

## Balanced measure equipment to improve lateral balance in disabled weightlifters

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### Objectives

The number of disabled athletes is increasing. And the sports for the disabled are being developed into the elite sports, but with the lack of the expensive specialized equipment for training, it is difficult for Korean disabled athletes to exert the best performance against the developed athletes. In most sports, including 'weight lifting', the balance of body and the power is very important and closely related to the result of the competition. In wheelchair, athletes require the equipments that can provide a feedback on the left and right balance accordingly. In addition, a low-cost equipment is required for the disabled athletes to receive a visual feedback on their own training without professional assistance. Therefore, we suggested the balance measuring equipment and the application that visualized through smart phones and providing the immediate data for the disabled weightlifters.

### Methods

We provided the player with information about the balance between left and right during the bench press operation by using balance measuring equipment and smart phone. As shown in Fig. 1, the balance measuring equipment has been designed to allow the mounting of the acceleration sensor in the center of the barbell to identify the left and right balance of the barbell. In order to identify the balance of the player's shoulder and hip on the bench, the load cell sensors have been designed to fit the size of the bench. As shown in Fig. 2, we designed and provided a smart phone application that receives the sensor values from the barbell side and bench side to the Bluetooth module and visually outputs the data. Fig. 3 shows the overall system configuration of the balance measuring equipment. Through the developed equipment, the balance data and equipment were used for the first time use of the equipment for the disabled weightlifters and the training was performed in parallel to re-measure the balance improvement after 6 weeks.

### Results

This study was conducted with a bench press training for the disabled using the balance measuring equipment and smart phone. The balance between the barbell side and bench side of the athletes showed a great difference when measured using the balance equipment for the first time. However, the balance of the barbell side was leveled close to 0 ° by using the equipment for 6 weeks of training. In the case of the balance of the bench, the difference between the left and right pressures was big before using the equipment, but the difference after training was remarkably reduced.

### Conclusion

The developed equipment can be used as a low-cost equipment in many aspects, not only for the disabled weightlifters, but also for the non-disabled people with bench presses, or by real-time monitoring of balance in sitting position using bench side sensors. We have improved balance between left and right after training by using the balance measuring equipment and smart phone.

### Keywords

Balance, Disabled weightlifting

## Acknowledgment

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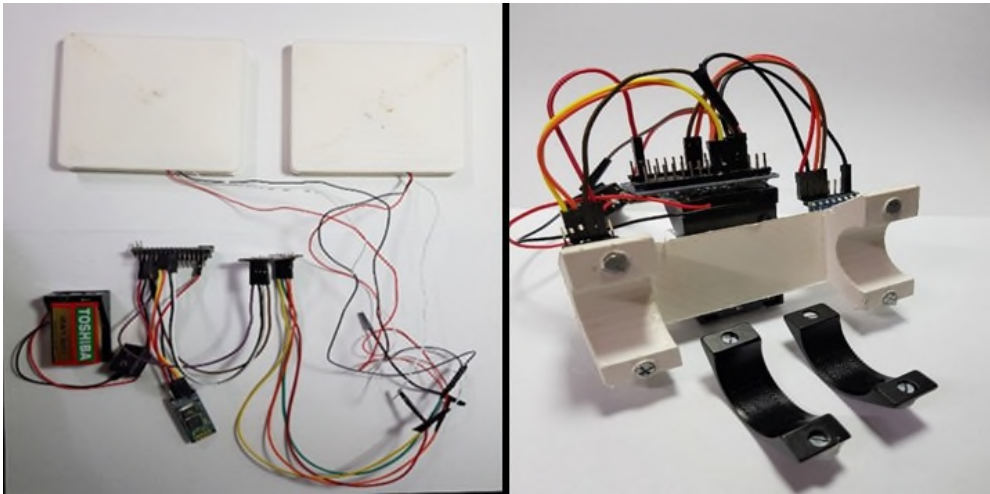


Fig.1 Balance measuring equipment

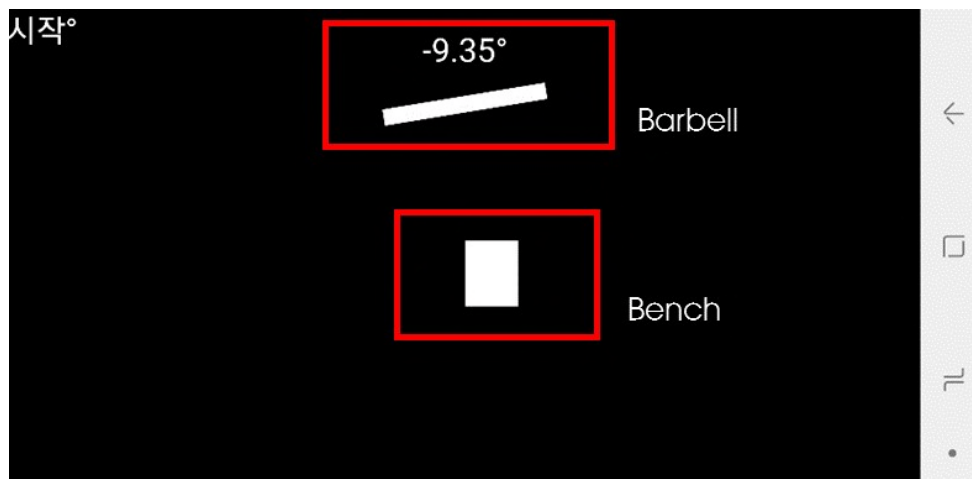


Fig.2 Smart phone application output screen

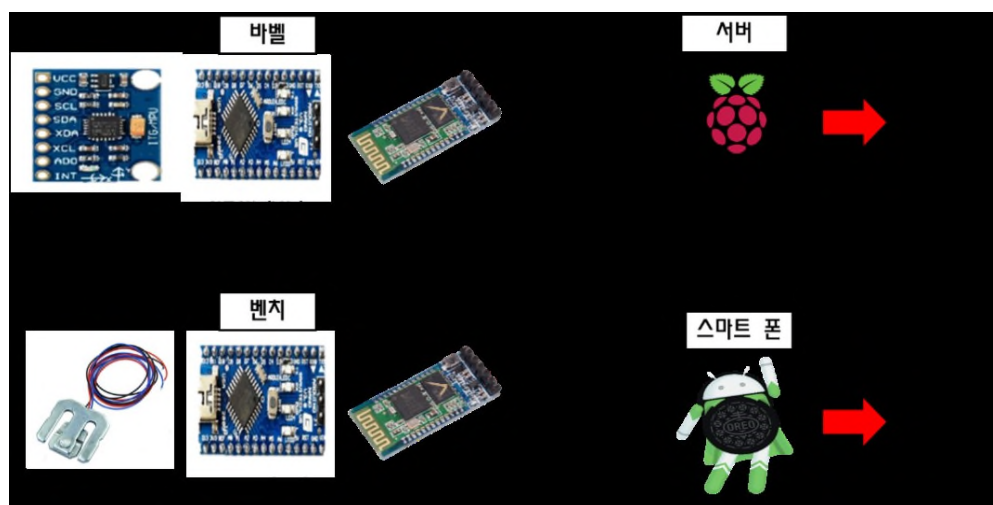


Fig.3 Balance measuring equipment overall system configuration diagram