ISBN:
978-1-917892-15-5

Kyungwho Choi

Sungkyunkwan University, Suwon, South Korea

Self-Powered Acceleration Sensor for DistancePrediction via Triboelectrification

Abstract: Accurately predicting the distance an object will travel to its destination is very important in various sports. Acceleration sensors as a means of real-time monitoring are gaining increasing attention in sports. Due to the low energy output and power density of Triboelectric Nanogenerators (TENGs), recent effortshave focused on developing variousacceleration sensors. However, thesesensors suffer from significant drawbacks, including large size, high complexity, high power input requirements, and high cost. Here, we described a portable and cost-effective real-time refreshable strategy design comprising a series of individually addressable and controllable units based on TENGs embedded in a flexible substrate. This results in a highly sensitive, low-cost, and self-powered acceleration sensor. Putting, which accounts for nearly half of all strokes played, is obviously an important component of the golf game. The developed acceleration sensorhas an accuracy controlled within 5%. The initialvelocity and acceleration of the forward movement of a rolling golf ball after it is hit by a putter can be displayed, and the stoppingdistance is quicklycalculated and predicted in about 7 s. This research demonstrates the application of the portable TENG-based acceleration sensor while paving the way for designing portable, cost-effective, scalable, and harmless ubiquitous self-powered acceleration sensors.

Keywords: triboelectric nanogenerator; self powered; acceleration sensor; distance prediction

Acknowledgements:
This work was supported by the NationalResearch Foundation of Korea (NRF) grant funded by the Korea government (MSIT)(RS-2024-00338055).