●Development Stage

(Fiscal Year 2006-2008)

Koriyama Area

Enhancing and Application of Haptic Technology with collaboration of Medical Science and Engineering

Fukushima Prefecture industrial promotion center
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Life Sciences
IT
Environment
Nanotech Materials
Others

Project Promotion

Project Director……Kuniaki Fukui
(President, Nippon Zenyaku Kogyo Co., Ltd.)
Chief Scientist……Isao Saito
(Professor, Department of Mechanical Engineering, College of Engineering Nihon University)
Science and Technology Coordinator…Hiroyuki Noda
Norimitsu Takahashi

Core Research Organizations

College of Engineering Nihon University, Fukushima Medical University, Fukushima University

Major Participating Research Organizations

Industry…IR Medical Laboratory Co. Ltd, P&M Co. Ltd., ASTER INDUSTRIES CO. Ltd. ATOM PRECISION TOOLS CO., Nidec Copal Corporation and others
Academia…College of Engineering Nihon University, Fukushima Medical University, Fukushima University and others
Government…Fukushima Technology Centre, Fukushima Agricultural Technology Centre - Livestock Research Centre and others

Aim of research and development

Fukushima Prefecture has conducted research and development for the up-to-date medical equipment industry which creates this state-of-the-art medical equipments such as telemedicines and the surgery robots to the start clinical setting widely, which is indispensable also for the next generation medical industry created in Japan to develop the Haptic technology which was developed by Nihon University (it is located in Koriyama City) as the Japan-made cutting edge technology. Its research and development were for City Area Program (Basic Stage) in Koriyama as the industries, academia and government aiming a wide range of use in the field of clinical treatment. The research and development of the Haptic technology has led development of new medical equipment and progress to the next generation medical and welfare equipment of non or low inversion for patients. Many other medical equipment were tentatively fabricated based on this technology.
In this City Area Program (Development Stage), this Haptic technology allowed research and development of the medical and welfare equipment using the industry-academia-government network that has been conducted as well as "Utsukushima next generation medical industry accumulation project" to accelerate the formation of the medical and welfare equipment industry cluster in Koriyama area.

Contents of research

It aims at the achievement of the next generation medical equipment by a new Haptic technology that can fuse to the state-of-the-art equipment such as telemedicines and the life support robots.

1. Integration of haptic (sense of touch) device, and its advanced functionalization and application to medical equipment
   1-1 Development of high performance type ultrasound probe with Haptic function and its application to clinical field
   Hardness of cirrhosis or hard lumps are detected by the equipment just like hands that touch the diseased part, for application and development of the next generation ultrasonic medical equipment.
   1-2 Development and research of a non-contact tonometer device by the phase shift method
   A new tonometer is developed. This is for diagnosis without contacting directly to the measuring object of the probe (augen) as using the supersonic wave that would be transmitted through air, which is different from conventional contact probes.

2. Development of bio-quality evaluation system of ovum and culture tissue by Haptic measurement
   2-1 Development of bio-quality evaluation system of ovum by Haptic measurement
   To complete a system to evaluate a bio-quality of ovum based on its biomechanics property through the use of Haptic technologies by conducting; (1) improvement of reliability for Micro Tactile Sensor (MTS) probe, (2) Development of a chamber for cultured cell measurement, (3) advanced functions of MTS integrating the monitoring technique of the respiration rate of oxygen, and (4) clinical evaluation.
   2-2 Tactile mapping
   To complete a system to evaluate the bio-quality by measuring the bio-mechanics property at the culture tissue level by conducting (1) MTS probe high acceleration, (2) development of the probe scanning system, (3) development of culture tissue chamber for measurement, and (4) clinical evaluation.

3. Development of the next generation gentle and soft robotic hand arm system with Haptic function and its application to medical support systems
   A robot hand arm system with the minimum weight will be achieved through an optimal structure design and a systematic joint mechanisms using the lightweight and direct acting actuators using a composite functional material by achieving a close relationship of experts in different fields such as material, sensor and system.
   This is to improve usability of the next generation hand arm systems for robots to live along with humans by integrating psychological analysis and evaluation by experts using an advanced sensor device or lightweight and flexible enclosure based on the research results.