

Research in Collaborative Robotics

The MARVIN project

UCD School of Mechanical and Materials Engineering
Laboratory for Advanced Manufacturing Simulation and Robotics



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MARVIN Project Partners



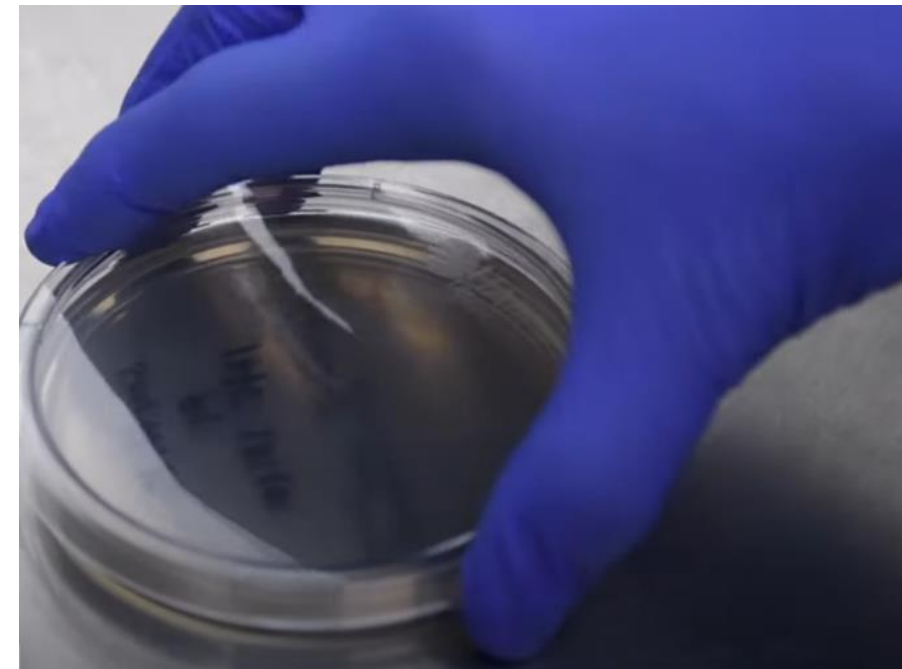
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Research Problem



- Microbiologists spend a significant amount of time on environmental monitoring activities in bioprocessing environments.
- Some of these activities involves:
 - Time-consuming gowning processes,
 - Handling of Petri Dishes in clean room settings.
- Using mobile robotics platforms could free operators to perform other high value-added tasks.



[Mathew, R.; McGee, R.; Roche, K.; Warreth, S.; Papakostas, N. Introducing Mobile Collaborative Robots into Bioprocessing Environments: Personalised Drug Manufacturing and Environmental Monitoring. Appl. Sci. 2022](#)

