

Sensor-Based Collision Avoidance for Robotic Wire Arc Additive Manufacturing

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Abstract:

This research explores the implementation of a sensor-based planner to avoid collision during robotic Wire Arc Additive Manufacturing (WAAM). The experimental setup comprises a collaborative robot with a MIG welding torch and a light detection and ranging (Lidar) camera to detect obstacles in the robot's path and estimate their location and distance. Additionally, a simulation of the robotic system has been developed to test its ability to avoid static obstacles. The simulation results show that the robot can successfully plan and execute trajectories inside a small container. The main challenge encountered in this research is addressing sensor noises that occur during WAAM operation, which can adversely affect system reliability. Future work will involve integrating laser scanners and potentially multiple sensors to enhance the feedback signal. This study contributes to the development of perception capabilities for robots during the WAAM process, resulting in safer operations, particularly for complex parts.