Gesture Recognition and Human-Computer Interaction Combining Flexible Biomimetic Sensor with Internet of Things

Shengshun Duan*, Jun Wu*

*Joint International Research Laboratory of Information Display and Visualization, School of Electronic Science and Engineering, Southeast University, 210096, China (wujunseu@seu.edu.cn)

Abstract

The combination of the Internet of Things and the flexible wearable electronics is considered as an effective way to realize data acquisition, processing and feedback and has drawn increasing attention in recent years. Therefore, A flexible bionic wearable angle sensor with linear sensing ability based on PVA-Microstructured PU sponge-PVA sandwich structure was fabricated by a simple two-step method including laser-engraving and dip-coating, which was inspired by the crack-shaped slit sensilla of the heterometrus petersii. The sensor took advantage of microstructured PU sponge as sensing functional layer and PVA thin film as supporting layer and strain transmitted layer.

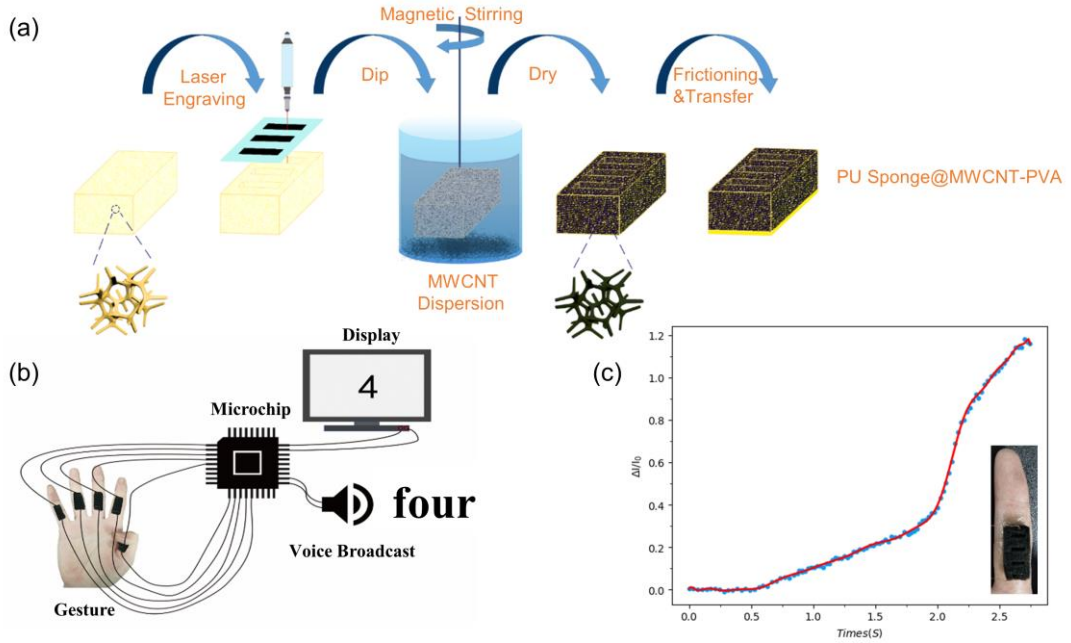

Figure 1. a) Schematic illustration of fabrication procedure of Microstructured PU sponge@SWCNT – PVA film. b) Schematic diagram of gesture recognition system. c) The I-T curve of the flexible biomimetic angle sensor during the bending of the index finger

By optimizing the structural parameters systematically, the sensor showed linear sensing ability for angle, which do not require additional complex signal processing and meet the increasing demand for device miniaturization and low power consumption. Furthermore, the sensor exhibited high sensing performance, such as high sensitivity($\frac{\Delta I/I_0}{\Delta angle} \approx 0.005$), fast response

time(≈286ms), and good durability(over 200 cycles). To demonstrate the potential application of this angle sensor in the field of human-computer interaction, we developed a gesture recogniton system by combining this angle sensor and the embedded system. The microchip acquires and processes data from the flexible angle sensor, and then, the recognised gesture are displayed and broadcasted, whih provided the basis for sign language recognition and display. This work provides a new prospective for fabricating wearable electronic sensors with high performance towards human-machine interaction and angle sensing, and will further expand their impact in the Internet of Things.