



Centre for Energy Research,
Hungarian Academy of Sciences

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:**
 - Construction 1988, KFKI AEKI-NOKIA Afora
 - Continuous improvements and upgrades to face the new requirements (HW & SW components, technological model system)
 - Replica simulator configuration in the Institute for the developments (reduced)
- **2012: New simulator room establishment**
 - Extended replica simulator configuration + plant computer system, + core monitoring system, + large screen displays)
 - 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

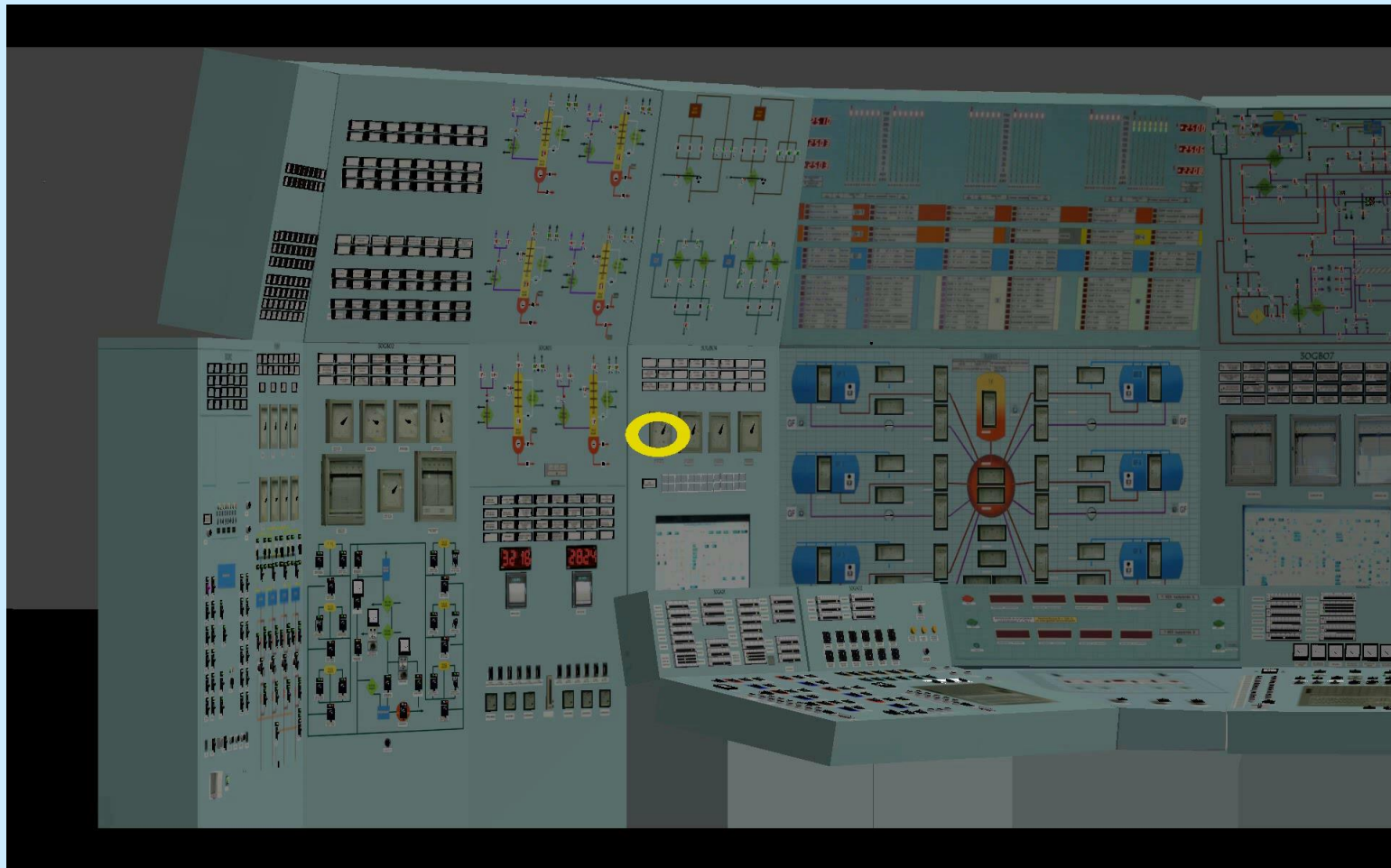




Simulator control room at Paks NNP

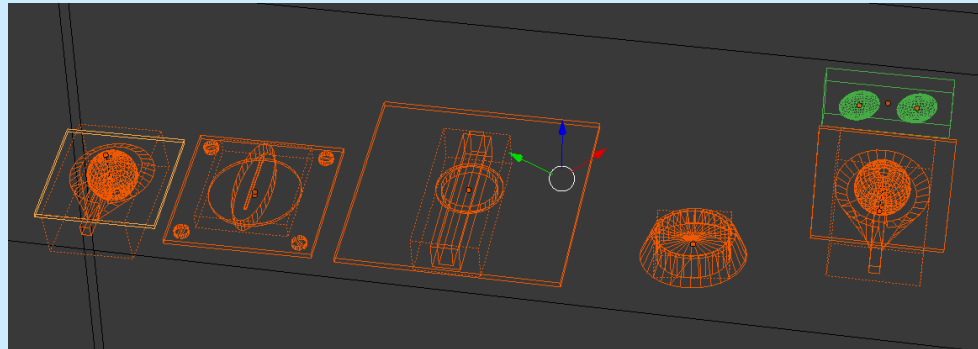


Virtual representation of the CR



3D interactive model of the CR: geometry

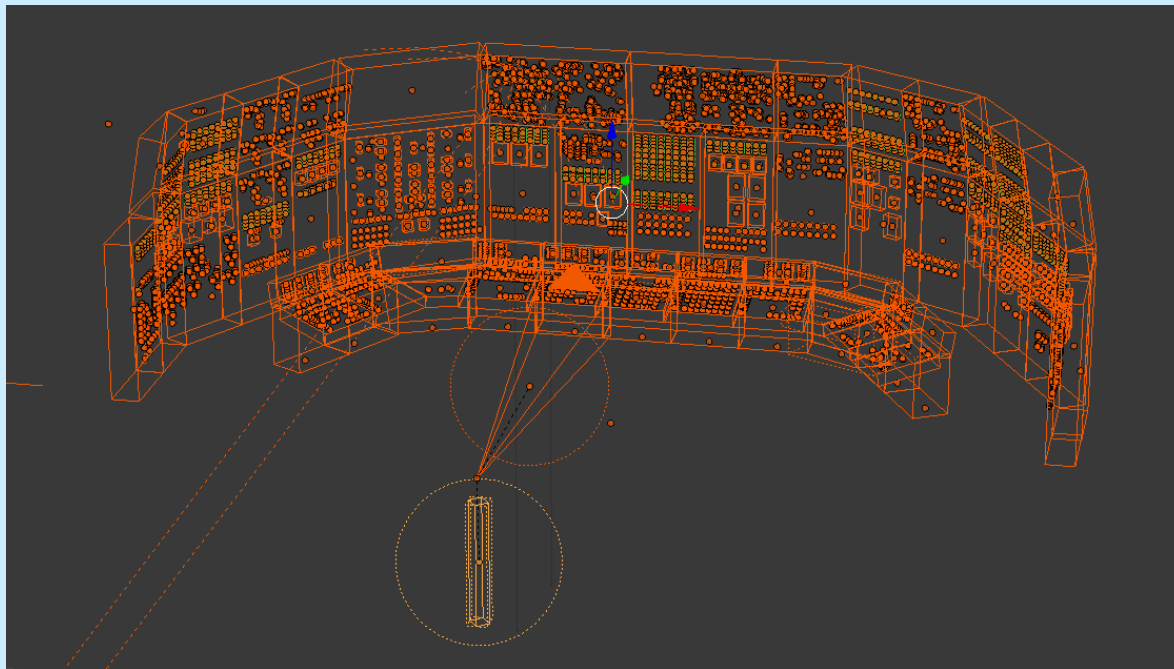
- **Blender: free and open-source 3D computer graphics SW**
 - **Building geometry: switches, actuators, push buttons, instruments, panels**



