Swarms of self-assembling artefacts

Results in Brief

Swarming with self-assembling robots

Under the auspices of the SWARM-BOTS project a novel, simple, insect-like, robot hardware, the s-bot was built of inexpensive parts aimed for swarm robotics applications.

INDUSTRIAL TECHNOLOGIES

One of the key developments of the SWARM-BOTS project is the design and implementation of a swarm-bot, that is an artefact consisting of 35 s-bots. This colony features increased self-organising and self-assembling capabilities to adapt to its environment.

The hardware design of an s-bot is based on a differential TREELS drive system that consists of TR-acks and wh-EELS. Aided by motor control each treel allows the s-bot to move in the environment and rotate on the spot. Via a motorised axis the motor base with the treels can rotate with respect to the main body of the s-bot.

There are two types of possible physical interconnections between s-bots, a rigid and a semi-flexible connection. Rigid connections can be accomplished with the aid of a gripper that is mounted on a horizontal active axis. This gripper has a huge acceptance area that offers a secure grasp at various angles and lift another s-bot if required.

On the other hand, flexible arms actuated by three motors found at the point of attachment on the main body allowing implementation of semi-flexible connections. The arm can perform movements with three degrees of freedom laterally and vertically with extension and retraction options as well.

Each s-bot constitutes a totally independent mobile robot capable of navigating in an autonomous way, perceiving its surrounding environment and grasping objects. S-bots can communicate with each other through advanced sensors and join themselves in either a rigid or flexible way to form a swarm-bot.

On the basis of a distributed adaptive control architecture mimicking ant colony behaviours, swarm-bots can accomplish difficult tasks such as exploration, navigation and transportation of heavy objects on very rough terrains. Potential applications could involve semi-automatic space exploration, search for rescue or underwater exploration.

Collaboration is sought with a company active in consumer electronics (cleaning), or logistics, or cargo organisation, or special-purpose exploration. The partner needs to be willing to develop a commercial system for transportation, surveillance, exploration, or cleaning activity.

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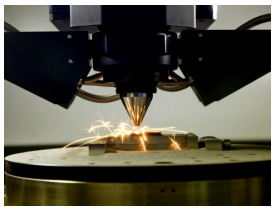

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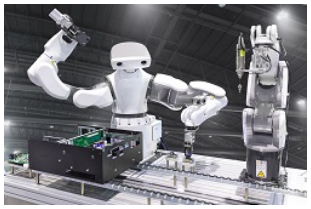

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Project Information

SWARM-BOTS

Grant agreement ID: IST-2000-31010

Project website

Project closed

Start date
1 October 2001

End date
31 March 2005

Funded under
Programme for research, technological development and demonstration on a "User-friendly information society, 1998-2002"

Total cost
€ 2 171 037,00

EU contribution
€ 1 000 000,00

Coordinated by
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Last update: 13 February 2006