

AIoT-enhanced health management system using soft and stretchable triboelectric sensors for human behavior monitoring

Liang Xu¹, Songyi Zhong¹, Tao Yue¹, Zixuan Zhang², Xiao Lu¹, Yangqiao Lin¹, Long Li¹, Yingzhong Tian¹, Tao Jin³, Quan Zhang³, and Chengkuo Lee²

¹Shanghai University

²National University of Singapore

³Shanghai University School of Mechatronic Engineering and Automation

March 31, 2024

Abstract

Sedentary, inadequate sleep and exercise can affect human health. Artificial intelligence (AI) and Internet of thing (IoT) creates the Artificial Intelligence of Things (AIoT), providing the possibility to solve these problems. This paper presents a novel approach to monitor various human behaviors for AIoT-based health management using triboelectric nanogenerator (TENG) sensors. The insole with solely one TENG sensor, creating a most simplified system that utilizes machine learning (ML) for personalized motion monitoring, encompassing identity recognition and gait classification. A cushion with 12 TENG sensors achieves real-time identity and sitting posture recognition with accuracy rates of 98.86% and 98.40%, respectively, effectively correcting sedentary behavior. Similarly, a smart pillow, equipped with 15 sensory channels, detects head movements during sleep, identifying 8 sleep patterns with 96.25% accuracy. Ultimately, constructing an AIoT-based health management system to analyzes these data, displaying health status through human-machine interfaces, offering the potential to help individuals maintain good health.

Hosted file

Cover Letter.docx available at <https://authorea.com/users/761721/articles/737852-aiot-enhanced-health-management-system-using-soft-and-stretchable-triboelectric-sensors-for-human-behavior-monitoring>

Hosted file

Complete Manuscript-R1.docx available at <https://authorea.com/users/761721/articles/737852-aiot-enhanced-health-management-system-using-soft-and-stretchable-triboelectric-sensors-for-human-behavior-monitoring>