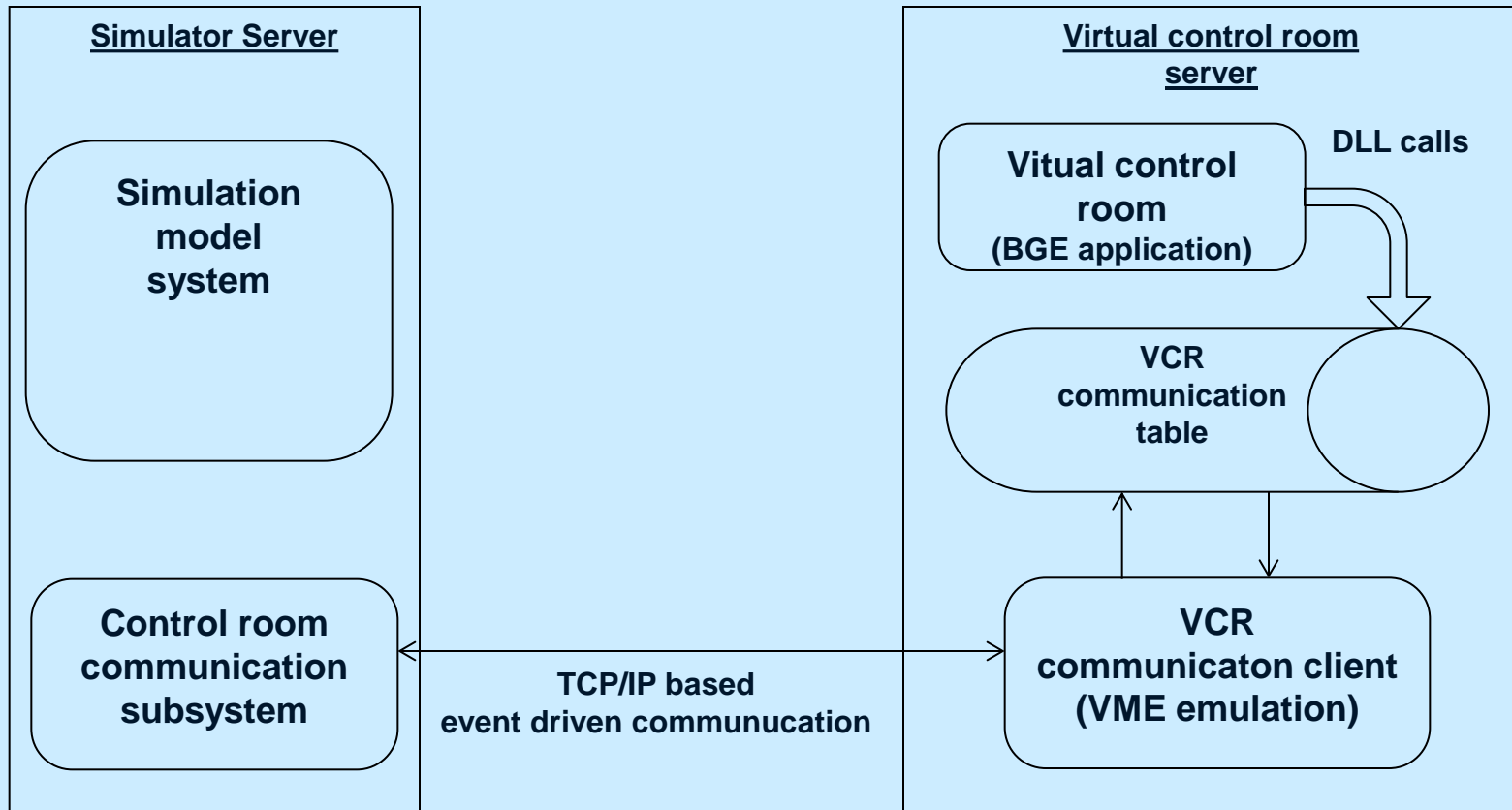
- **Applying photos of the CR as textures:**
 - at the beginning: helps the placement and positioning of CR devices
 - at the end: process and replace the original images (higher resolution, smaller size)
- **Share geometrical data (mesh) among the same looking objects:**
 - better memory utilization,
 - 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



