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Topic of the Speech:

Wireless Temperature Sensing Yarn with UHF RFID Helix Dipole Hybrid Antenna for Respiratory Monitoring

Professor Jiyong Hu

Donghua University
China

Professor Jiyong Hu received his Ph.D. in textile engineering from Donghua University in 2008, and as a visiting student studied in ENSAIT, France between 2006-2007. Prior to joining the Donghua university faculty in 2011, he was a postdoctoral researcher in the Hong Kong polytechnic university.

He has been engaged in the research and development of functional textiles, especially in flexible fiber/textile electronics and weaving technology of technical fabric. His researches are financially funded by the national key research and development project, the NSFC, NSFC of Shanghai, China postdoctoral science foundation and enterprise joint projects. He has won the science and technology progress award of the textile industry federation and the textile teaching reform achievement award, and has been selected into "entrepreneurship and innovation doctor talent" by Jiangsu as well as Anhui province.

He has published more than 200 peer-reviewed papers, owned more than 40 invention patents, and published a monograph supported by the national publishing foundation and two textbooks.

ABSTRACT SUBMISSION
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Jiyong Hu
Shanghai Frontiers Science Center of Advanced Textiles, College of Textiles, Donghua University, Shanghai 201620, China
*Presenter's email: hujy@dhu.edu.cn

ABSTRACT (NO MORE THAN 500 WORDS:)

Respiratory contains the basic signal of human health, and its monitoring plays an important role in clinical treatment. In recent years, the combination of radio frequency identification (RFID) sensing technology and textile materials has provided a new scheme for respiratory monitoring. However, existing textile-based RFID sensors in the field of respiratory monitoring involve issues such as poor comfort, low flexibility, poor concealment, and frequent signal interferences. There is an urgent need to develop flexible wireless sensors with lightweight, miniaturized or even one-dimensional structure, and good reading performance for monitoring of human respiration. We designed a wireless temperature sensing yarn by the principle of impedance mismatch between ultra-high frequency (UHF) antenna and RFID chip as well as an incorporation of miniature thermistor, then the prototype was prepared, the structure was optimized and its basic sensing performance was evaluated. Additionally, the impact of contextual factors (bending, humidity, and human body) on the functionality of the sensing yarn integrated into facemasks for respiratory monitoring was investigated. The findings revealed that the received signal strength indication (RSSI) of the developed sensing yarn with right helix structure exponentially varied with temperature, showing its good wireless temperature sensing ability. Further, the contextual factors influenced antenna impedance, resonant frequency, and radiation capacity of the sensing yarn to some extent, leading to a slight deterioration in its performance. Nevertheless, it was worth mentioning that these factors had minimal effect on respiratory monitoring and provided preliminary evidence supporting its precise capability in tracking human respiration.