Human-like robots that stretch your imagination

S’pore scientists use elastic polymer to create less jerky movements

By DAVID EE

GOODBYE, R2-D2. Hello, Terminator.

Singaporean researchers have made an important breakthrough in the field of robotics that may mean the end of clunky, awkward robots, and herald the rise of a new generation that move like us.

In a world first, they took inspiration from the human body to use conductive, elastic polymers as “muscles”.

These stretch in response to electrical impulses, much like human muscles extend and flex when neurons carry signals from the brain.

Robots using the man-made muscles “will be able to function in a more human-like manner” than conventional ones powered by hydraulics, said lead researcher Adrian Koh of the National University of Singapore’s Department of Civil and Environmental Engineering.

They could be up to 10 times lighter. And, crucially, they may be able to carry loads up to 80 times their weight, compared to just double their weight now.

This is because the polymer “muscles” have both strength and high elasticity, meaning they can stretch up to 10 times their length when under strain, before returning to their original shape.

“Think of how efficient cranes could get if armed with such ‘muscles’,” said Dr Koh.

The 38-year-old was awarded the Promising International Researcher Award at the 3rd International Conference on Electromechanically Active Polymer Transducers and Artificial Muscles in Zurich in June in recognition of his work.

“Robots move in a jerky manner because of (hydraulics),” he said.

“Now, imagine artificial muscles which are pliable, extendable and react in a fraction of a second just like those of a human.”

The polymer, known as acrylic elastomer, has also been used in robot “faces” to enable them to mimic facial expressions.

Extending this throughout a robot body could make it “entirely possible” to one day create robots that are indistinguishable from humans in how they look and move, said Dr Koh.

One other advantage of the polymer is its ability to store energy. This means that robots using it could be predominantly self-powered, needing only short periods of charging.

Dr Koh’s team aims to first create a robot “arm” within three years, then a full robot body within six to eight years.

davidee@sph.com.sg