Using selection units



Navigation methods

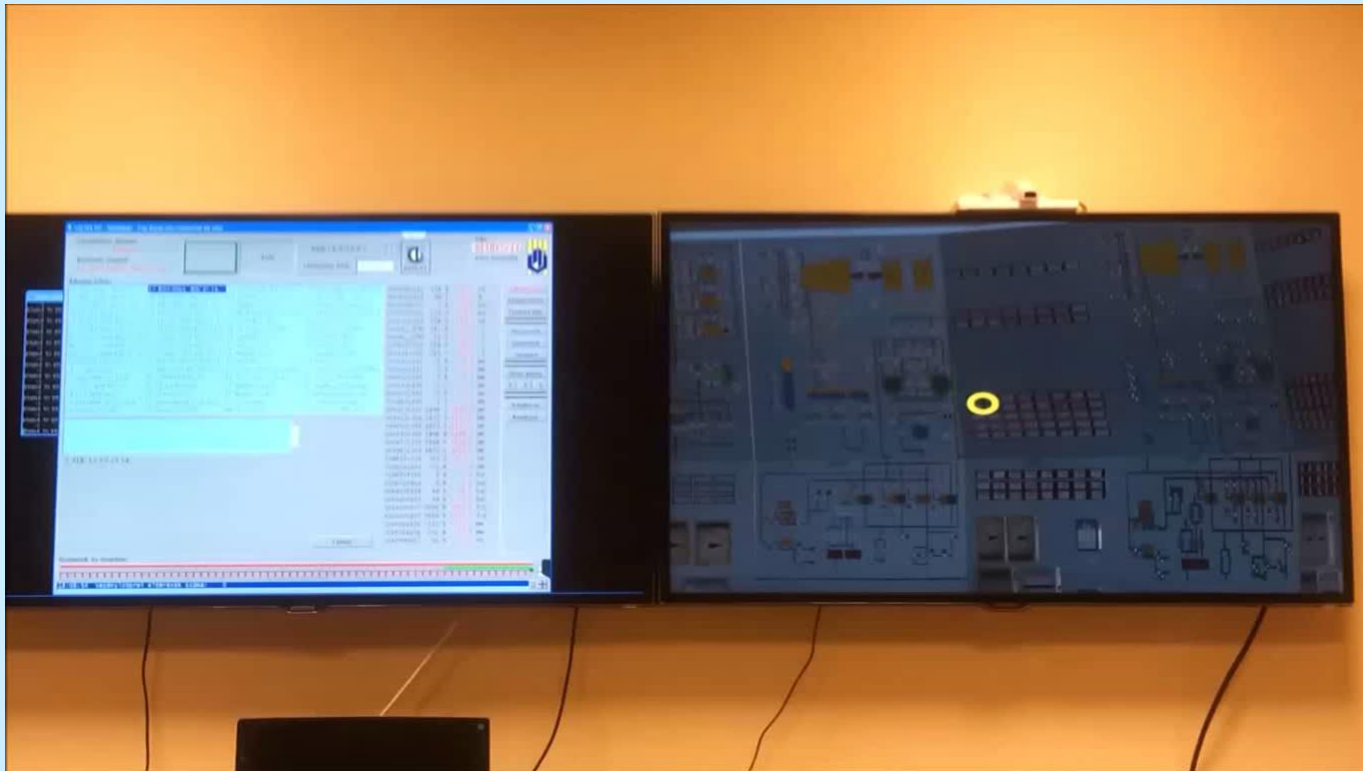
- **Desktop computer :**
keyboard + mouse
- **Large screen display:**
 - **Wireless control with Nintendo
Wii Remote and Nunchuk**



