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Development of Textile Capacitive Proximity Sensor and Gait Monitoring System for Smart Healthcare

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Abstract. Gait is the most common situation and activity in daily life and it is a basic parameter to monitor ones health status. We propose a single channel capacitive proximity pressure sensor (TCPS) and gait monitoring system for smart healthcare. To evaluate an accuracy of TCPS, step count and error rates of step counting were detected at the same time using a ZIKTO Walk, pedometer and naked eye as reference. Results showed that the error rate at 1.77% of TCPS was lower than those of other devices and correlation coefficient was 0.958 (p-value: 0.000). From this result, our proposed system will be helpful a development of gait monitoring and measurement system as smart healthcare.

Keywords: Gait, Capacitive Proximity Sensor, Conductive Textile

1   Introduction

Nowadays, interest in healthy life is being increased with improvement in healthcare technology. In addition, an aging society has contributed to increases in medical costs due to the need for individualized healthcare to prevent disease and maintain healthy life [1]. Recently, the paradigm of healthcare which impacts individual's quality of life has shifted its focus from medical system to individual healthcare. These changes have led to the pursuit of user convenience in healthcare-related devices and systems.

Walking is the most natural and convenient way to move in short distances. Currently, various researches are being conducted in detect of gait indicators. To measure gait indicators, various signal processing techniques are being studied [2]. Step counts and strides are the most important indicator of daily walking [3]. In [4], research related to step counting was performed to determine of personal health in daily life. Also, as technology advances with this trend, various sensors have been developed to collect biometric information. Sensors used for gait analysis can be roughly divided into inertial sensors, pressure sensors, and cameras (image data) [5-7].

Meanwhile, Conductive textile has been used in various fields. It has advantage such as comfortable, elasticity, and so on. It can be created in various forms. It has been