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## **Robotics Challenges for Radiological and Nuclear Reconnaissance Applications**

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Natural disasters, industrial catastrophes and terror acts pose an unpredictable yet significant risk to the lives and prosperity of the world's population.

The ability of properly assessing these situations, especially in combination with radiological / nuclear (RN) threats, remains a significant challenge.

Several incidents in the past decades (Fukushima, Chernobyl, Asse, Majak, Sellafield) have underlined the need for robotic platforms which can assist operations in scenarios which are hazardous for human personnel to enter.

Since the late 1980s robotic solutions have been utilised in many of the response efforts to these incidents, demonstrating their potential to reduce the risk of loss of life, reduce response times and gather essential data. Robots can be employed in a wide array of relevant and otherwise potentially dangerous tasks including search and rescue, disrupted area mapping, radiation measurement, structural damage assessment, reconnaissance, and manipulation tasks.

Although robotics research has produced impressive results in general, there is still significant room for improvement with respect to the use of robotics in radiological and nuclear related applications.

One major problem with RD; in this very specialised field of robotics is the lack of testing possibilities, especially with regards to radiation sources.

Another challenge is to compare various unmanned systems in the field of outdoor robotics. Robotic competitions have become a common means of evaluating the performance of robotic techniques as well as a tool for trend-setting.

ELROB and EnRicH are two successful examples of such outdoor robotics competitions aiming to assess the capabilities of robotic systems in realistic disaster response scenarios.

A newcomer to the scene is the IAEA robotics challenge, held in 2017 for the first time. The event has a slightly different emphasis, however, and focuses mainly on indoor and structured scenarios.

The paper will give detailed insight into these three robotics events that include applications in the RN field.

Keywords: Field Robotics (FR); Radiological and Nuclear (RN); disaster response; robotics competitions; unmanned ground vehicle (UGV); robotics challenges

### **Which "Key Question" does your Abstract address?**

TEC5.3

### **Which alternative "Key Question" does your Abstract address? (if any)**

TEC5.1

### **Topics**

TEC5

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