Self Brand 2011 magazine

An article written by Prof. Takano has been featured in the June 10 issue of Self Brand 2011 magazine. Please visit the webpage below to read the article.

▶ http://www.sdm.keio.ac.jp/news/2010/06/10-082704.html

Prof. Kenichi Takano

TOPIC 2 Article on Prof. Sasaki's IEEE Daniel E. Noble Award published

An electronic edition of the 2010 IEEE booklet announcing that Prof. Shoichi Sasaki has won the Daniel E. Noble Award and describing his achievements is available on the webpage below.

▶ http://online.qmags.com/IEEEAWARDS10

Prof. Sasaki's awards article is on page 20, and SDM's congratulatory ad is on page 32.

TOPIC 3 Article by Prof. Ohkami in the Journal of the Japan Society of Mechanical Engineers

"Revisit Strategic System Engineering", an article written by Prof. Ohkami is featured in the journal of the Japan Society of Mechanical Engineers, TOPICS (2010.6 Vol.113 No.1099).

▶ http://www.sdm.keio.ac.jp/en/news/2010/07/article-by-prof-ohkami-in-the-japan-society-of-mechanical-engineers-journal.html

TOPIC 4 Expanding Student Exchange Program

Keio SDM started the student exchange program with Delft University of Technology (TUD) last year, and is finalizing agreements to start exchanging students with Swiss Federal Institute of Technology (ETH) and Politecnico di Milano (Polimi). Both are prestigious graduate schools in Europe and as their names suggest, (Department of Management, Technology and Economics at ETH and Department of Management, Economics and Industrial Engineering at Polimi) they both integrate social and technical fields, just as SDM does. SDM's prestige is growing through these exchanges of our top students.

In addition, SDM has agreed to exchange students with Institut National Des Sciences Appliquees de Toulouse in the field of safety and security. The revised agreement enables the two universities to exchange students in broader technical fields. In addition to European universities, SDM is currently in talks about possible partnerships with MIT and Purdue University in the US.

These universities ask for collaboration in research as well as education. SDM would like to collaborate with these foreign universities to provide support for SDM member organizations, such as visits for study and joint research. Especially, SDM would like to establish long term relationships with top-class universities such as MIT, Stanford University and ETH.

TOPIC 5 Crash course "Reliable Embedded Systems"

A five-day crash course titled "Reliable Embedded Systems" was held from June 7 to 11. The lecturer, Mr. Niels Malotaux, has 35 years of experience in electronic hardware and software design, and consults in various areas as a project coach. He is known as a highly effective teacher of Evolutionary Project Management (Evo), and Requirements Engineering and Management, Reviews and Inspections. In the course, he used actual case studies to explain problems in basic knowledge and reliability of embedded systems, hardware and software, and participants were encouraged to have group discussions in the class. Not only students but also internal and external experts attended the course to learn about reliability of embedded system design, its requirements and design methods, and project organizing techniques.

Mr. Niels Malotaux

TOPIC 6 JAXA Seminar (SE for beginners)

During the lecture

Associate Prof. Shirasaka (middle) with participants

The seminar held to introduce system engineering to employees of The Japan Aerospace Exploration Agency (JAXA) was held on June 17 and 18. Thirty JAXA employees from different departments participated. The first lecture was on logical thinking, which is the basis of the system thinking, and its application. After the big picture of SE was explained, the participants formed groups to do SE process exercises, which began with requirement analysis and proceeded to integration and verification. At the end of the seminar, as new SE topic was introduced; the US Department of Defense Architecture Framework (DoDAF). The lecturer, Associate Prof. Seiko Shirasaka, used easy-to-understand examples from his previous work experience in space exploration. Most participants rated the seminar as excellent and want to attend more JAXA seminars.

Notice

Brief version of SDM brochure renewed

The SDM brochure was completely redesigned in June. The SDM curriculum and the Dean's message titled "To fulfill the mission of breaking the deadlock in modern society", describing the ideal leaders who create next-generation technological and social systems that SDM aims to foster, are featured in the new brochure. The new brochure appeals the characteristics of SDM, such as the integration of art and science, the diversity of SDM students, faculty members with international corporate work experiences, and SDM's strong ties with global corporations and foreign universities. Please visit the webpage to read the redesigned brochure.

▶ http://www.sdm.keio.ac.jp/pdf/sdm2010.pdf

TOPIC 7

Uchu Mita-kai Meeting

The Uchu Mita-kai Meeting was held on June 19 at the Collaboration Complex on Hiyoshi Campus. Several events were held, including a lecture by Prof. Ohkami and a CDF (Concurrent Design Facility) tour. Mita-kai is Keio's alumni association, and of which around 300 people involved in space exploration and related organizations are the members of Uchu Mita-kai. The members work for various organizations, including rocket and satellite developers, trading firms, telecom companies, government agencies, and Keio University. The Association hosts regular meetings and get-togethers to encourage information sharing and networking among its members. Two Japanese astronauts are Keio's alumni and Uchu Mita-kai members: Ms. Chiaki Mukai and Mr. Akihiko Hoshide. Around 50 members visited the Collaboration Complex to attend a Communications class taught by Prof. Hibiya, a fellow Uchu Mita-kai member, and a general meeting/reception. From SDM, Prof. Yoshiaki Ohkami, Prof. Hidekazu Nishimura, Associate Prof. Naohiko Kohtake, Associate Prof. Seiko Shirasaka, and Assistant Prof. Terumasa Narukawa attended the meeting and enjoyed catching up with old friends and making new ones. Under the systems engineering collaboration agreement that JAXA and Keio University have signed, SDM conducts various education and research projects in the area.

