

# Wearable antennas for remote monitoring

November 14 2014, by Robyn Mills

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Humans may become walking antennas for remote monitoring and mobile communications – with the help of University of Adelaide research to produce antennas integrated into clothing.

Still under development, the wearable antennas have potential application in biomedical monitoring, sports analysis, military and [emergency communications](#).

The antennas can be incorporated into clothing using computerised embroidery into conductive fabric. A range of different shaped and sized antennas can be produced using altered patterns in the embroidery.

"Wearable electronic systems for a range of communications applications have grown exponentially over the last few years," says Dr Thomas Kaufmann, post-doctoral researcher in the School of Electrical and Electronic Engineering.

"But the problem is these devices need very efficient antennas to communicate with the data receiver and to power the sensors being used – especially with [radio frequency identification](#) (RFID) systems where the radiowave has to power the whole system.

"Another issue is that the human body does not make a good environment for our [antenna](#). We are a container of saltwater from an electromagnetic point of view; we absorb and change the characteristic of the signal, rather than transmitting it efficiently."

The solution being developed is a t-shirt made of conductive metallised fabric which is low-cost, flexible and lightweight. It doesn't deteriorate easily and is washable, with the antenna embroidered onto the textile.

The difficulty of incorporating the electronics has been overcome with using snap-on buttons which form a connection between the textile antenna and the sensor device. These can easily be removed for washing.

"We can't integrate the electronics directly into the t-shirt because they would be uncomfortable to wear and aren't water-proof," says Dr Kaufmann. "We've recently shown in work by PhD student Shengjian Jammy Chen that these readily available snap-on buttons used commonly on clothing, make very reliable connections between the antenna and the electronics."

Dr Kaufmann, who is part of the Applied Electromagnetics Group with Professor Christophe Fumeaux, is working with Dr Damith Ranasinghe, School of Computer Sciences, on an active monitoring system for elderly people.

The group is investigating various configurations of antennas to optimise their performance for different frequencies and purposes, and are also looking at the replacement of rigid data cables with flexible ones incorporated as transmission lines into t-shirts.

Provided by University of Adelaide

Citation: Wearable antennas for remote monitoring (2014, November 14) retrieved 25 April 2024 from <https://phys.org/news/2014-11-wearable-antennas-remote.html>

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