Building Future Safeguards Capabilities
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The IAEA Robotics Challenge –Demonstrating Robots for Safeguards Inspections

IAEA safeguards inspections often involve inspectors making repetitive, time-consuming measurements of nuclear material in parts of nuclear facilities that may be difficult to access or have elevated radiation levels. Advances in the field of robotics have opened up the possibility that autonomous systems could assist inspectors to complete repetitive inspection tasks more efficiently and consistently. This could free up inspectors to concentrate more on other aspects of the safeguards mission and help the IAEA to cope with the ever-increasing volumes of nuclear material under safeguards.

The IAEA Robotics Challenge, co-hosted by the Data61 innovation network of Australia's Commonwealth Scientific and Industrial Research Organisation, took place in Brisbane in November 2017. The Challenge aimed to facilitate the development of new robotic systems to help the IAEA conduct inspections. Twelve teams of robotics experts from nine member States each designed their own robots and brought them to Brisbane where they were required to autonomously navigate inside simulated nuclear facilities and carry out inspection tasks. In order to make the Challenge accessible to robotics experts with varying degrees of prior knowledge of safeguards, the Challenge was precisely defined by breaking it up into specific usage scenarios (such as navigation in the presence of obstacles, automatic recognition of items of nuclear material to be verified, and decontamination of the robotic system). A panel of experts evaluated the robotic systems based on their capability to fulfil the inspection scenarios.

The Robotics Challenge demonstrates the benefits of looking beyond traditional procurement channels to use crowdsourcing for the development of new technologies for verification. Among the systems demonstrated in the Challenge, unmanned surface vehicles for verifying spent fuel in ponds appear particularly promising. As a next step, the IAEA may work with selected robotics teams and member states to conduct proof-of-concept deployments in real spent fuel ponds. The IAEA may award purchase agreements to the teams with the best robotic designs. This paper will discuss the lessons learned from conducting the Challenge and the prospects for robotics in safeguards inspections.

Which "Key Question" does your Abstract address?

TEC5.2

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

TEC5.3

Topics

TEC5

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