TRN Research News Roundup
The Latest Technology Research News

Week of August 22, 2005

Give it some skin

Consider a humanoid robot in your home. Would you trust it toput away the dishes, hang a mirror, brush the dog or boil water on the stove? One of the key differences between humanoid robots as they exist today and humans is skin that is sensitive to pressure and temperature.

A method for making flexible plastic mesh that contains pressure or temperature sensors at each junction could lead to artificial skin with sensitivities comparable to those of human skin. The technique also enables multiple meshes containing different types of sensors to be laminated together. A multiple-mesh skin could give robots not only sensitivity to pressure and temperature, but also to light, humidity, strain and ultrasound.

This mesh contains a flexible network of pressure and temperature sensors that could one day serve as skin for robots.

(Conformable, Flexible, Wide-Area Networks of Pressure and Thermal Sensors with Organic Transistor Active Matrixes, *Proceedings of the National Academy Of Sciences*, August 23, 2005)

Fast nanotube fabrics

Carbon nanotubes are stronger than steel and have useful electrical and optical properties, making them a prime candidate for all sorts of strong, light, intelligent materials. The challenge to seeing the tiny tubes through to their potential is making materials from them in bulk in a way that preserves all the useful properties.

A new manufacturing method that's practical enough to be used commercially produces 5-centimeter-wide sheets of carbon nanotubes at a rate of 7 meters per minute. Meter-long samples a thousand times thinner than human hair are transparent, conduct electricity, absorb microwaves and emit light. Potential applications include solid-state lighting, solar cells, displays, and antennas built into car windows.

(Strong, Transparent, Multifunctional, Carbon Nanotube Sheets, *Science*, August 19, 2005)

Domesticated algae

Throughout history, humans have used beasts of burden. As scientists working in microscopic realms shift from exploring to exploiting, what's old could become new again.

Scientists have attached plastic beads to microorganisms and directed the movement of the tiny organisms to cause them to transport the beads. The researchers burdened one-celled algae that swim toward dim light and away from bright light with beads as large as six thousandths of a millimeter. The method calls for chemically attaching beads to the algae, using light to direct the motion of the organisms, then detaching the beads at the destination using ultraviolet light.

The tiny beasts could be used as power sources and transporters in microfluidic devices.

(Microoxen: Microorganisms to Move Microscale Loads, *Proceedings of the National Academy Of Sciences*, August 23, 2005)

Bend, but don't slow down

The possibilities of rollup displays and bendable electronic gadgets have focused much attention on making circuits from plastic. Although an impressive feat, today's prototypes are slower than the silicon devices that have been widely used for decades.

As it turns out, however, flexibility doesn't necessarily require the circuits themselves to be plastic, just the substrate they occupy. A method of printing microscopic gallium arsenide wires onto plastic surfaces shows

that circuits made from traditional high-speed metal and semiconductor materials can be made to bend.

The high-speed flexible circuits could be used in communications devices, space systems and flexible displays.

(Bendable GaAs Metal-Semiconductor Field-Effect Transistors Formed with Printed GaAs Wire Arrays on Plastic Substrates, *Applied Physics Letters*, August 22, 2005)

Bits and pieces:

A robotic bat head emits and detects ultrasound, and even has movable ears; a method of slowing and speeding light traveling through optical fiber; and a prototype fuel cell powered by coal.

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