



A Minimalist Robotic Inspection System

Technology

The National Aeronautics and Space Administration (NASA) seeks to transfer technology for a low-cost robotic system for automated inspection repair.

Benefits

- Performs various inspection and repair tasks with minimal processing capability, minimal power budget, and minimal communication bandwidth
- Utilizes commercial off-the-shelf components and innovative control algorithms to produce a low-cost automated inspection system
- Low-cost units allow for multiple agents enabling increased reliability
- Inspection and repair in locations where human safety issues are of concern

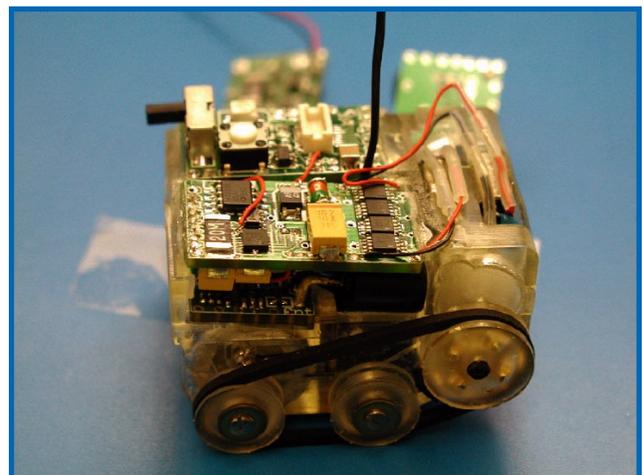
Commercial Applications

- Automated inspection and repair of a variety of platforms (spacecraft, aircraft, industrial facilities, etc.)
- Communication schemes applicable to biomedical devices
- Throw-away sensors for hostile environment research activities

Technology Description

The robotic inspection system consists of low-power microcontrollers with reduced instruction set computer (RISC) architecture, a novel capacitance ring for proximity detection and short-range communication, an optical mouse sensor for navigation and visual detection of surface defects and a low power transceiver for long-range host communication and data archival. Robotic agents perform random walks across an area of interest, scanning the surface for visual defects while passing information to nearby agents to increase search activity in suspicious areas, improve fidelity in navigation and provide backup storage of critical information in several agents for later extraction by the host. Utilization of various biological behavioral models (Braitenberg) allows for simplistic control algorithms to perform seemingly complex tasks.

To date, there is no system available that capitalizes on low-end processing, low power, and low bandwidth to effect a low-cost solution for inspection and repair of various surfaces within a variety of aerospace environments.



Inspection and repair robot prototype.

Options for Commercialization

This project requires advances in several key technology areas such as power, locomotion, and communication in order to produce a viable product. NASA researchers are seeking partners in industry and academia to cooperatively develop these technologies.

Contact

Technology Transfer & Partnership Office
NASA John H. Glenn Research Center
at Lewis Field
Mail Stop 4-2
Cleveland, OH 44135-3191
Phone: 216-433-3484
Fax: 216-433-5012
E-mail: ttp@grc.nasa.gov
<http://technology.grc.nasa.gov>

Key Words

Robotics
Low-cost inspection and repair
Low-power communication