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## Prof. Jong-Hwan Kim

### “Intelligence Technology” for Intelligence Super-Agent

#### *Abstract:*

Information technology (IT), first coined in 1958 and booming since the early 1990s, is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data. In 1990s, the concept of Information Superhighway was developed to realize the goals of IT across the globe. In a business context, it has been defined as "the study, design, development, application, implementation, support or management of computer-based information systems" by the Information Technology Association of America. It has generated several associated industries, such as computer HW, SW, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services.

Now we are facing a new technological challenge on how to store and retrieve knowledge and manipulate intelligence, in addition to the management of information and data, for autonomous services by intelligent systems. In this regard, the speaker has proposed “intelligence technology (“IT”) for robots that think” in his recently accepted paper in IEEE Computational Intelligence Magazine. “IT” is the application of computers and machines to perceive and process data and information for knowledge-based reasoning and utilize their own reasoning to execute an appropriate action. “IT” covers all aspects of intelligence from perception at sensor level and reasoning at cognitive level to behavior planning at execution level for each low level segment of the machine. It is equipped with technologies for cognitive reasoning, social interaction with biological species, behavior planning, ability to cooperate with other machines, ambience awareness, and an artificial genome that can be passed on to other robots. Based on these six aspects of intelligence technology, “IT” can be materialized through “Intelligence Super-Agent (ISA).” A virtual example for such an agent is V.I.K.I. (Virtual Interactive Kinetic Intelligence), an intelligent virtual super-agent from a science-fiction action film, I-Robot, released in 2004.

This talk presents the concept of iSA and Intelligence Operating Architecture (iOA) for realizing iSA using “IT.” iOA, which is inspired by human brain functions, is a modular framework that can be used as a whole or in modules to generate intelligent functions for iSA. It can be used to implement different kinds of intelligence, such as cognitive intelligence, social intelligence, behavioural intelligence, ambient intelligence, collective intelligence and genetic intelligence. To emphasize the functionality of each category of intelligence, this talk also introduces the related research outcomes for building thinking robots, i.e. “Robots That Think,” carried out at the Robot Intelligence Technology Lab., KAIST in recent years. These outcomes shall pave the way to the development of iSA,

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