

PhD Candidate full name:

Artur José Vilares Cordeiro

Higher Education Institution: UTAD - Universidade de Trás-os-Montes and Alto Douro**Doctoral Programme:** Doctoral Program in Electrical and Computer Engineering**Dissertation Title:** Configurable Perception Pipeline for Bin-picking in Industrial Scenarios**Date:** 2026-02-12 10:30:00**Location:** UTAD - Universidade de Trás-os-Montes and Alto Douro | School of Sciences and Technology | Library | Room B- 1.04

Abstract or Public Summary: In today's industry environment, picking systems are crucial in transforming internal logistic operations by enhancing automation, efficiency, and accuracy. Despite significant advancements, current perception approaches for picking system often fall short in dynamic and uncontrolled environments due to their reliance on static assumptions, leading to decreased performance. This thesis develops hybrid perception systems for picking operations by integrating artificial intelligence with traditional methodologies, aiming to create configurable systems adaptable to diverse dynamic environments. A novel data generation technique and a modular perception system were developed to address complex bin-picking challenges in both controlled and uncontrolled settings, incorporating new objects using only their 3D models and enabling the use of varied techniques for dynamic problem-solving. The system achieved a 91.81% average picking success rate in dynamic, cluttered, and unstructured environments, while also generating synthetic labeled data 440 times faster than manual real-data collection with comparable quality. This work provides a robust, modular perception and data generation solution, validated across industrial environments, offering a versatile tool for addressing challenging bin-picking tasks in diverse scenarios.

Principal Supervisor at INESC TEC: João Pedro Carvalho de Souza**Scientific Domain:** [Computer Science and Engineering] + [Robotics]**Keywords:** Perception systems; Robotic picking; Computer Vision; Machine learning