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# MTL Research Centers

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## Center for Integrated Circuits and Systems (CICS)

*Prof. Hae-Seung Lee, Director*

The Research Center for Integrated Circuits and Systems (CICS) is a form of an industrial consortium created to promote new research initiatives in circuits and systems design, as well as to promote tighter technical relation between MIT's research and relevant industry. Three faculty members, Hae-Seung Lee, Anantha Chandrakasan, and Charles G. Sodini participate in the Center for Integrated Circuits and Systems. We have been investigating a wide range of circuits and systems related to wireless communication, microsensor/actuator systems, imagers, digital and analog signal processing circuits, dc-dc converters, and many other systems.

We strongly believe in the synergistic relation between the industry and academia, especially in practical research areas of the integrated circuits and systems. We are convinced that the Center for Integrated Circuits and Systems is the conduit for such synergy. The Center currently has member companies including Analog Devices, IBM, Level-One Communications/Intel, Lucent Technologies, Maxim Integrated Products, National Semiconductor, Philips, Silicon Laboratories, and Texas Instruments. The Center includes all research projects that the three participating faculty members conduct regardless of the sources of funding. There are two different forms of technical interaction between the member companies and the Center. The broad interaction occurs through research reviews held twice a year open to member companies. These are technical reviews where technical representatives from member companies can critique the projects. In each full day review, we present as many projects as possible. The more intimate interaction happens at a more personal level with graduate students who are working on projects of member company's particular interest. The member company may invite them to give presentations at their site.

At biannual research reviews we have received valuable technical feedback as well as suggestions for future research. There has been close interaction between member companies and the Center personnel through company visits, summer employments, and personal interactions. We believe such an interaction has given very positive results for both MIT and member companies. We are hoping to continue to expand the Center in the future.

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# MTL Research Centers

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## **Intelligent Transportation Research Center (ITRC)**

*Dr. Ichiro Masaki, Director*

Transportation is an important infrastructure for our society. The U.S. interstate highway network, for example, contributes significantly to improving our standard of living. On the other hand, current transportation systems have serious problems including congestion, safety, and environmental issues. While the problems are becoming more serious, the conventional solutions such as building new roads are getting more difficult. It is now time to propose a new transportation scheme for solving those increasing problems. Fortunately, we have a technical foundation to propose Intelligent Transportation Systems (ITS) for improving the existing transportation systems by utilizing microsystems and other related technologies.

ITS includes various systems for private and public transportations and also for roadside functions. Some early systems are already commercially available but significant research is needed for more advancement. Examples of commercially available systems include intelligent cruise control for controlling the distance to the car in front, intelligent traffic lights which give a high priority to buses and emergency vehicles, and smart roadside cameras for detecting accidents. Furthermore, ITS has possibilities of becoming the first large-scale application of the next generation communication networks.

In responding to those social needs, MIT's Microsystems Technology Laboratories has established the Intelligent Transportation Research Center (ITRC) in September 1998 as a contact point of industry, government, and academia for ITS research and development. The emphasis of the center is the integration of component technology research and system design research. The integration of technical possibilities and social needs is another focus of the center. Multidisciplinary teams are working on various aspects of ITS to find real solutions.

I. Masaki leads the center, and the faculty collaborators include B. K. P. Horn, H.-S. Lee, T. B. Sheridan, C. G. Sodini, J. M. Sussman, and J. L. Wyatt. Five companies have joined the center as members, and some of them have their representatives staying at MIT as visiting scientists. Research projects range from custom chips for wide-dynamic imaging and array processing to sensor-fusion, real-time stereo vision, three-dimensional image compression, recognition of compressed image without decompression, internet-based network architecture, and the next of the next generation internet.