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Special Session Chairs:

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Special session title:

Image Processing and Virtual Reality for Enhanced Industrial Safety, Training, and Operational Intelligence

Brief description of the proposed topic (150-300 words):

This special session explores the convergence of image processing, computer vision, and virtual reality (VR) technologies to enhance safety, training, and operational intelligence in industrial environments. As industries continue their digital transformation, the ability to perceive, interpret, and interact with complex operational scenarios becomes crucial for minimizing risks, improving situational awareness, and supporting data-driven decision-making.

Recent advances in image and video analysis—particularly through 3D imagery, point cloud data, and event recognition techniques—have enabled the development of immersive digital twins and high-fidelity virtual environments. These technologies support realistic simulations of industrial sites, enabling safer training procedures, remote inspection, proactive hazard detection, and interactive process monitoring. Moreover, the integration of point cloud processing, segmentation, scene reconstruction, and event detection empowers intelligent VR systems that reflect real-time or context-aware changes in the physical environment.

This session invites contributions presenting methodological innovations, practical implementations, and case studies on the application of image processing and VR in industrial settings. Topics of interest include, but are not limited to:

- 3D scene generation from LiDAR, photogrammetry, or multisensor fusion,
- Point cloud compression, segmentation, fusion, and visualization,
- Vision-based event detection and activity recognition for safety monitoring,
- Immersive training platforms and virtual safety drills,
- Remote inspection and process monitoring via VR interfaces,
- Modeling and simulation of industrial processes in virtual environments,
- Imaging modalities (e.g., 360° imagery, stereoscopic, thermal, HDR, depth, light field, holographic) for enhanced realism, perception, and situational awareness in industrial VR environments,
- Real-time rendering and interaction with complex industrial data,
- Integration of digital twins and VR for predictive maintenance and operational planning.

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