Remote Photonics for Characterisation of Radioactive Environments

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Characterisation of environments is an important challenge in the nuclear industry, particularly in the management and decommissioning of legacy facilities. In such facilities access can be highly restrictive with deployment ports often 150 mm or smaller. Research at the University of Manchester has focused on the development of small, low-cost mobile robotic systems able to navigate through such ports and autonomously generate 3D maps of environments using LiDAR technology. With support from Lancaster University, the robots have been equipped with radiation detectors able to provide spectral information regarding radioactive sources as well as information regarding gamma dose rates and neutron flux. More recently, the use of photonic diagnostic systems such as Raman and LIBS have been investigated as methods able to characterize materials located in legacy nuclear environments, where inventories of materials may be unavailable or incomplete. The presentation will describe a number of case studies that have been investigated, which include the development of ground based robots for detecting contamination and mapping radiation dose rates and submersible vehicles able to maneuver around water based environments and identify neutrons and gamma sources.

Short Bio:

Andrew West joined the University of Manchester Robotics group as a Post-Doctoral Research Associate in 2017, previously conducting research on x-ray lasers at the University of York for Inertial Confinement Fusion. He received his Masters degree in Physics and Nanotechnology from The University of Leicester, and PhD in Plasma Physics from The University of York, specialising in optical plasma diagnostics for industrial processes and cancer research which won the Institute of Physics Best Thesis Prize. His current role is integrating various radiation and photonic diagnostics for total characterisation of radioactive environments onto a robotic platform through the use of ROS (Robot Operating System), allowing real-time remote inspection and visualisation of extreme environments.