Team creates new tool to speed up the design of wearable tech

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In a new paper published by *Nano Energy*, experts from the Advanced Technology Institute (ATI) at the University of Surrey detail a new methodology that allows designers of smart-wearables to better understand and predict how their products would perform once manufactured and in use.

The technology is centred on materials that become electrically charged after they come into contact with each other, known as 'triboelectric materials' - for example, a comb through hair can create an electrical charge. 'Triboelectric Nanogenerators (TENGs)' use this static charge to harvest energy from movement through a process called electrostatic induction. Over the years, a variety of TENGs have been designed which can convert almost any type of movement into electricity. The University of Surrey's tool gives manufacturers an accurate understanding of the output power their design would create once produced.

This follows the news earlier this year of the ATI announcing the creation of its £4million state-of-the-art Nano-Manufacturing Hub. The new facility will produce plastic nanoscale electronics for wearable sensors, electronic tags and other electronic devices.

Ishara Dharmasena, lead scientist on this project from the University of Surrey, said: "The future global energy mix will depend on renewable energy sources such as solar power, wind, motion, vibrations and tidal. TENGs are a leading technology to capture and convert motion energy into electricity, extremely useful in small scale energy harvesting

applications. Our work will, for the first time, provide universal guidance to develop, compare and improve various TENG designs. We expect this technology in household and industrial electronic products, catering to a new generation of mobile and autonomous energy requirements."

Professor Ravi Silva, Director of the Advanced Technology Institute, said: "This is truly an exciting area of research for our team - an area we have been working on over a number of years. We believe that our new tool will be of great help to a lot of researchers and designers who are investigating these materials.

"The world urgently needs new forms of affordable and renewable energy sources. TENGs not only present a wonderful opportunity for the consumer electronics industry, but they are an incredibly exciting material group that could be used in all countries and remote locations where the nation grid does not extend, particularly for radios, wireless communication devices and medical equipment."

More information: R.D.I.G. Dharmasena et al, A unified theoretical model for Triboelectric Nanogenerators, *Nano Energy* (2018). DOI: 10.1016/j.nanoen.2018.03.073

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