

Laboratory / Center profile

Model-Driven System Development Laboratory

Representative: Professor Hidekazu Nishimura

Model-Based Systems Engineering (MBSE) has been increasingly mentioned by the International Council on Systems Engineering (INCOSE) in recent years. According to Project Associate Professor Ishibashi, who attended the MBSE Workshop which was part of the INCOSE International Workshop 2014, Mr. David Long, Chairperson of INCOSE, is now focusing on making MBSE mainstream by moving towards digital systems engineering.

In particular, there is an increasing emphasis on SysML (one of the modeling languages) in the area of MBSE both domestically and globally. Since its founding in 2008, Keio SDM has been organizing lectures utilizing SysML every year together with Mr. Laurent Balmelli, who was with IBM at that time. At the same time, we have been conducting research related to SysML. In 2012, our laboratory played a key role in publishing a book titled, *Systems Modeling Language: SysML*. It is a Japanese version of a famous book by Sanford Friedenthal, *A Practical Guide to SysML, the book on SysML*. Recently in Japan, consultants have been receiving many inquiries and requests relating to SysML following the issuance of ISO26262, which is a functional safety standard for automobiles.

However, I would like to pose a simple yet fundamental question: "SysML exists for what purpose in the first place?" As MBSE Workshop reminds the participants every year, we shall not forget that MBSE is SE.

On Wednesday, February 5th, 2014, we organized a forum for the "SysML Utilization Consociation" established under the Object Management Group

(OMG) Japan Branch. More than fifty professionals participated from different firms, which reaffirmed the popularity of SysML. I will be serving as chair of the SysML Utilization Consociation, and I would like to stress that if companies want to utilize

SysML for development, operation and disposal of products and services, there must be a proper understanding of systems engineering across the organization to begin with. If companies merely use SysML without realizing this point, they cannot expect good results.

Why is SysML based on four pillars (structure, behavior, requirements and parametrics)? What systems are targeted? What is the fundamental question? What is the overall purpose? Without having concrete answers to these questions, there is no use in promoting the utilization of SysML. In order to prevent people from confusing ends and means, our laboratory, together with the Systems Engineering Center and the SysML Utilization Consociation, plans to carry out activities consistently yet swiftly with the aim of spreading the proper use of system engineering, MBSE and SysML to a wider society.



Panel discussion at a forum for the establishment of the SysML Utilization Consociation

▶ http://www.omgwiki.org/MBSE/doku.php?id=mbse:incose_mbse_iw_2014

Visible Light Communication Laboratory

Representative: Professor Shinichiro Haruyama

The Visible Light Communication Laboratory deals with themes relating to visible light communication technologies, including LED illumination and automobile LED lamps that have been becoming popular recently.

Inter-Vehicle Communication System Using In-Vehicle LED Lamp

Intelligent transport systems (ITS) have been actively researched recently. ITS can support safe driving based on various kinds of traffic information. Road-to-vehicle communications and inter-vehicle communications are crucial for gathering traffic information required by ITS. The Visible Light Communication Laboratory studies inter-vehicle visible light communications using LED lamps instead of radio communications. In the case of radio communication, it is difficult to identify the location of the communicating partner. The visible light communication, on the other hand, enables us to locate the communicating partner with accuracy using image sensors.

Figure 1 shows the concept of information exchange using visible light communications of LED break lamps. With visible light communication technology, it becomes possible to visualize which driver is transmitting what type of information.

Figure 2 is a prototype made by Keio SDM with the aim of putting the above concept into practice. The picture on the left is a prototype for an LED transmitter. The picture on the right is a display of the receiving side that shows which driver is sending what kind of information.



Figure 1: Information exchange by visible light communication between LED break lamps



Figure 2: A prototype of visual light communication between LED break lamps

Standardizing Visual Light Communication

The Visual Light Communication Consortium, composed of Keio SDM and private firms, has been advocating for the standardization of a visible light beacon system. The Japan Electronics and Information Technology Industries Association (JEITA) approved the proposal as "CP-1223" in May 2013. With the introduction of this standardized system, it will become possible to transmit ID information from LED illuminations in a uniform manner. The system can be applied to a wide range of goods and services, such as indoor location services and indoor shopping services. We also submitted a proposal to the International Electrotechnical Commission (IEC) last winter. The proposal has been accepted and the commencement of the standardization activities has been approved.



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