An Operators' Real-sense-based Fire Simulation for Human Factors Validation in Nuclear Power Plants

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Abstract : On March 31, 1993, a severe fire accident took place in a nuclear power plant located in Narora in North India. The event involved a major fire in the turbine building of NAPS unit-1 and resulted in a total loss of power to the unit for 17 hours. In addition, there was a heavy ingress of smoke in the control room, mainly through the intake of the ventilation system, forcing the operators to vacate the control room. The Narora fire accident provides us lessons indicating that operators could lose their mind and predictable behaviors during a fire. After the Fukushima accident, which resulted from a natural disaster, unanticipated external events are also required to be prepared and controlled for the ultimate safety of nuclear power plants. From last year, our research team has developed a test and evaluation facility that can simulate external events such as an earthquake and fire based on the operators' real-sense. As one of the results of the project, we proposed a unit real-sense-based facility that can simulate fire events in a control room for utilizing a test-bed of human factor validation. The test-bed has the operator's workstation shape and functions to simulate fire conditions such as smoke, heat, and auditory alarms in accordance with the prepared fire scenarios. Furthermore, the test-bed can be used for the operators' training and experience.