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Reconfigurable Robotic Platforms for Structural Health Monitoring

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There are numerous examples for remote inspection on industrial plant and civil structures where a rapid preliminary inspection with either a wheeled remote sensing agent (RSA) or a small unmanned aerial vehicle (UAV) removes the need to physically send a person into a potentially dangerous environment (expensive and hazardous), and removes the need for expensive supporting hardware (scaffolding, safety equipment etc). Many such examples are to be found in nuclear, oil and gas and civil structures where a fundamental requirement for monitoring exists.

Since 2003, The University of Strathclyde has been involved with research as part of the UK Research Centre for Non Destructive Evaluation (RCNDE) to develop robotic deployment of NDE measurement probes. The use of multiple inspection vehicles (coupled with different sensing modalities), allows for a flexible, reconfigurable, and adaptive approach to remote health monitoring. However to be effective in real inspection applications, effective co-ordination between multiple agents must be integrated into the system, along with accurate positioning. In this paper we discuss using artificial potential fields for formation structuring for NDE robots. A theoretical framework is developed and supported by experimental measurements of simple formation structuring in the laboratory environment using five independent NDE robots.

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Ключевые слова:

Содержание
Abstract
Introduction
RSA robot hardware
Swarm methodology
Experimental results
Conclusions