Development of a Cobot Radiological Survey Assistant

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RAICo ROBOTICS AND AI COLLABORATION

The University of Manchester



Photo courtesy of the NDA

Introduction

Many items such as PPE, radios, and paperwork as well as humans need to be monitored out of Radiological and Contamination Controlled areas.

Currently systems only monitor for γ radiation and require manual monitoring to detect α & β contamination.

Collaborative Robots (Cobots) could automate the process of detecting α & β contamination especially at barriers

Aim

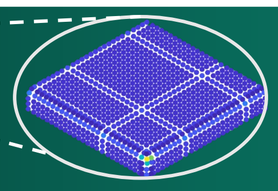
Develop a system for detecting contamination on objects and humans

Fellowship

Developing the path planner and simulation.

Implementing monitoring of static objects on the physical systems.

Path Planning & Simulation



Capture Point Cloud

Generate a set of candidate viewpoints

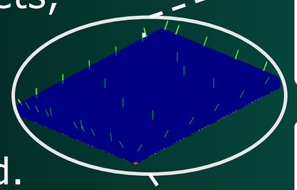
Perform accessibility assessment

Construct all valid cover sets

Select near-optimal viewpoints from cover sets

Connect viewpoints into a continuous path

Builds cover sets, mapping each scan point to a cover of the point cloud.



Uses a greedy algorithm

Wavefront algorithm clusters points, connects scan points within clusters and between adjacent clusters

A sampled-based viewpoint path planning algorithm utilising a wavefront algorithm is used to generate natural scan paths.

Simulation tests the path planning approach on objects and static humans.

Challenges

- Trust in the System
- 100% coverage
- Avoiding Collision
- Tracking Human Motion

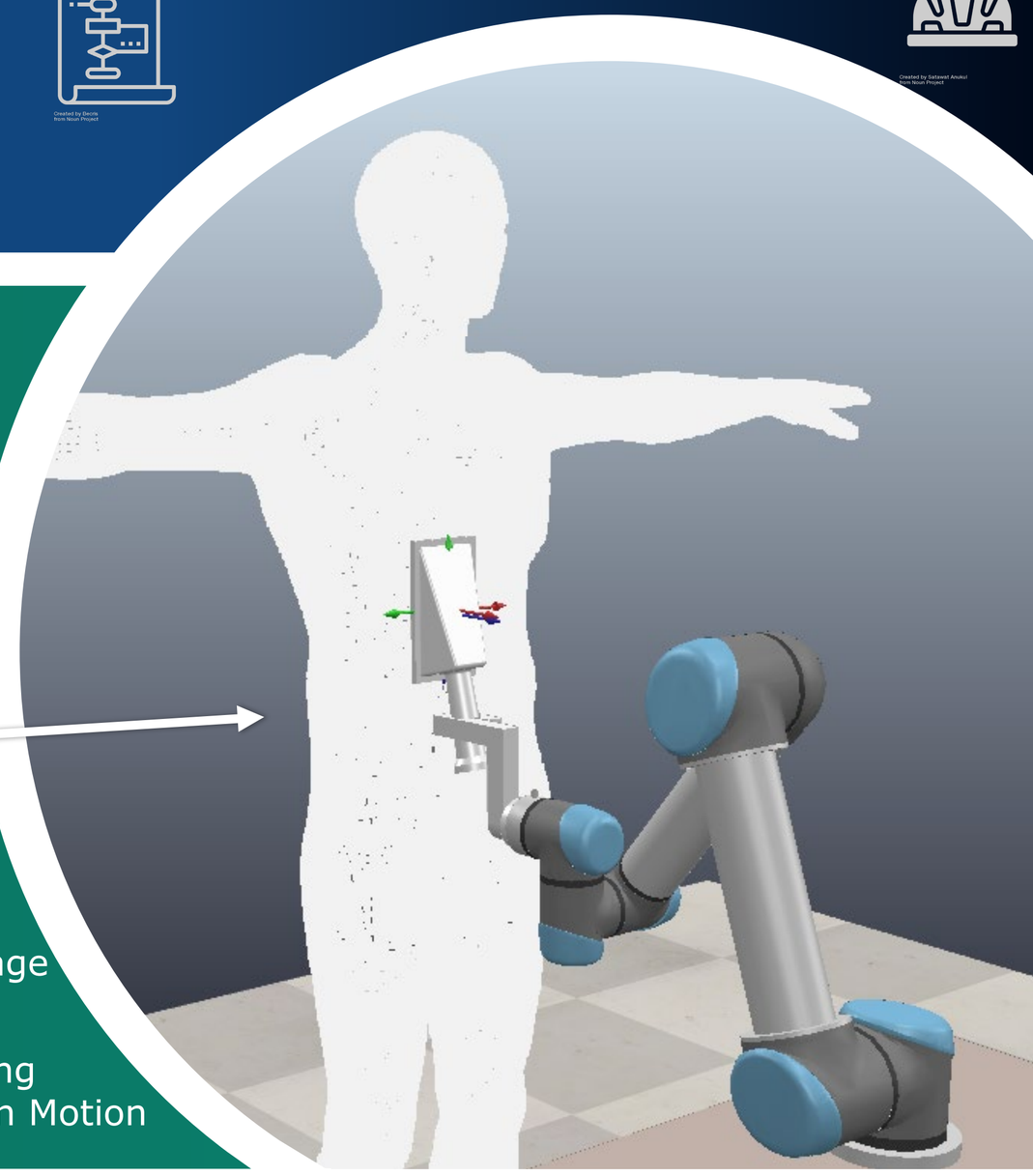




Photo courtesy of the NDA

Deployment

This fellowship supported a 3-week placement at NRS Sizewell A.

Rad monitors provided:

- Training & guidance
- Information on best practices
- Feedback on system design
- Evidence of use cases

This system is designed to be deployed at barriers between C2/C3 where manual personnel monitoring is required and at egress points out of radiological controlled areas for object clearance.

Post Fellowship Development

Focus will be on scanning humans and tracking of a moving surface.

The next system will be deployed on site to gather real world data and user feedback.

Interested in the details? Read our paper related to this work presented at TAROS 2024

Recent Research Outputs

Want to know more about the impact of this work? Check out our recent GOV.UK blog about our work with NRS Sizewell A:

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