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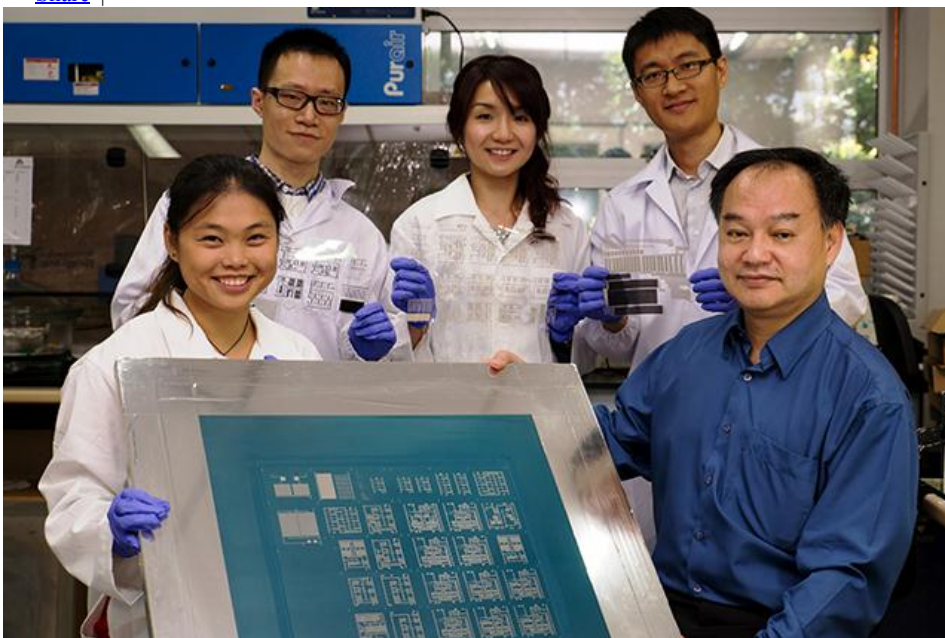
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## Printing electronic circuits with common t-shirt printer

17 November 2014  
By Tereza Pultarova



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Singaporean researchers have developed a new method to print complex flexible electronic circuits using an ordinary t-shirt printer.

According to the researchers, various electronic components such as resistors, transistors and capacitors could be printed in layers on common materials including plastic, aluminium foil and even paper.

“This means we can have smarter products, such as a carton that tells you exactly when the milk expires, a

A research team from Singapore's Nanyang Technological University with a complex printed electronic circuit [Credit: NTU]

bandage that prompts you when it is time for a redressing, and smart patches that can monitor life signals like your heart rate,” said Associate Professor Joseph Chang from the School of Electrical and Electronic Engineering of the Nanyang Technological University (NTU) in Singapore.

“We are not competing with high-end processors like those found in smartphones and electronic devices. Instead we complement them with cheaply printed circuits that cost mere cents instead of a few dollars, making disposable electronics a reality.”

Electronic components created with the t-shirt-printing method would not only be disposable but also easy to mass-produce, the scientists believe.

To reduce the environmental impact, the team has only used non-toxic organic materials such as silver nanoparticles, carbon and plastics.

“Our innovative process is green, using non-corrosive chemicals,” Chang said. “It can be printed on-demand when needed within minutes. It is also scalable, as you can print large circuits on many types of materials and, most importantly, it is low cost, as print technology has been available for decades.”

The most complex circuit the team has created using the method was a 4-bit digital-to-analogue converter – a component commonly used in turning digital signals into sound for speakers and headphones.

The university has recently established a start-up company to explore possibilities for commercialisation of the invention.

The team of four, including two engineers, a material scientist and a chemist, will now focus on developing both digital and analogue printable circuits for biomedical applications and smart lighting systems.

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