Uchu Mita-kai members

The Keio flag that Mr. Hoshide took on his STS-124 mission into space

Mita-kai
▶ http://www.keio.ac.jp/english/alumni/mitakai.html

The collaboration agreement between Keio University and JAXA
▶ http://www.jaxa.jp/press/2007/10/20071019_keiouniv_j.html
▶ http://www.keio.ac.jp/ja/press_release/2007/kr7a43000000a96l.html

TOPIC 8

The second workshop of SDM 2010 Design Project ALPS

The second workshop of SDM 2010 Design Project ALPS was held on June 25 and 26. In the first workshop, 17 groups of students started working on the 15 project themes relating to "Safe and Secure System Design" proposed by 13 companies and one university. Their first presentations were made in English in the second workshop, in which they proposed new ideas using the various methods they had learned in previous lectures. At the end of the second day, the "Prototyping Rapidly" presentation was given, in which each team presented a prototype had they made from readily available items such as cardboards and Lego blocks. Prototypes are used to easily and quickly deliver accurate and visual information to the audience; something beyond what a PowerPoint presentation can do. The audience easily understood the group's concepts only by viewing the prototypes.

Presentation of prototypes

Prototype samples

Students working on prototypes

Group presentation

Lab profile

Ubiquitous Communication Laboratory

Professor Shinichiro Haruyama

Professor Shinichiro Haruyama worked for AT&T Bell Labs in the US and Sony Computer Science Laboratories as researcher, and the Department of Information and Computer Science, Keio University as visiting professor. His specialties are system design for software and hardware, integrated circuits, and communication systems. He is a fellow at The Institute of Electronics, Information and Communication Engineers.

1 Ubiquitous Communication Laboratory profile

The recent rapid growth of cell phone use has brought on the age of ubiquitous communication; we now share information any time and anywhere. Further improvement of technology will bring unimaginable new services and products, in addition to the existing services with utilizing sound, e-mail and moving images. The Ubiquitous Communication Laboratory covers various research topics including communication systems, man-machine interface, augmented reality, integrated circuit design and software development methods, to build new communication systems and computing systems from the users' point of view. In the lab, Prof. Shinichiro Haruyama works with five doctoral students and seven master's students, more than half of whom are currently working full time in the communication sector, and they can draw from their work experiences in their research. Some activities and experiments are conducted at the Kawasaki Business Incubation Center.

Prof. Haruyama and students

Experimenting at KBIC

2 Robot positioning control using LED illumination

LED lights are expected to be used in most homes and offices in the future. The Ubiquitous Communication Laboratory has developed a technology to detect the accurate 3D indoor positioning by transmitting information via the visible light of LED illumination. The technology enables a robot to detect the LED light source on the ceiling two meters away and judge its position to within one centimeter. By installing the system on a wheelchair, as shown in the picture, patients can be automatically guided to an examination room in a hospital.

Robot positioning control with illumination

3 High accuracy surveying technology for civil engineering

The Ubiquitous Communication Laboratory developed "a visible light communication 3D position measurement system" jointly with Sumitomo Mitsui Construction Co., Ltd. The system, adopting visible light technology and photogrammetry for the building and construction field, enables low-cost nighttime measurement and unmanned measurement, both of which were difficult with conventional measurement technologies. The system can measure 3D positions in the range of around 40m x 40m to within a millimeter. The system was chosen as one of the "2009's 10 greatest civil engineering innovations" by the Japan Society of Civil Engineering.

High accuracy surveying technology for civil engineering

4 High-speed communication technology for high-speed trains

Wireless LAN internet service in trains, launched by JR Tokai in 2009, is drawing attention, but the current communication speed is slow; sending and receiving e-mail is slow and cumbersome. To enable many passengers to view video on youtube and ustream, for example, the communication speed between the ground and the train needs to be increased by several thousand times. The Ubiquitous Communication Laboratory has been conducting joint research and contract research with Railway Technical Research Institute since 2004. They have successfully developed a new technology of optical communication between the ground and high-speed moving vehicles, achieving a speed of up to one gigabit per second. The experiment on the transmission of bi-directional high-definition videos was also successful; both those on the ground and the passengers in moving vehicles were able to see high quality video without delays. The lab will continue to develop services that benefit users, including improving communication performance.

High-speed communication technology for high-speed trains

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