

Fiscal Year 2012, Tokyo Institute of Technology ASPIRE League Research Grant

Selected Research Projects in FY2012

Principal Researcher	Name	<b>Kaoru HIROTA</b>
	Department and graduate school(institute)in Tokyo Tech	Department of Computational Intelligence and Systems Science Interdisciplinary Graduate School of Science and Engineering
	Position	Professor
Co-researchers	HKUST	King L. CHOW, Professor Division of Life Science
	KAIST	Kwang H. LEE, Professor Department of Bio and Brain Engineering
	NTU	—
	Tsinghua	Baoding LIU, Professor Department of Mathematical Sciences
Subject of the research project		<b>Soft Computing Approach to Intelligent Informatics under the Existence of Uncertainty</b>
Summary of the research project		<p>This grant for <b>Soft Computing (or Computational Intelligence) research</b> has been proposed to develop and utilize humans' intelligent information technology and to provide researchers in these disciplines an opportunity to show leadership in the field. Traditionally, the natural sciences in the West have stressed the pursuit of <b>objectivity</b> and <b>clarity</b>, whereas humans, especially in Asian countries including Japan, have paid close attention to <b>subjectivity</b> and/or <b>uncertainty</b>. In human-to-human communications in European and American countries for example, it is important to make clear "Yes" or "No." However, it is often thought that limiting research conclusions to this type of "crisp" information only is not enough in Asian countries, especially in Japan. Asian researchers think that people need to pay attention to other issues such as <b>ambiguity</b>, <b>subjectivity</b>, <b>atmosphere capturing</b>, and <b>intention understanding</b>.</p> <p>Co-researcher Prof. Liu @ Tsinghua Univ., has established the</p>

**Uncertainty Theory Lab** in cooperation with Prof. Hirota@Tokyo Tech and other co-researchers, in order to study Intelligent Informatics under the existence of uncertainty. Researchers from the four universities participating in this grant proposal will study these kinds of human-related information-processing technologies on computers and the internet using soft computing or computational intelligence that includes, as core technologies, such areas of study as **artificial intelligence, fuzzy logic, neural networks, genetic algorithm/evolutionary computation, chaos, and fractals**. From the application viewpoint, the proposed research topics should include robot-human **casual communication, quantum-computing**-based image understanding, **bio-informatics, multimedia** information retrieval/instrumentation, **logistics** optimization, **finance** engineering, and **intelligence control**.

A **satellite lab** will be established in the Department of Computational Intelligence and Systems Science at Tokyo Tech based on this research grant, where **TV conference** systems will be introduced to facilitate the smooth daily communication among researchers/students in the four universities. Direct **face-to-face** meetings/symposiums are also planned and research results will be published in the *Journal of Advanced Computational Intelligence and Intelligent Informatics* as a **special issue**. One of the principal researchers, Professor Hirota, is an editor-in-chief of this journal. Based on the 2012 research activities resulting from this grant project, further research cooperation will continue into 2013 in the form of symposiums, lectures, and publications.