**Master Thesis**

Deggendorf Institute of Technology, Deggendorf

Faculty of Mechanical and Mechatronics Engineering

Master Mechatronics and Cyberphysical Systems

Verfolgung eines Förderbands mit zwei Robotern mithilfe einer Bildverarbeitungskamera

# Tracking a conveyor belt with two robots using a machine vision camera

Master Thesis to obtain Academic Degree

**Master of Engineering(M.Eng)**

submitted by: Midhun Eldose, 22101196

first examiner: Prof. Ginu Paul Alunkal

Deggendorf, 30.04.2025

**Confidential Disclosure Agreement**

between

**Deggendorf Institute of Technology**

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Faculty of Mechanical Engineering and Mechatronics
Major: Mechatronics and Cyberphysical Systems

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(in the following "Deggendorf Institute of Technology")

and

Midhun Eldose

(in the following "NEURA Robotics GmbH")

(in the following singularly and jointly "Contractual Partner")

## Preamble

The Deggendorf Institute of Technology supervises an examination paper with the topic of **Framework for the Safe and Reliable Integration of Artificial Intelligence in Lightweight Robots**

(in the following "examination paper"), in which, among other things, confidential information of the company is processed. Simultaneously, confidential information also shared with the company in the context of supervision by the Deggendorf Institute of Technology.

**Declaration**

Name of the Student: Midhun Eldose

Name of the first Examiner: Prof. Ginu Paul Alunkal

Title of master thesis:

Tracking a conveyor belt with two robots using a machine vision camera

I hereby declare that I have written this thesis independently. I have not submitted it for any other examination purposes. I have not used other references or material than mentioned in the bibliography and I have marked all literal analogous citations.

Deggendorf,30.04.2025 Signature of the student:

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**Acknowledgement**

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Midhun Eldose

**Abstract**

Conveyor tracking using collaborative robots equipped with vision cameras represents a significant advancement in modern production. This innovative approach enables cobots to interact dynamically with moving goods on conveyor belts, thereby enhancing efficiency, precision, and adaptability. By utilizing vision cameras, cobots can accurately detect, locate, and track objects in real-time, accommodating changes in shape, speed, and orientation. The integration of vision technology allows cobots to perform tasks such as sorting, assembly, and pick-and-place operations with minimal human intervention.

This thesis explores the technical aspects of conveyor tracking with cobots, highlighting the role of vision systems in improving automation capabilities, reducing error rates, and enabling flexible manufacturing environments. It also addresses the challenges of synchronizing cobot actions with fast-moving conveyors and discusses the potential benefits for industries such as logistics, packaging, and electronics assembly.

The experimental work involves establishing a collaborative environment of cobots for conveyor tracking experiments using a vision camera. The primary objective is to enhance the tracking accuracy of objects and capture various shapes on the conveyor belt. The experimental setup includes two cobots, a conveyor belt, two grippers, and objects of different shapes. As the conveyor belt moves these objects, the vision camera captures their images and poses, along with their part coordinate system (PCS). This information is relayed to the first robot, which sorts the objects based on shape. The second robot then synchronizes with the sorted objects in a designated capture zone, picking them up and placing them into user-defined target boxes. Once filled, the boxes are removed via the conveyor or another transport mechanism.