

Master Thesis - “Collision Avoidance in Industrial Robot Stations Using Vision and Sensors”

(30 credits/20 weeks – 1 student)

About us

GKN Aerospace is the world’s leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world’s aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world’s advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Project Background

Industrial robot stations are widely used in modern manufacturing due to their precision, speed, and reliability. Despite careful planning and simulation, unexpected collisions can still occur due to incorrectly placed workpieces, variations in orientation, or objects entering the robot workspace. Traditional safety systems are typically static and based on predefined zones, which makes them less effective in flexible production environments. There is therefore a need for more adaptable and intelligent collision avoidance solutions.

Assignment Description

The aim of this thesis is to develop a modular collision avoidance system that can detect potential collision risks in real time and trigger a safe response, such as stopping or slowing down the robot. The system should be easy to integrate into existing robot stations with minimal wiring and limited modifications.

Two possible approaches will be explored:

- Use of overhead cameras to monitor the workspace, track robot and objects, and detect collision risks. The system should also verify correct workpiece presence and orientation.
- Use of proximity sensors mounted on the robot or end effector to detect nearby objects and provide fast local feedback.

The solution should be designed for simple integration, for example using a minimal number of signals to communicate with the robot controller. The system will be demonstrated in a real-world scenario, focusing on detecting risks and triggering responses. It should also be configurable, allowing adjustment of sensitivity levels and other parameters.

Evaluation will be based on detection accuracy, response time, robustness, and ease of integration.

Qualifications

- Studies in robotics, mechatronics, automation, or similar
- Basic knowledge of industrial robots and control systems
- Experience with sensors, computer vision, or programming is beneficial

Apply by

Send your resume and cover letter to Supervisor

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Last date for application: 31 July 2026.

