VIRTUAL REALITY AND CONTROL SYSTEMS: HOW 3D SYSTEM LOOKS LIKE

L.Pranovi, M.Montis , INFN-LNL, Legnaro, Italy

ICALEPCS 2021
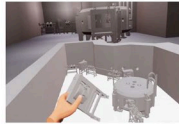

PRELIMINARY WORKS

Data Collection and Design:
The virtual model is defined starting from 3D CAD models. The tool can be very useful to verify data integrity and coherence. This aspect results in reducing design errors and optimizing communication and data exchange among the groups.

Machine Operation and Maintenance
Using the same virtual environment provided for the training, it is possible to evaluate and prepare maintenance planning (ordinary and extraordinary) and machine upgrades. As the entire environment is rebuilt starting from CAD models, the final 3D virtual model guarantees sub-millimeter resolution where VR users can operate in the virtual simulation to evaluate, for example, device positioning for machine upgrades.
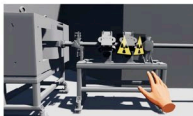
Training:
Through VR and AR technology, operator training can be done in a secure simulated environment, independent of the physical machine.

Machine Operation and Maintenance

Data collection and Design: Interactive 3D model

Training: Radioprotection PoC

VIRTUAL REALITY AND AUGMENTED TECHNOLOGIES

AR IN NUCLEAR FACILITIES

AR integration:
In a facility like a nuclear plant, the introduction of AR technology can increase performances and help operators in numerous tasks:

- Provide an easy way to recall information during apparatus maintenance

- Communicate with colleagues and teams through dedicated communication apps

- Introduce a new concept of Human-Machine Interface (HMI) where the classical control panels are extended with virtual ones

Studies and tests are ongoing to provide control information during maintenance: the goal we want to achieve is to provide at least the same control panels available to operators working close to the machine during local supervision. Preliminary tests have been done with promising results (i.e., touchless controls maximize the cleaning of environment and tools), but more effort must be invested in this task.

Preliminary tests with AR technology for maintenance operations.

FURTHER DEVELOPMENTS

AR in next future Control System:
The work done and exposed is a preliminary test for a more stable solution of virtual monitoring and it requires further development regarding reliability and usability. The main goal we want to achieve is to extend the usage of virtual desktops not only for supervision but also for control: this step can have an important impact in term of space optimization and portability.

VR Application

Control System Framework EPICS | 3rd Party Applications | Scripting Language

VR/AR and control system tools - Proof of concept

Concerning this goal, additional studies and investigations are required to evaluate the effort required to realize multi-user and multi-platform solutions.

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Panels in AR added as additional virtual desktop in the main control room.

INFN-LNL:https://www.lnl.infn.it

PRELIMINARY WORKS

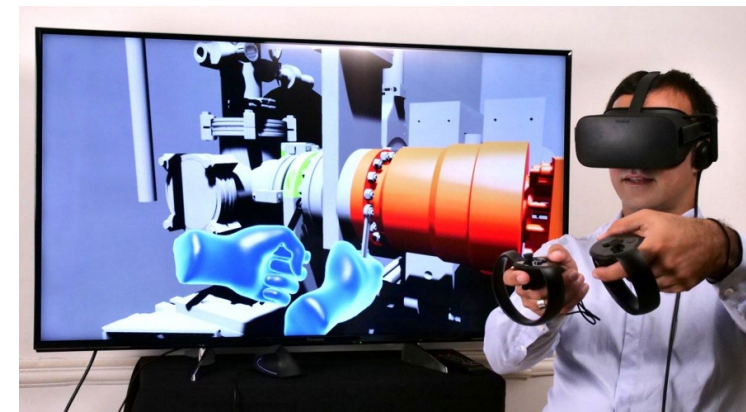**Data Collection and Design:**
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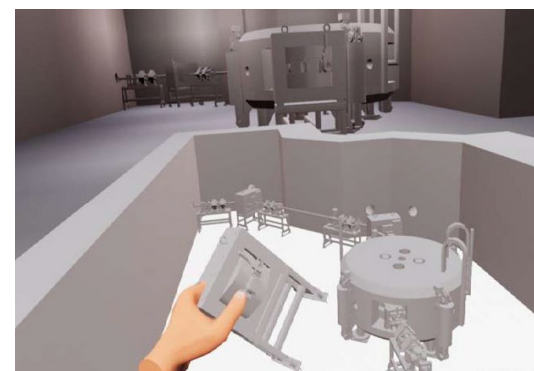**Machine Operation and Maintenance**
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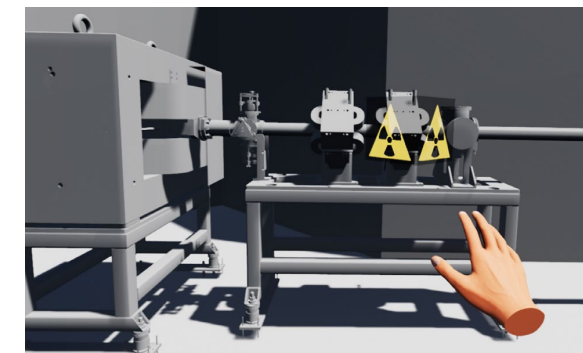
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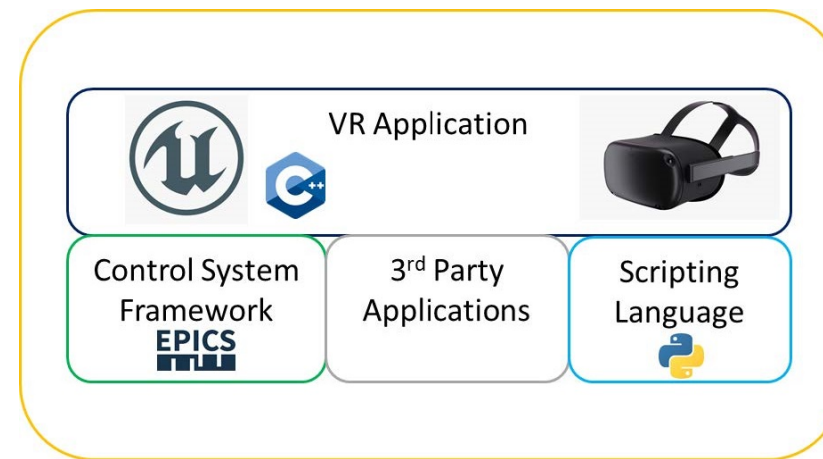Preliminary tests with AR technology for maintenance operations.

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