



Southmead hospital, North Bristol

A robotic platform for the autonomous detection of leaks in plantrooms.

The Challenge

Leak detection in plantrooms is a challenging and unsolved problem. Static sensors that can detect localised spillage do exist, however this would be a costly and impractical solution to install them densely across a large plantroom.

Project Overview

We are collaborating with Innovate UK, and the robotics innovation facility (RIF) (based at the University of West Bristol) to develop an autonomous plantroom inspection platform. Leak detection was chosen as an important first task to be investigated by the RIF, as it is a challenging problem, that can be costly and impractical to detect with static sensors.

Our Solution

Preliminary investigations suggested the idea of a robotic solution for the leak detection problem. The concept consisted of a mobile platform equipped with multiple sensors that could identify spillages.

This system would log the location of spillages and notify maintenance staff of their presence.

To be able to successfully perform liquid spilling detection in a plantroom, the robotic solution would need to be able to work and adapt in a dynamic environment.

The first stage of this project was to identify the most suitable platform for liquid spillage detection.

After trialling two robotic platforms, the Leo Rover Platform was identified as the most suitable.

Key features of the Leo Rover Platform:

- Nimble
- Stable
- Long battery life (4 hours, with a 20-minute charge time)
- Easily transverse the plantroom walkways (can navigate corridors down to 50cm wide)
- In-built safety features to reduce the impact of battery failure, including having the battery contained within an IP-rated enclosure.
- The Leo Rover's customisability would allow for changes, such as fitting larger wheels.

There were also some features, such as opening doors, that neither platform trialled. As a result, it is likely that any future robotic platform will need to be modified to meet these requirements if they are deemed necessary.

The project revealed that a leak was detected 80% of the time. Resulting data insights indicate that there would be shorter and less frequent shutdowns for failure thus benefitting the NHS through mitigating patient care disruption.

Benefits

- Practical
- Efficient
- Increased productivity of maintenance staff

"The existing methods are predominantly manual through plantroom visual inspections by the operational team and alarm alerts from the Building Management System (BMS). This leads to a run-to-fail or blanket replacement programme which is not cost effective. The ideal scenario is to intervene just before the failure. This is both costeffective and frees up trained resources to perform more complex and technical maintenance tasks."

- **Simon Hayman, Regional Director**

- **4 hours of battery life**
- **3 patrols a day carried out by maintenance staff cut down**
- **Leak was detected 80% of the time**
- **90% of leak detections were reported through system improvements**

