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## Stretchy circuit possibilities

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A new kind of stretchy silicon circuit could open the door to "smart" surgical gloves, interactive clothing and flexible devices that wrap around mechanical parts such as aircraft wings.

The stretchable integrated circuit can be moulded around complex shapes and operate while being compressed, folded or pulled apart with no reduction in performance.

It would be ideal for wearable medical monitors that can read heart rate and other vital signs, or surgical gloves fitted with sensors, say scientists.

Professor John Rogers, a member of the development team at the University of Illinois in Champaign, US, said: "The notion that silicon cannot be used in such applications because it is intrinsically brittle and rigid has been tossed out the window. Through carefully optimised mechanical layouts and structural configurations, we can use silicon in integrated circuits that are fully foldable and stretchable."

In December 2005 Prof Rogers and his team reported the development of a form of "wavy" single-crystal silicon that could stretch in one direction.

Now, working with colleagues in the US and Singapore, the group has extended the concept to two dimensions.

The circuit elements are printed onto a plastic layer 50 times thinner than a human hair.

These are then bonded to a piece of pre-strained silicon rubber. When the strain is relieved, and the rubber allowed to spring back to its initial shape, a complex pattern of "wavy" buckling is created. It is this "wavy" geometry that allows the circuit to be folded or stretched in different directions.

The researchers incorporated the stretchy circuits into transistors, oscillators, logic gates and amplifiers. They were found to have electrical properties comparable with those of similar circuits build on conventional rigid silicon wafers.

A report on the work appears in the online edition of the journal Science.