- **Experimenting with head
tracking**



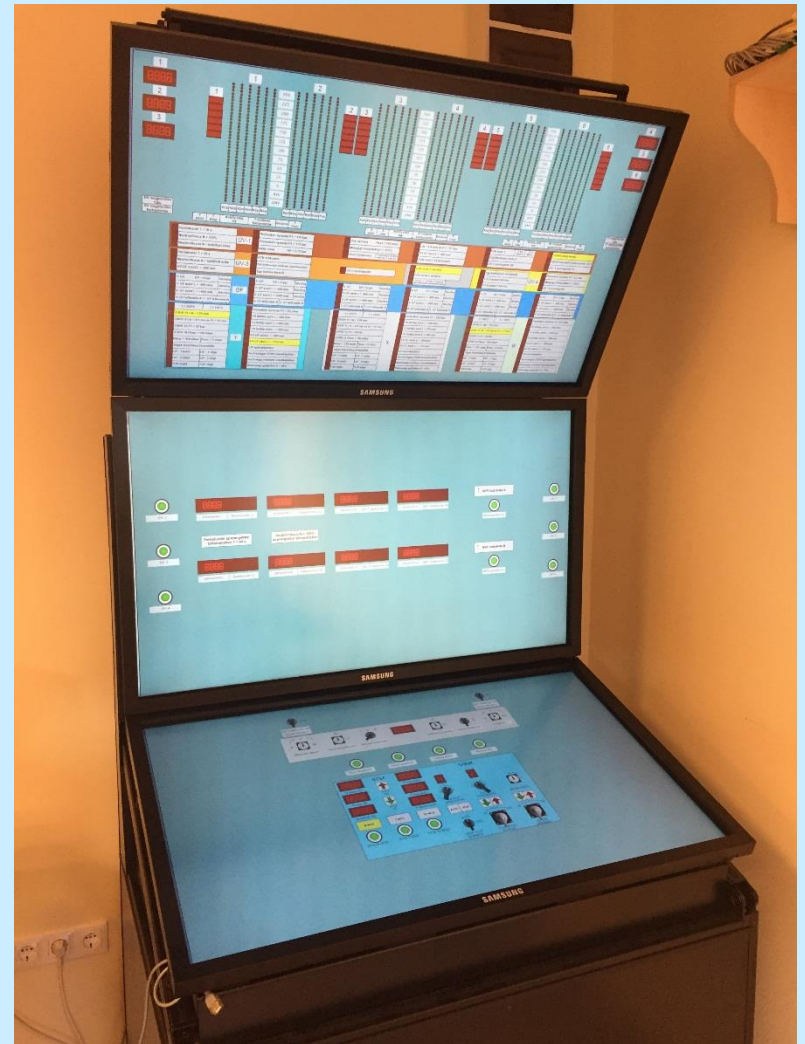
VCR simulation scenario

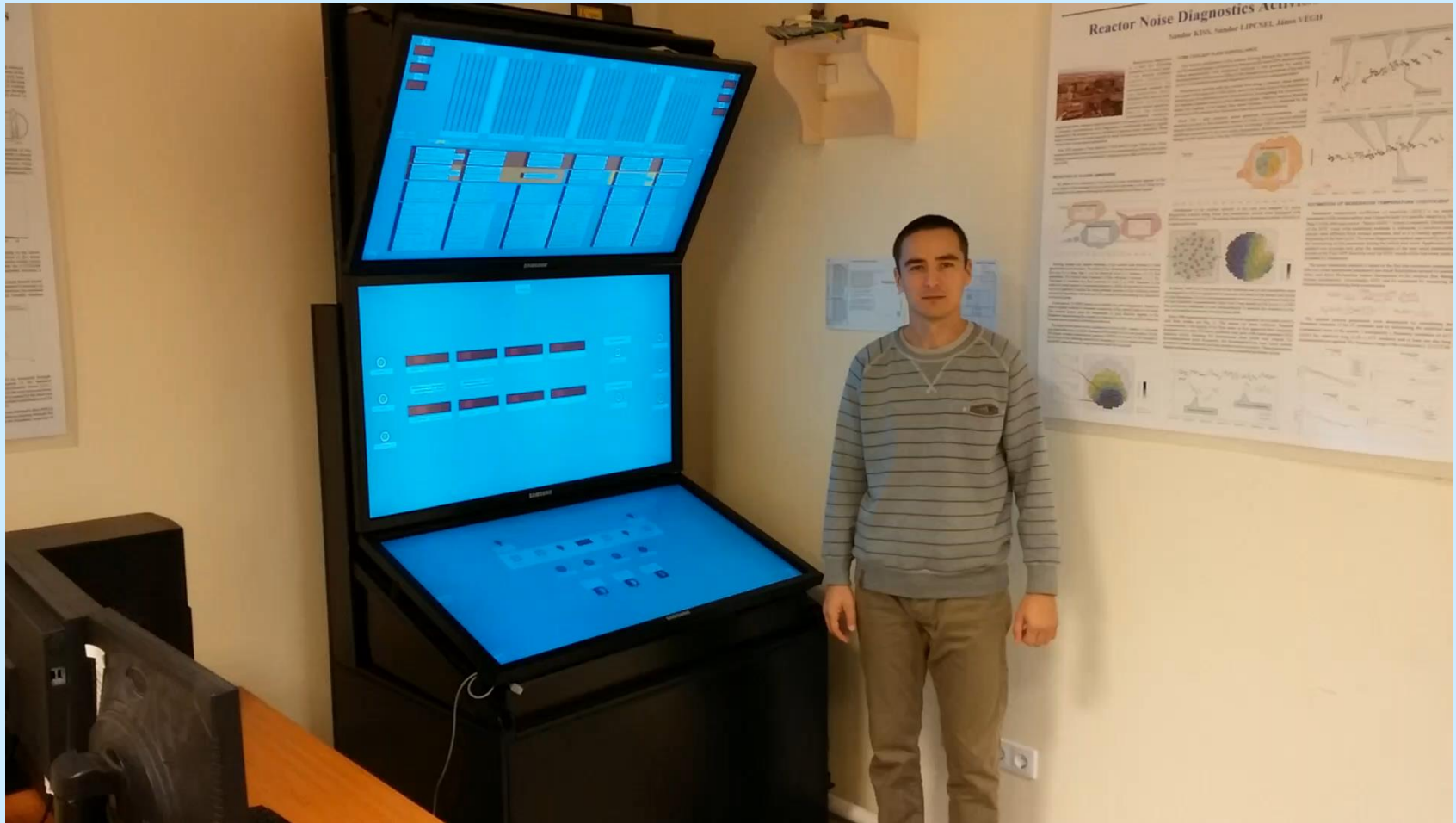




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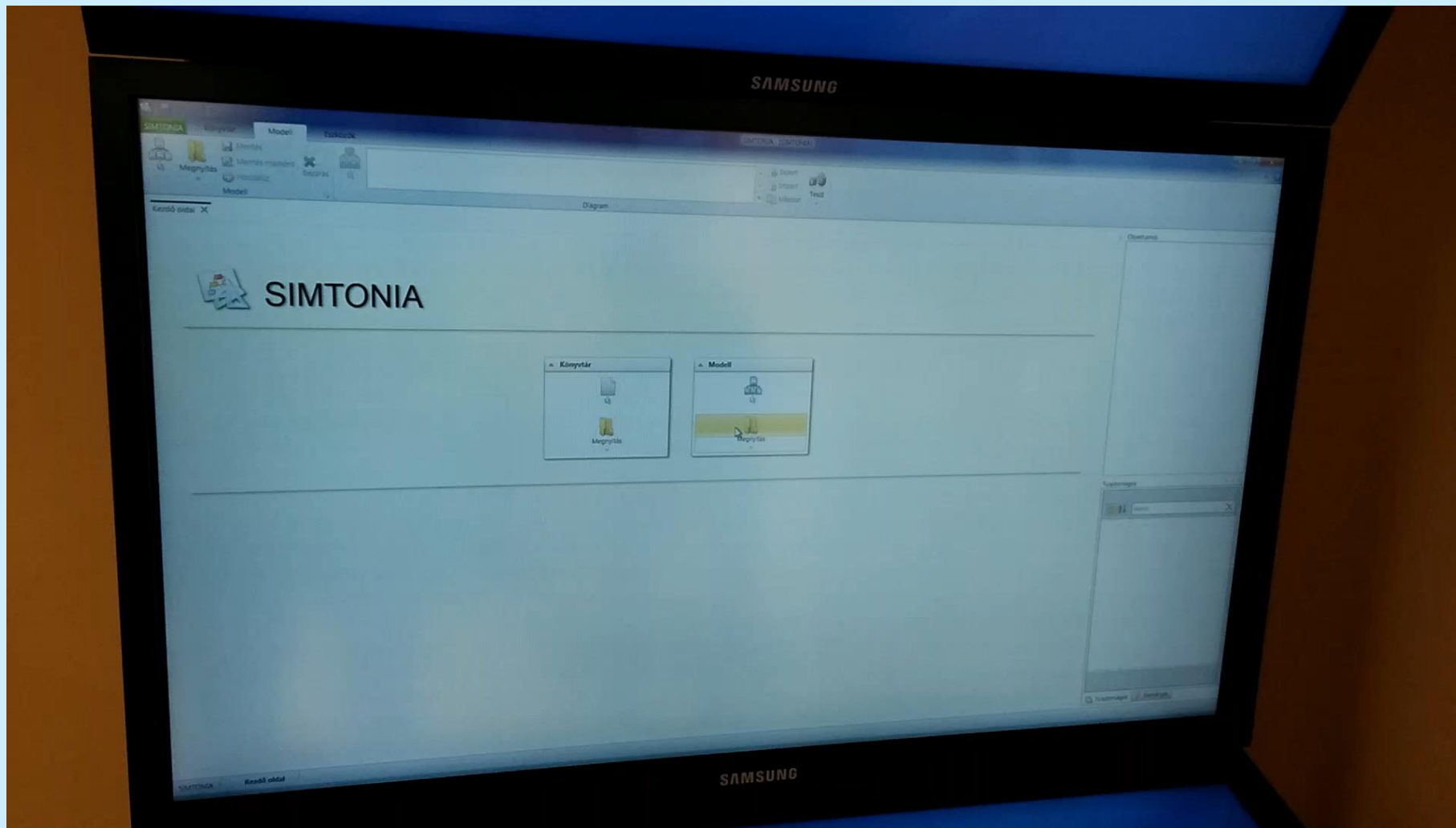
- Refurbishment of RCS and RPCS as a subcontractor of SKODA JS
- Touchscreen solution based on SIMTONIA's visual engine







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**Thank you
for your attention!**