

Kanazawa



Development of a system for diagnosis of early-stage dementia and other systems for a prevention-oriented society

Cluster Vision

Using research "seeds" from universities and research institutions within Ishikawa Prefecture such as superconducting quantum interference devices (SQUIDS), biosensors, and biomeasurement systems, we aim to develop a system to aid in diagnosis of early-stage dementia and other support systems for the elderly and to promote technological developments in the field of high-tech measurement. By fostering these research results and expanding with a focus on projects such as technology transfers, we aim to create new industry and business, inaugurate a system for brain checkups in response to the aging of society, innovate in order to construct systems for a prevention-oriented society, and finally to form Knowledge Clusters to produce technological "seeds."

Project Overview

Technologies to measure brain function are highly promising; using these technologies, the Kanazawa area is working to develop the technological elements that would effectively allow diagnosis of early-stage dementia, which is an issue for a rapidly aging society. We are also developing diagnostic and measuring systems used both at hospitals and in daily life, and the medical evaluations of these systems are to be performed. Taking advantage of the characteristics of the Kanazawa area, we aim to construct systems ranging from those for preventive medicine and health checkups, like the development of a system to aid in early diagnosis and prevention of dementia, to those to aid in healing/recovery and those for environmental conservation and food safety. We aim to construct industrial clusters in order to create a prevention-oriented society of the future.

1. Developmental research on a system to aid in diagnosis of early-stage dementia and protocols to prevent dementia
2. Development of ultra-sensitive magnetic-field measurement and control technologies for brain checkups and applied research into new fields of applications
3. Development of highly functional biosensors for brain checkups, and applied research into new fields of applications
4. Development of information-integration technologies within network environments for brain checkups, and applied research into new fields of applications
5. Developmental research on protocols to aid in recovery based on advanced biomeasurement technologies
 - Development of systems to aid in recovery based on noninvasive biomeasurement technologies
 - Development of protocols to measure evidence of mental health care and to aid in recovery
6. Developmental research on "aware" technologies in order to create "aware" homes
7. Development of biomagnetic field measurement equipment for small animals

Project Director
Shuichi Nakagawa



Shuichi Nakagawa: Former Director of Technical Development and Director of the Central Research Facility at Yokogawa Electric Corp., and former President of Yokogawa Research Institute Co., Ltd.

Incorporating project results with the prefecture's industry and health/welfare strategies and promoting cluster creation

Our project is facing its 4th year, which marks an important phase as emphasis shifts from validation of medical utility and verification tests to practical use.

Creating a framework to use development results to somehow continue creating clusters in the future and linking them to regional policies is also crucial.

These policies are distinguished from other general industrial policies in that they are industrial strategies linked directly to the results of the sensing cluster and health/welfare strategies using those results.

A strategy of utilizing the results from the sensing cluster as a specific project has been adopted by Ishikawa Prefecture's "Industrial Innovation Strategy" and "Health Frontier Strategy."

Fortunately, in November 2005, we succeeded in inviting the headquarters and research laboratory of the life-science division of a key corporation that had participated in joint research here in Kanazawa. This business and development base has begun operation, and we intend to further accelerate this momentum.

Cluster Headquarters

President.....Masanori Tanimoto (Governor, Ishikawa Prefecture)
 Vice President.....Hirotohi Shibuya (Chairman, Ishikawa Machinery and Electronics Association)
 Project Director.....Shuichi Nakagawa
 Chief Scientist.....Ryoji Suzuki (professor, Kanazawa Institute of Technology)
 Science and Technology Coordinators... Osamu Ishihara, Kazuo Tsukabayashi, Mutsumi Usui, Isao Hashimoto

Core Organization

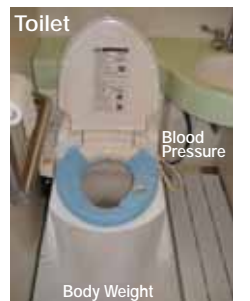
Ishikawa Sunrise Industries Creation Organization (ISICO)

Participating Research Organizations (Bold: Core Research Organization)

Industry...Shibuya Kogyo Co., Ltd., Yokogawa Electric Co., Ltd., Eagle Technology Inc., Ishikawa Seisakusho, Ltd., COM-ONE Ltd. Three Arrows Co., Ltd., Noritz Co., Fujitsu Hokuiku Systems, Ltd., Intec Inc. Progress Ltd.
 Academia...**Kanazawa University, Kanazawa Institute of Technology, Japan Advanced Institute of Science and Technology (JAIST),** Kanazawa Medical University, Osaka University, Tokyo Medical and Dental University
 Government...Industrial Research Institute of Ishikawa, RIKEN

Main Results

1. Applications of SQUID sensors
 We developed an MEG using SQUID sensors and are proceeding with clinical trials for diagnosis of early-stage dementia. We also developed a device for measurement of evoked magnetic fields in the spinal cord; it measures magnetic fields accompanying neural signal transmissions of the human cervical spine and is used to diagnose spinal damage. A clinical study on the device is underway at Tokyo Medical and Dental University. Furthermore, we developed a biomagnetic field measurement device for small animals consisting of 9 SQUID sensors integrated on a 10-mm-square chip. The device is used to measure the MCGs and MEGs of small animals. Clinical studies are underway with an eye toward its use in pathological analysis and to aid in new drug development.
2. Non-invasive biomeasurement system
 We are developing systems that can measure information such as body weight, blood pressure, and ECGs at home in a minimally invasive manner. One is a system to measure body weight, excretion, and blood pressure using a bathroom toilet seat. Another is a system to measure ECGs and respiration in the bathtub. Yet another is system to measure heartbeat and respiration during sleep using a pillow. Data on these systems is being collected from a model room and analyzed, and these systems are also being placed in hospitals and are undergoing clinical validation.
3. Commercialization of biosensors
 We developed an electrochemical detection chip that, in comparison to ELISA, uses a small sample size (1/10 the size), has a high sensitivity (10x higher), and detects its target in less time (1/10 as long). This chip is being commercialized as a "DEP Chip" with screen-printed electrodes. In addition, we developed a high-sensitivity fluorescence detector for biosensors. We have shrunk it down to A4 size and plan to commercialize it.



Results of Joint Research

