A New Virtual Control Room System for the Paks NPP Full-Scope Simulator

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Motivation

• Development of the full-scope training simulator of Paks NPP:
  o Construction 1988, KFKI AEKI-NOKIA Afora
  o Continuous improvements and upgrades to face the new requirements (HW & SW components, technological model system)
  o Replica simulator configuration in the Institute for the developments (reduced)

• 2012: New simulator room establishment
  o Extended replica simulator configuration
    + plant computer system, + core monitoring system, + large screen displays)
  o Support other application areas
    I&C system design and validation, HMI development and study, engineering support, etc.

• 2013: Virtual control room development
CER Simulator room
Simulator control room at Paks NNP
Virtual representation of the CR
3D interactive model of the CR: geometry

- Blender: free and open-source 3D computer graphics SW
  - Building geometry: switches, actuators, push buttons, instruments, panels

- Applying photos of the CR as textures:
  - at the beginning: helps the placement and positioning of CR devices
  - at the end: process and replace the original images (higher resolution, smaller size)

- Share geometrical data (mesh) among the same looking objects:
  - better memory utilization,
  - a large number of same looking objects can be modified at once (mesh, material).
3D interactive model of the CR: interaction and movement

- Blender Game Engine (BGE)
  - BGE logic bricks: sensors, controllers, actuators
  - Python scripts: complex object movement, simulator communication
  - Modeling the operator: operator object with a linked camera
Virtual CR – Simulator communication

Simulator Server

Simulation model system

Control room communication subsystem

Virtual control room server

Virtual control room (BGE application)

VCR communication table

VCR communication client (VME emulation)

TCP/IP based event driven communication

DLL calls

Using selection units
Navigation methods

- Desktop computer: keyboard + mouse
- Large screen display:
  - Wireless control with Nintendo Wii Remote and Nunchuk
- Experimenting with head tracking
VCR simulation scenario
- Refurbishment of RCS and RPCS as a subcontractor of SKODA JS
- Touchscreen solution based on SIMTONIA’s visual engine
Thank you for your attention!