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Drone experts gather in Twente

The University of Twente is cooperating with a number of European Universities and companies on the development of autonomous drones for the inspection and maintenance of wind turbines and incinerators. The partners in this project (Aeroworks) met last week of May 2017 in Twente to showcase and coordinate their results. The project focusus on the autonomous inspection and maintenance of relatively inaccessible infrastructure. There is a particular emphasis on drones physical interactions with their environment.

Wind turbines and reactor chambers

Wind turbine blades are subject to mandatory annual inspections, which are still being performed manually. ?Maintenance work on wind turbines costs wind farms a great deal of money each year. This applies to both the repairs as such, and to the time lost while the wind turbine is not running?, says Han Wopereis, a PhD student in the University of Twente?s Department of Robotics and Mechatronics. ?In addition, performing repair work at altitude is a dangerous job. For instance, it might surprise you to hear that the safety issues faced by these mechanics include the risk of blood poisoning. They are usually hoisted up in a harness. Over a period of time, this can restrict blood flow to the legs, creating this type of effect. We hope to avoid these problems through the use of drones.?

The project partners are also working on maintenance and inspection drones that can operate dozens of meters above the ground, servicing tall industrial reactors and mega-incinerators. The high temperatures and humidity involved often result in wear and tear, as well as deposits on the walls that can become dislodged and crash down. The autonomous drones are fitted with an arm

that is used to remove these deposits and to abrade the exposed surface beneath, so measurements can be made of the thickness of the reactor?s wall. This is a first for the sector.

Second integration week

During an earlier meeting, at Zurich in Switzerland, the first steps were taken in the area of localization and interaction with drones. The emphasis here was on integrating the hardware and on testing the first prototype robot arms. This second integration week, in Twente, is all about interaction. The work involved will include the integration and testing of algorithms. These algorithms keep drones stable by calculating the extent to which their centre of mass is displaced when the arm makes a particular movement. Tests are also being performed on algorithms for physical interaction, including the application of force to the environment. Localization by means of stereo camera images is another area in which results are being shared.

Experiments

On Thursday May 26th, researchers will be demonstrating a quadcopter (drone) in the Smart XP Lab on the University of Twente?s campus. This device can use a robot arm to exert pressure on its surroundings without becoming unstable. This drone also has a base that serves as a docking station.

The AEROWORKS website has various video clips of demonstrations and experiments

About Aeroworks

The AEROWORKS consortium consists of leading academic institutions and private organizations in the field of robotics. This involves the Universities of Twente, Zurich (ETH), Lulea, Patras and Kungliga Tekniska Hogskolan (KTH), as well as Ascending Technologies, Alstrom Inspection Robotics and energy producer Skelleftea Kraft. They have been awarded 3.7 million euros for this project, as part of the EU-funded Horizon2020 research programme. Each partner has a specific part to play, and contributes to a balanced value chain extending from university laboratories to the end user.

It was Dr Matteo Fumagalli (now at Aalborg University in Denmark) who, in early 2015, initiated the University of Twente?s participation in the AEROWORKS project. Various undergraduates, PhD students, and researchers at the University of Twente?s Department of Robotics and Mechatronics (headed by Prof. Stefano Stramigioli) are involved in the project.

https://www.utwente.nl/en/news/!/2016/5/5334/drone-experts-gather-in-twenteH2020/Eurostars