

Measurement systems and Human augmentation technology

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Keyword

Measurement engineering, Human augmentation, Robotics

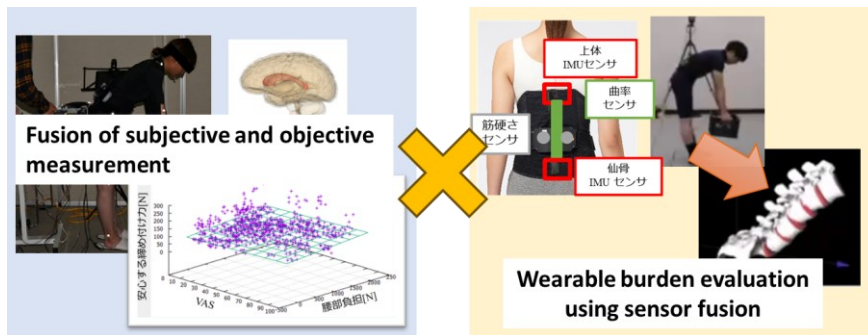
Technical consultation, available technology

- Research on motion measurement systems
- Development and proposal of a system to reduce body burden through movement measurement

PROJECTS

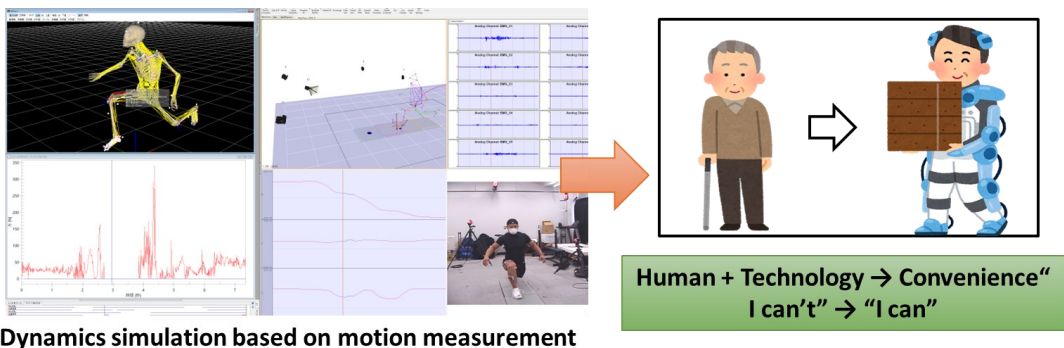
【Non-Invasive Motion Measurement System Using Sensor Fusion】

The incidence rate of lower back pain is approximately 80%, and measures for lower back pain, such as risk assessment through work and health management, are being implemented. However, with the increase in the elderly population and the workload of caregivers, the incidence rate of lower back pain exceeds 30%. Additionally, because the factors contributing to lower back pain are diverse, it is necessary to individually identify the specific causes of lower back pain and implement tailored measures accordingly. So far, an increase in intradiscal pressure (lower back load) has been cited as one of the factors contributing to lower back pain, and many studies have been conducted on this topic. However, a method for measuring individual lower back loads has not been established. Therefore, we are advancing the development of a wearable sensor system that can be used in daily life, as shown in the diagram. Furthermore, we are constructing technology to clarify the relationship between sensory measurements using the developed system.



【Assist System Based on Motion Measurement】

Preventing the need for care and supporting independence in Japan's aging society with a declining birthrate is an extremely important issue toward solving social problems such as a shortage of caregiving labor and social security funds. Currently, the most important aspect of care prevention and support for independence is to appropriately support the gradual decline in physical functions due to aging and maintain the activity range of elderly individuals as much as possible. Based on the idea that "maintaining the ability to stand up and sit down is directly linked to improving activity levels," we aim to construct an assist system for standing up and sitting down support. Additionally, we are also working on automation and robotization to improve factory work and productivity. In the construction of these systems, we independently build prototype machines through rapid prototyping.



Selected Papers

- [1] Tsuchiya Y., Tanaka, Y., Tanaka, T., Fundamental Knowledge Acquisition by Using Wearable Sensor for “KEIROKA” of Construction Industry. IFAC-PapersOnLine, 56(2), pp.9709-9714,2023.
- [2] Mikami H., Tsuchiya Y., Tanaka T., Wada C., Selection and Evaluation of Appropriate Assist Force for Standing and Sitting Motion Assist Devices Using Residual Function, The Japanese Journal of the Institute of Industrial Applications Engineers, 10(2), pp.82-89, 2022 (in Japanese).
- [3] Tsuchiya Y, Tanaka T., Kamishima T., Relationship between Upper Body Posture Angle and Vertebral Body Posture Angle in Lateral Flexion and Rotation Posture, Advanced Biomedical Engineering, 9, pp.181-188 , 2020.