Scientists design first robot using mould

August 30 2009

Plasmodium used in the research.

(PhysOrg.com) -- Scientists at the University of the West of England are to design the first ever biological robot using mould.

Researchers have received a Leverhulme Trust grant to develop the amorphous non-silicon biological robot, plasmobot, using plasmodium, the vegetative stage of the slime mould Physarum polycephalum, a commonly occurring mould which lives in forests, gardens and most damp places in the UK. The Leverhulme Trust funded research project aims to design the first every fully biological (no silicon components) amorphous massively-parallel robot.

This project is at the forefront of research into unconventional computing. Professor Andy Adamatzky, who is leading the project, says their previous research has already proved the ability of the mould to have computational abilities.

Professor Adamatzky explains, “Most people's idea of a computer is a piece of hardware with software designed to carry out specific tasks. This mould, or plasmodium, is a naturally occurring substance with its own embedded intelligence. It propagates and searches for sources of nutrients and when it finds such sources it branches out in a series of veins of protoplasm. The plasmodium is capable of solving complex computational tasks, such as the shortest path between points and other logical calculations. Through previous experiments we have already demonstrated the ability of this mould to transport objects. By feeding it oat flakes, it grows tubes which oscillate and make it move in a certain direction carrying objects with it. We can also use light or chemical stimuli to make it grow in a certain direction.

“This new plasmodium robot, called plasmobot, will sense objects, span them in the shortest and best way possible, and transport tiny objects along pre-programmed directions. The robots will have parallel inputs and outputs, a network of sensors and the number crunching power of super computers. The plasmobot will be controlled by spatial gradients of light, electro-magnetic fields and the characteristics of the substrate on which it is placed. It will be a fully controllable and programmable amorphous intelligent robot with an embedded massively parallel computer.”

This research will lay the groundwork for further investigations into the ways in which this mould can be harnessed for its powerful computational abilities.

Professor Adamatzky says that there are long term potential benefits from harnessing this power, “We are at the very early stages of our understanding of how the potential of the plasmodium can be applied, but in years to come we may be able to use the ability of the mould for example to deliver a small quantity of a chemical substance to a target, using light to help to propel it, or the movement could be used to help

assemble micro-components of machines. In the very distant future we may be able to harness the power of plasmodia within the human body, for example to enable drugs to be delivered to certain parts of the human body. It might also be possible for thousands of tiny computers made of plasmodia to live on our skin and carry out routine tasks freeing up our brain for other things. Many scientists see this as a potential development of amorphous computing, but it is purely theoretical at the moment."

More information: Professor Adamatzky has recently edited and had published by Springer, 'Artificial Life Models in Hardware' aimed at students and researchers of robotics. The book focuses on the design and real-world implementation of artificial life robotic devices and covers a range of hopping, climbing, swimming robots, neural networks and slime mould and chemical brains.

Provided by University of the West of England