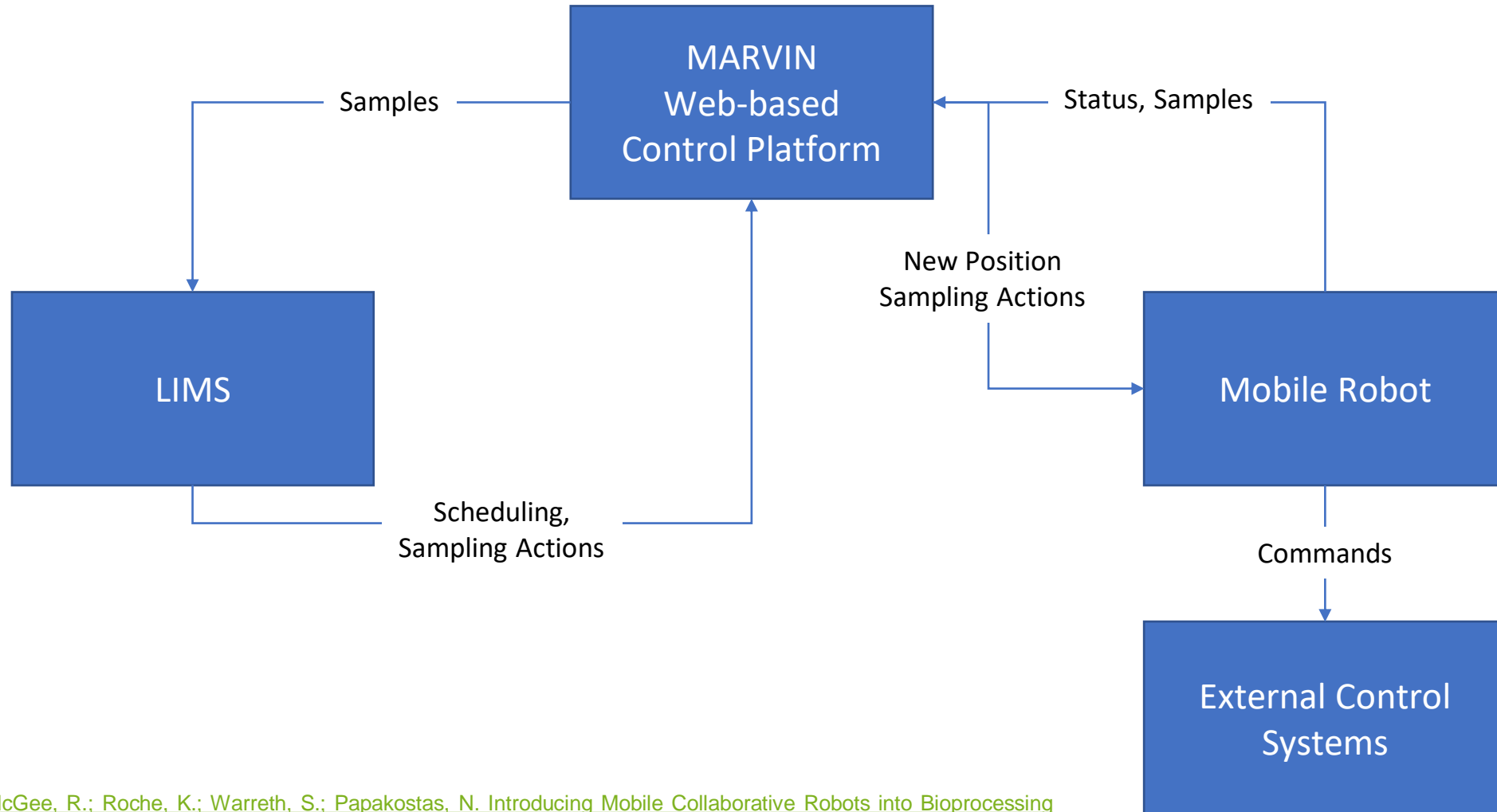
Key Objectives

- ✓ To facilitate the safe operation of Mobile Robotic Platforms in bioprocessing environments, complying with **ISO 10218 Parts 1 and 2**.
- ✓ To enable the autonomous movement of Mobile Robotic Platforms through GMP air locks, laboratories and production spaces, for environmental monitoring tasks.
- ✓ To integrate sensors for reducing the localisation error of the mobile platform.
- ✓ To build auxiliary devices using parametric design principles, enabling the use of diverse environmental monitoring equipment.
- ✓ To integrate Laboratory Information Management Systems with Mobile Robotic Platforms, so that environmental monitoring tasks are converted to robot tasks.
- ✓ To log all pertinent information with zero compliance errors.

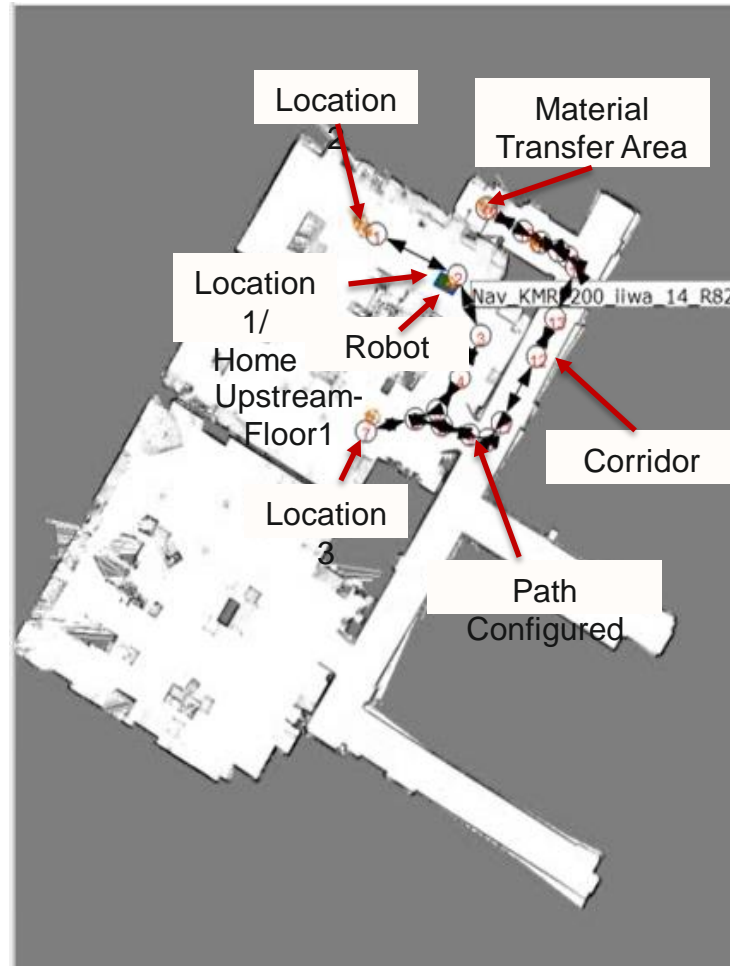
Implementation



Platform Architecture



Implementation



NIBRT
National Institute for
Bioprocessing Research and Training
Dublin, Ireland

Implementation

[Video Link](#)



[Mathew, R.; McGee, R.; Roche, K.; Warreth, S.; Papakostas, N. Introducing Mobile Collaborative Robots into Bioprocessing Environments: Personalised Drug Manufacturing and Environmental Monitoring. Appl. Sci. 2022](#)

Conclusions



- ✓ Demonstration of a fully autonomous and safe mobile robotic platform in real bioprocessing environments.
- ✓ The mobile platform could perform a series of additional tasks, such as:
 - Air sampling
 - Monitoring (temperature, humidity) in more locations
 - Quality inspection of processes using vision systems
 - Assembly and packaging
- ✓ Return on Investment – Ireland: 2 to 3 years.
- ✓ Further Research:
 - More end effectors could be tested for performing additional tasks.
 - More mobile robot hardware will become available in the next few years.

Thank you for your attention!



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