

# Cleaning robot swarm

## Visual control of a swarm of cleaning robots

### Invention

Particularly in the commercial sector (e.g. hotels, offices, retirement homes, hospitals) but also in private use, it is desirable if a floor cleaning by robots in the shortest possible time is completed (noise, accessibility). For this purpose, an intelligent, image-based navigation method was developed in which several cleaning robots in the swarm divide the space between each other during the cleaning process. The method uses inexpensive camera sensors with panoramic optics for navigation. It is scalable to any number of robotic robots (even for one robot only), robust against single robot failure and flexible when adding or removing robots. The cleaning is efficient and with low multiple coverage.

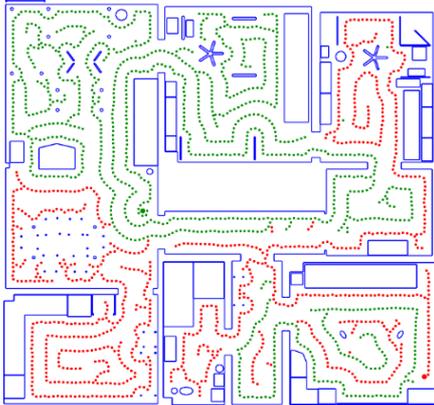


Fig.: Simulated cleaning run with two robots (red and green dots, thick: starting points) in an apartment with 9 rooms and 101 qm (blue: obstacles)

The clearance is self-organized by an advanced form of simple "obstacle tracking" in which each robot drives snugly to real obstacles or to track sections previously driven by any of the robots. With this ride strategy, the lanes adapt perfectly to the spatial conditions, guaranteeing seamless cleaning with low multiple coverage. The robots communicate only indirectly with each other through the common map construction; a complex planning and coordination with each other is not necessary. A protocol for the exchange of map data via WLAN was developed.

### Current Status

The invention has been granted internationally. We are happy to inform you about the status of the proceedings. The basic functionality has already been proven in computer simulations and robot experiments. On behalf of the University of Bielefeld, PROvendis is looking for companies that are interested in further development to market readiness. Apart from the cooperation, licenses can be granted for the invention and the intellectual property rights.

An invention of the Bielefeld University.

### Competitive Advantages

- Any number of robots
- Flexible and robust process
- Controllable software
- Complexity
- Inexpensive camera sensors

### Technology

#### Readiness Level

12345678

Technology validated in relevant environment

### Industries

- Electrical Engineering
- IT Industry
- Mechanical Engineering

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