Conformal sensors for non-invasive monitoring and health care

Prof. Madhu Bhaskaran
School of Engineering
Royal Melbourne Institute of Technology (RMIT)

madhu.bhaskaran@rmit.edu.au

Abstract – Incorporating electronic materials into flexible or stretchable platforms enables the development of sophisticated and conformal electronic devices. My research has focussed on processes that enable functional stretchable electronics while conducting studies to understand the fundamental mechanisms behind the behaviour of the realized devices. The curvilinear adaptability offers distinct advantage over conventional rigid electronic devices. These devices can adapt seamlessly to the human body, which allows for excellent vital information collection through intimate contact with the skin.
This research enables us to push fundamental boundaries – an example of this is demonstration of electronic skin. Electronic artificial skin has components that mimic human skin's responses. These replicate organic skin's ability to react to external stimulus such as pressure or heat and relay a signal to the brain through the nervous system, as well as the brain's decision-making ability allowing an appropriate response to the stimulus to be relayed back. Such breakthroughs are significant steps towards the development of life like prosthetics or incorporating more sensing modalities for robots. There are also numerous practical applications - the presentation will also cover the journey to commercialise technology in collaboration with numerous industry, manufacturing, and design partners. These include nearables for non-invasive monitoring, wearables for healthcare, and point of care diagnostics.

Prof. Madhu Bhaskaran FTSE is a multi-award winning electronics engineer and innovator - she has won the 2018 Batterham Medal from the Australian Academy of Technology and Engineering and the 2020 Frederick White Medal from the Australian Academy of Science. She co-leads the Functional Materials and Microsystems Research Group at RMIT University which she established in 2010. She also has leadership roles with the ARC Hub for Connected Sensors for Health and the ARC Centre of Excellence for Transformative Meta-Optical Systems. Her work on electronic skin and wearable sensors has been patented and her group works collaboratively with multiple industry and design partners to commercialise the technology for healthcare and aged care.