



Dutch Robotics for Inspection and Maintenance

Written by: Astrid Seegers

Robotic solutions are supposed to make our lives easier. We do not want robots to take over our jobs, we need them to support and alleviate the dull, dirty and dangerous aspects of it. Enhanced cognition for autonomous operations and improvement of mobility in an unstructured environment creates new opportunities for adoption of technology. Combining available technologies and leveraging on trends such as 'Internet of Things' can facilitate a paradigm shift for existing industries.

In the Netherlands public-private collaborations are dedicated to co-develop new technologies for inspection and maintenance of capital intensive infrastructure and assets. There is a need for these solutions as the urgency to minimize the impact on safety and the environment is growing. Using robotics in this domain is of vital importance because of the increased operational efficiency and productivity that result from not requiring human entry into difficult to access confined spaces. In addition, the use of robotic solutions can reduce the cost, improve the quality and increase the safety of performing inspection, maintenance and cleaning activities.

Busy bees: collaborative aerial workers

The Robotics and Mechatronics (RaM) team at the University of Twente deals with the application of modern systems and control methods to practical situations. The team focuses on three main application areas: inspection robotics; medical robotics for assistance to surgeons and diagnostics; and service robotics.

Together with several European universities and companies, the Robotics and Mechatronics (RaM) team participates in AEROWORKS. AEROWORKS as a consortium develops a novel aerial robotic team that possesses the capability to autonomously conduct infrastructure inspection and maintenance tasks, while additionally providing intuitive and user-friendly interfaces to human-operators. The project combines a drone with a robotic arm. One of the challenges is to put pressure on surfaces with the robotic arm, without disturbing the balance of the drone. The drone can for instance be used to inspect industrial reactors, but also wind turbines, and perform maintenance tasks. The project aims for direct exploitation in the infrastructure services market. The results will be demonstrated and evaluated in realistic and real infrastructure environments, with a clear focus on increased technology readiness levels.

Send in the robots: inspection and maintenance in the oil industry

Robots offer great opportunities to drive efficiency, increase productivity and improve safety in the petrochemical industry and utilities. In addition, robotic inspection and maintenance may reduce shutdown times, preventing human entry of vessels and other equipment, as well as reduction of costs related to services required to enable human entry.

Important lessons have been learned in the past five years about key drivers and hurdles for implementation. To harvest the potential of inspection and maintenance robotics, innovative business and cooperation models are vital. The Dutch SPRINT Robotics initiative is an industry-driven initiative founded to promote the development, availability, application and commercialization of robotic techniques in technical inspection and maintenance of capital intensive infrastructure. By bringing the whole value chain, consisting of end users, service providers and technology providers, together, developed solutions become beneficiary to everyone. SPRINT Robotics compiles, expands and disseminates robotic industry knowledge and maintains the strategic roadmap.

SPRINT Robotics has also found its way to Singapore. After rapid growth in Europe and North America, SPRINT Robotics is now spreading its wings to Asia. One of the highlights for 2017 will be the launch of its Asia-Pacific Chapter in October, to coincide with the SPRINT Robotics Seminar. SPRINT Robotics Chairman dr. Tjibbe Bouma has been engaging frequently with the industry sector in both Singapore and



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Japan. The Singapore Economic Development Board has provided support to initiate an industry focus group for inspection and maintenance robotics in Singapore as part of its wider strategic program for robotics. This will result in a number of field trials and demonstration in Singapore later this year.

A fresh coat of paint: autonomous robot solutions for aircraft maintenance

The aerospace sector can also benefit from the extensive growth in the field of robotics. One of the important maintenance processes, removal and application of paint, is a very labour-intensive task with a lot of health-risks.

The Dutch company LR Systems provides fully autonomous robot solutions for aircraft maintenance organizations. These solutions have numerous benefits, such as lower costs, higher quality, higher efficiency and a much lower CO₂ footprint compared with the current legacy procedures and methods. The driving factors for robotics solutions are the predicted annual growth of the aircraft market, the introduction of new aircraft surface technology, such as composite and stealth, the estimated installed base by 2030, legislation on CO₂ reduction and the growth of the lease market in addition to emerging regional and political motives that limits the number of (cheap) foreign labor in favor of the increase in local added value and higher-skill employment.

Back to school: preparing the workforce of tomorrow

The successful adoption of robotics is highly dependent on a skilled workforce. This brings us to another successful example of an existing Dutch-Singapore Partnership. ICRIT, a consortium of Dutch SMEs focusing on developing training and new capabilities within the maintenance, repair and overhaul (MRO) industry, specifically on composite materials, has started developing ideas and plans for creating a large area inspection robot in collaboration with HOPE TECHNIK and the Singapore Economic Development Board. Future inspection and maintenance will change from traditional, manual labour to robotics and autonomous processes for composite inspection, maintenance and repair.

The Holland Innovation Network

The Netherlands enjoys a strong position for the development of robotic solutions, because of a strong eco-system of four technological universities and innovative companies and multinationals. Collaborative innovation is a keyword; robotic solutions should be developed in collaboration with industry not for industry. This open approach to research and innovation, combined with an excellent business infrastructure and a highly-educated, dynamic workforce makes the Netherlands an ideal location for high tech business expansion and acceleration.

The Holland Innovation Network at the Netherlands Embassy in Singapore focusses on innovation, technology and science collaborations between Southeast Asia and the Netherlands. By organizing seminars and workshops the team informs and inspires about topics such as policy innovation, autonomous driving and robotics. The Holland Innovation Network writes articles to inform Dutch government agencies, knowledge institutes and companies about developments in Southeast Asia. To explore collaborations and business opportunities on smart industry and robotics R&D in the Netherlands, contact Ms Astrid Seegers, Advisor for Innovation, Technology and Science via sin-ia@minbuza.nl.