Automated Object Detection in a Collaborative Robot Workspace

Abbreviation: Rob195
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Introduction

Collaborative robots are meant to be flexible and easy to be reprogrammed. For safety, most current systems rely on force or torque sensors to stop any motions if a collision takes place. This approach works reasonably well for human-machine collisions. In a collaborative situation, the robot workspace is dynamic, clutter may obstruct parts of it. This clutter may be tipped over by the robot and pose health risks (e. g. containers with liquids, heavy unstable objects) or lead to unnecessary halts.

Goal

Integrate a vision system to detect in real-time unexpected temporary objects in a robot workspace to add an extra layer of safety and reduce downtime.

Description

The system to be developed shall be tested in the robot workspace illustrated in the figure below. It consists of a Fanuc CR35i collaborative robot arm adjacent to a small table on one side and freely configurable space on the other. The vision system shall monitor the workspace and detect occupied areas in real time. The robot's motions shall be adapted accordingly on the fly to enable continuous operations without collisions.

Prerequisites

- High motivation to work in the emerging field of collaborative robotics with the currently largest commercially-available cobot for industrial applications.
- Excellent programming skills (C++, Python, Karel).
- Autonomy, flexibility, discipline.

Part of this work shall be performed at the BFH AHB premises in Biel.

Work Type

Conceptual	■	■	
Mechanical	■		
Hardware	■		
Software	■	■	■
Experimental	■	■	