Call for Bachelor Project:
Designing a cobot supported quality control inspection

Project title: Designing a cobot supported quality control inspection – roboQC
We are excited to announce a challenging and innovative project opportunity for bachelor students to collaborate on designing a platform for quality control inspection.

Project Overview:
This project involves the design and implementation of an automated quality control inspection platform integrating a UR3e collaborative robot (cobot) to ensure consistent, accurate, and efficient product verification. The platform is intended for industrial environments where dimensional accuracy, weight conformity, and color consistency are critical to product quality and regulatory compliance.

The inspection system is structured around three primary control functions: length measurement, weight measurement, and color verification. Length control is achieved using precision sensors such as laser displacement or vision-based measurement systems, enabling non-contact inspection with high repeatability. Weight measurement is performed via an integrated load cell or dynamic weighing module, ensuring that each inspected part falls within defined tolerance limits. Color inspection is carried out using an industrial vision system equipped with controlled lighting, allowing reliable detection of color deviations, surface inconsistencies, or incorrect material finishes.

The UR3e cobot serves as the central handling and positioning unit within the platform. Its role includes picking parts from the production line, accurately positioning them at each inspection station, and sorting them based on inspection results. The cobot's high repeatability, force sensing, and collaborative safety features allow it to operate alongside human operators without the need for extensive safety guarding, increasing flexibility and reducing floor space requirements.

All inspection data are processed through a centralized control system that evaluates measurements against predefined quality thresholds. The platform provides real-time feedback, automatic pass/fail classification, and traceable data logging for quality reporting and process optimization. The modular design of the system allows easy reconfiguration for different product variants or inspection criteria.

Overall, the project aims to enhance quality assurance by reducing human error, improving inspection consistency, and increasing throughput while maintaining a safe and adaptable production environment through the use of collaborative robotics.

Objectives:
The primary objective of this project is to design and develop a functional quality control inspection platform supported by a UR3e collaborative robot.
A second objective is to implement the control and inspection logic through software development using both Python and UR Polyscope.

Methods:
The mechanical structure of the platform will be designed using SolidWorks, ensuring a robust, modular, and ergonomic framework capable of integrating sensors for length, weight, and color inspection. Emphasis will be placed on design for manufacturability and assembly, allowing the framework to be produced using additive manufacturing. All structural and mounting components will be 3D printed, enabling rapid prototyping, cost efficiency, and easy iteration during the development phase.
Python will be used for sensor data acquisition, processing, and decision-making, including tolerance checking, color analysis, and result classification. The Python programs will also handle data logging

and communication between the inspection modules and the robot controller. This approach ensures scalability and allows future integration with databases or manufacturing execution systems.
Polyscope will be used to program the UR3e cobot's motion, task sequencing, and human–robot interaction. The robot program will coordinate part handling, positioning at inspection stations, and sorting actions based on inspection outcomes provided by the Python application. Safety features, collaborative modes, and optimized motion paths will be configured within Polyscope to ensure reliable and safe operation.
Collectively, these objectives aim to deliver a fully integrated mechanical and software framework that demonstrates the practical application of collaborative robotics, additive manufacturing, and automated inspection technologies in an industrial quality control context.

Final Prototype and Testing:
The final prototype will undergo rigorous testing in the laboratory to ensure functionality and reliability. The outcomes of the project will be presented in public lecture held by project members at the University of Nova Gorica (UNG).

Team members, students and project costs:
The team shall consist of 3-4 students of the University of Nova Gorica with technical and project management backgrounds or interests, as well as a basic understanding of 3D computer modelling, Python programming, basic of Jupyter Notebooks, and practical mechanical skills. If there are several applications, the teams will be selected on the basis of their skills (Python, SolidWorks, Polyscope). A supervisor from School of Engineering and Management will be dedicated once the project team is formed.
All project costs, including travel costs, food allowances for the student members will be covered by the UNG.

Application process:
Interested students may obtain additional information and are encouraged to submit letters detailing their competencies and interests to the Secretary of the School of Engineering and Management at helena.skrl@ung.si with the email subject line "**roboQC".**

Applications for the teams are open until **March 15, 2026**.

The project initiation shall be April 2, 2026 and the project is expected to finish by October 30, 2026. The project offers a good opportunity for students to apply their skills and knowledge to a real-world engineering challenge, contributing to both their academic development and practical skills. The work may result in the conference paper and presentation at the conference in Slovenia (e.g. IEEE ERK) or within ACROSS network. All team members will be awarded a PTF certificate. We are looking forward to receiving your applications and embarking on this exciting journey together.