About

VxLab is an eResearch facility at RMIT University. VxLab provides a distributed virtual laboratory targeting multiple use cases connecting industry and RMIT university sites in Australia and internationally. VxLab supports local and remote collaboration, measurement and control and high performance analysis and visualization. The ‘x’ in ‘VxLab’ stands for a new capability or research application in a virtual or remote setting.

VxLab has been developed as a generalization of the RMIT Virtual Interoperation Testing Lab (VITELab) which provides a global laboratory and ‘lab scope’, enabling collaboration for cloud-based and collaborative design and software testing of cyber-physical systems.

Facilities

- A Global Operations Visualization (GOV) Lab provides videoconference and streaming capability to remote sites combined with high resolution tiled display. The display is driven by a dedicated local display driver cluster compatible with parallel rendering middleware such as SAGE and Google Liquid Galaxy.
- Advanced Manufacturing Robot Interoperation Test (AMRIT) Lab provides industrial robot arms connected to the GOV lab, including sensors and cameras as ‘eyes on the robots’.
- Cyber-Physical-Simulation (CS) Rack provides parallel cloud computing capability to support modeling and simulation.
- Network connectivity between sites is supported by dedicated links and research software stacks.

Use cases

- Distributed cyber-physical systems modeling, design and testing research with industry partners.
- Safe student access to remote or dangerous labs without suiting up.
- Multi-disciplinary collaboration, prototyping and troubleshooting requiring multiple viewpoints and information architectures.
- Dashboards and decision support for global planning and operations, e.g. in automation, power, facilities, environmental management.
- Virtual or immersive environments based on virtual and augmented reality.

Context

The VxLab is developed by the Australia-India Research Centre for Automation Software Engineering (AICAUSE). AICAUSE focuses on architectural design, testing and monitoring of distributed industrial automation software. AICAUSE is a collaboration between RMIT, the ABB Group and the Victorian State Government. Our research has applications in energy, advanced manufacturing, building automation and mining.

Stages

2013: Concept demonstration to industry partner; Remote connectivity demonstration to industry partner; Robot and visualization labs deployed; Stage 1 formal launch (visualization wall, robot lab and cloud server).

2014: First pilot users; Stage 1 completion. Stage 2 upgrades (Power systems / hardware-in-the-loop FPGA platform; Robot grippers). General availability to users; Connection to international sites; Transition into a facility in RMIT College of Science, Engineering and Health.

2015: Refurbishment of Virtual Experiences Laboratory - completion. Additional network connections to international partners. Formal launch. Deployment of VXRoom (large mobile 3D immersive display panels).