

TAKING PIECES WITH ROBOT ARM UR5 AND ARTIFICIAL VISION

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DESCRIPTION OF FINAL THESIS

1. Goals

The main goal is the detection of centers of gravity and position by artificial vision, using a static camera, then with any communication protocol it sends the coordinates to the UR5 robot arm, which will take the pieces and deposit them on a conveyor belt, adjusting to their position and orientation.

2. Parts of the project

a. Identification of pieces

A camera will be used to obtain direct images of the pieces container and then with artificial vision using OpenCV to get the CDG of the pieces and the orientation will get the position and orientation.

b. Communication between camera and robot arm

After identifying the number of parts, relative positions and centers of gravity, the coordinates will be sent to the robot, using some type of communication such as sockets, TCP protocols, JSON or ROS..

c. Coordinates correction and leave on conveyor belt

When receiving the information provided by the controller of the camera will be made the necessary transformations to obtain the coordinates relative to the base of the robot and to be able to make the approximation to the piece, closing of tweezers according to the size of the piece and placement on the conveyor belt.

d. (Optional) Cloud base information

Taking the data obtained in the selection of pieces following this stage, a small monitoring system will be made of the whole process of selecting parts which can be accessible from any device with access to the cloud.

3. Solutions

a. Independent camera with raspberry pi as microcontroller

Raspberry Pi controller which runs the program of artificial vision and communication with the robot

b. UR5 integrated camera

Use of universal robot software. It is not necessary to create a communication protocol between camera and robot. Doubtful the viability and computational power

c. Independent camera with PC

Static camera and a program running on a PC for faster and computational power. Easy integration with robot communications.