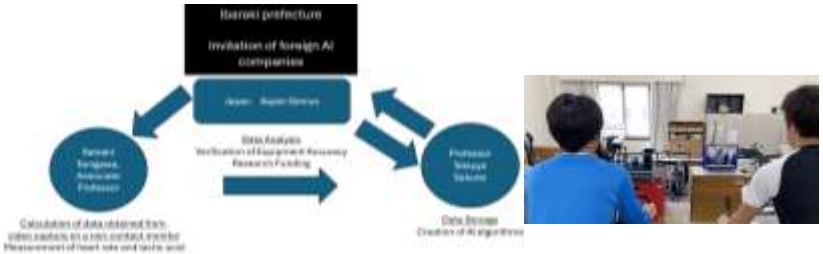
Super Genius AITek

The Project of Non-Contact Lactate and Other Physiological Data Measurement for Athlete Training and General Health Management in the Field of Health Management

Purpose of the Project

- This project aims to demonstrate the effectiveness of using a camera to measure key physiological data such as lactate in real time without direct physical contact by utilizing a new health management system for athlete training and general health management in the field of health management. This approach minimizes the burden and risks associated with traditional physiological measurement methods.
- Blood lactate concentration has long been used as an objective indicator of exercise intensity, but it has been time-consuming and costly. If the validity of a non-contact lactate monitoring system is proven, it will be a revolution in exercise monitoring methods.
- Expected results and solutions: 1.The non-contact measurement system can accurately detect an athlete's lactate threshold. 2. Lactate measurements can effectively assess post-exercise fatigue and recovery speed. 3. It can monitor changes in lactate dynamics after long-term training and evaluate training effectiveness.



Details of Demonstration

- This project is a collaborative research with the University of Tsukuba. The overall management, data collection, and operation of the non-contact monitor were conducted by the Institute of Health and Sport Science, University of Tsukuba. The AI Research Center, University of Tsukuba was responsible for obtaining the data, creating the AI algorithms, and storing the data obtained during the exercises. Our company was responsible for selecting the measurement and evaluation items, including blood lactate concentration and heart rate, and analyzing data obtained from the non-contact monitoring.
- Synchronization between blood lactate data and non-contact measurement results was performed. Blood lactate measurement is widely recognized and plays an important role in ensuring the reliability of the results, while non-contact measurement technology is still new. For this reason, the synchronization of both measurement results was conducted to verify data consistency.
- Through non-contact monitoring system, each subject performed three types of tests — Incremental Load Test, Constant Load Test, and Wingate Test — and collected and analyzed changes in blood lactate data and heart rate.

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Project Outcome

1. Validation of Lactate Threshold: Significant correlations were observed between changes in facial images and blood lactate concentration. This demonstrates that non-contact image monitoring technology effectively reflects changes in exercise load and its potential as an assessment tool for exercise intensity.
2. Exercise Fatigue and Recovery Time: The group with higher HRV tended to recover faster, while the group with lower HRV to take longer to recover. This result suggests that HRV analysis can be applied to personalized exercise training plans and may help optimize training loads and recovery strategies for athletes.
3. Training Adaptability Assessment: It has found that the group with higher HRV recovers faster, while the group with lower HRV takes longer to recover. Therefore, it is necessary to make estimates based on each subject's individual condition until all data is collected.
4. Real-Time Exercise Intensity: If exercise intensity can be calculated from physiological parameters such as image data and heart rate, it will be possible to display changes in exercise intensity in real-time.

Challenges and Solutions

The application value of non-contact physiological monitoring technology in exercise science and health management has been confirmed in the early stages.

- To recruit participants, we will use various methods to reach a wide target audience.
- We will reduce unnecessary delays in test progress and increase the availability of equipment and test sites.
- Data analysis will be conducted in phases to reduce the processing burden and ensure that the necessary data can be processed promptly.

Future Plans

- Short-term Plan: We aim to introduce our products or services to the Japanese market, focusing on acquiring both B2B and B2C users.
- Mid-term Plan: We will work to expand into the Taiwanese and European markets while pursuing the necessary international certifications for our products and services.
- Long-term Plan: We plan to enter the U.S. market, where demand is expected to be high in the sports and healthcare sectors.