

DEVELOPMENT OF FURNITURE-EMBEDDED NON-CONTACT OPTICAL BIOMETRIC MEASUREMENT SYSTEM FOR HOME HEALTH MANAGEMENT

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ABSTRACT

The second leading cause of death among Japanese is heart disease, and since 1997, this figure has been on the rise. While assessments of cardiac function involve methods such as echocardiography, MRI, and Holter electrocardiogram tests, these generally require visits to medical facilities, making their use in daily life. Additionally, the proportion of elderly individuals in present-day Japan is 29.2%, exceeding global averages, resulting in an aging society where daily medical appointments become a significant burden for the elderly.

In recent years, home medical care has gained attention, leading to the development of furniture-embedded measurement devices and systems that enable unconscious measurements during daily life. Considering that users are typically clothed during these measurements, signal measurements through clothing are being considered.

This study aimed to develop a device that allows unconscious pulse wave measurement simply by sitting in a chair during daily life. Furthermore, a measurement system utilizing pulse waves during sleep was created for health management, designed to be embedded in bedding. Subsequently, investigations were conducted to determine whether waveform measurements through clothing over the knee pit using an optical sensor are feasible when the device is placed on a chair, and similar considerations were made for signal detection from the neck under comparable conditions. Neck measurements were conducted with the subject lying supine on a bed in a resting state.

In this study, a male in twenties was the target subject, and pulse wave measurements through fabric over both the knee pit and neck were conducted using an optical sensor, confirming the feasibility of signal detection. Additionally, knee measurements involved actual clothing, confirming pulse wave measurements under various conditions such as thickness, color, and fabric.

Thus, it can be concluded that pulse wave measurements through fabric in a seated position and waveform measurements from the knee pit while wearing clothing are possible. Also, based on the confirmation of pulse wave measurements from the neck, the acquisition of biological information usable for daily health management was established.

Therefore, future research should not only verify if measurements are possible with different types of clothing but also involve an increase in the number of participants. To achieve the ultimate goal of this study, which is the development of a device that can be used by subjects requiring home medical care, participants from various age groups need to be included. Furthermore, simultaneous measurement of pulse waves in the lower limbs and neck is necessary to develop a system capable of evaluating circulatory function.