

## Abstract

This paper addresses the imperative need for implementing Safety Assurance Cases (SAC) utilizing machine learning, specifically the YOLOv8 algorithm, in the context of Autonomous Vehicles (AVs) within smart factories. The study emphasizes the transition towards transparent documentation of system design, testing, and implementation, using the Structured Assurance Case Metamodel (SACM) Notation. Urgent concerns include emphasize the need for the prompt implementation of safety measures and protocols, ensuring that potential risks in the rapidly evolving technological landscape are addressed without delay, necessitating meticulous hazard analysis, risk evaluation, and evidence-backed arguments for immediate resolution. The paper highlights the significance of YOLOv8, an innovative object detection algorithm, chosen for its real-time capabilities, and discusses the practical application of SACM notation in structuring logical relationships among safety claims. Considering the transformative landscape of Smart Factory systems, this study elucidates the importance of standardized safety documentation in the era of autonomous driving, emphasizing the need for SACM notation in addressing safety challenges specific to industrial AVs.

**Keywords:** Safety Assurance Case (SAC), Autonomous Vehicle (AV), Structured Assurance Case Metamodel (SACM) Notation, Smart Factory, YOLOv8.