

# **Todo list**



---

---

# Robot Vision Mini Project

---

Project Report  
Group 18gr842

Aalborg University  
Robot Vision

Copyright © Group 18gr842, Robot Vision P8, Aalborg University 2018

This report is compiled in L<sup>A</sup>T<sub>E</sub>X. Additionally is Mathworks MATLAB, Adobe Illustrator, Lucidcharts.com, Inkscape, and Autodesk Eagle used to draw figures, schematics, and charts.



**Robot Vision**  
Aalborg University  
<http://www.aau.dk>

## AALBORG UNIVERSITY STUDENT REPORT

**Title:**

Robot Vision Mini Project

**Theme:**

Computer Vision

**Abstract:**

The video example of the project is found on YouTube, following the link:  
<https://youtu.be/79HsSZoeQIg>.

**Project Period:**

Spring Semester 2018

**Project Group:**

Group 18gr842

**Participants:**

Shagen Djanian

Niclas Hjorth Stjernholm

**Supervisor:**

Number of Pages: 5

**Date of Completion:**

April 26, 2018

*The content of this report is freely available, but publication may only be pursued with reference.*





# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Setup</b>	<b>3</b>
	<b>Bibliography</b>	<b>5</b>

# Chapter 1

## Introduction

For the mini project in the Robot Vision 2018 course the task of assembling Simpsons figures with a robot was given. The figures are made of LEGO®Duplo bricks stacked on each other as can be seen in Figure 1.1. The figures are the following:

- Homer: Yellow, Red, Blue.
- Bart: Yellow, Orange, Blue.
- Maggie: Yellow, Blue.
- Lisa: Yellow, Orange, Yellow.
- Marge: Blue, Yellow, Green.



**Figure 1.1**

To automatically solve this task a robot and a camera is needed in a setup like Figure 1.2. The camera takes pictures of the area where the bricks are located. The image is then processed to figure out where the bricks are located and how they are oriented. The robot is then ordered to assemble a figure e.g. Homer and can now do this automatically since it knows where the bricks are. The figure is then assembled and dropped off in a loading area and the robot prepares for a new order.

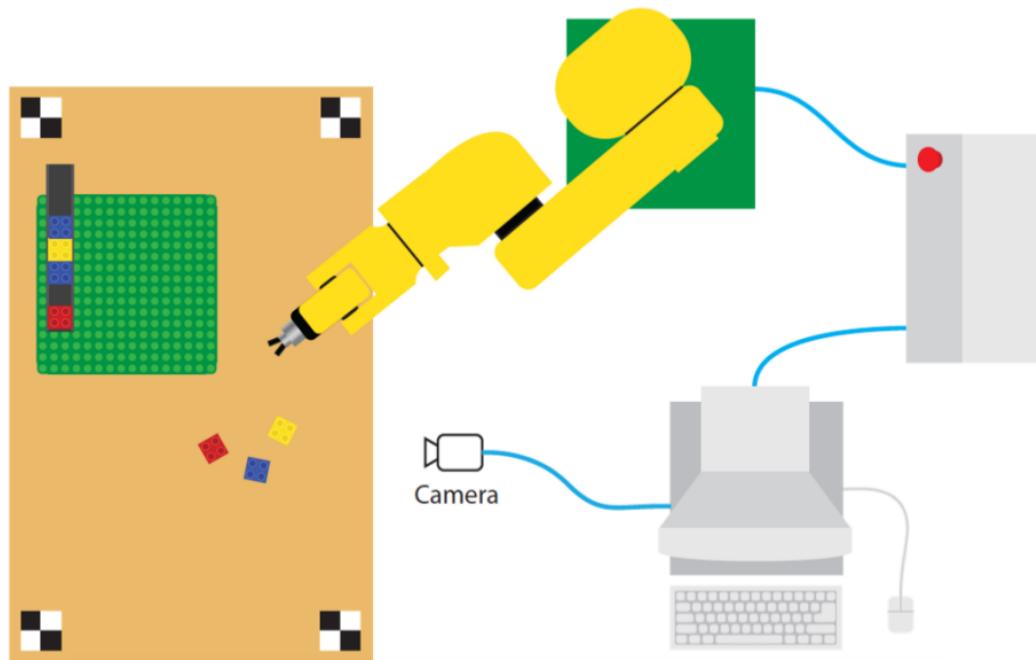


Figure 1.2

# Chapter 2

## Setup

To do the task laid out, the following equipment was used:

- 6 Degrees of Freedom Universal Robot
- Logitech Webcam 1080p
- MATLAB
- LEGO®Duplo bricks
- Parallel Gripper

The robot cell is shown in Figure 2.1. The red square marks the zone where the bricks are placed. The Universal Robot (UR) can then grab them with a parallel gripper. The green zone marks the drop off zone. Here the UR delivers the assembled figure.

The camera was mounted to the tool, Figure 2.2, as there were no other places to mount it. The benefits of this approach are that the camera does not obstruct the robot when it is moving. Another benefit is that the cameras frame is known when the tool is known, except it is flipped on one of the axes.

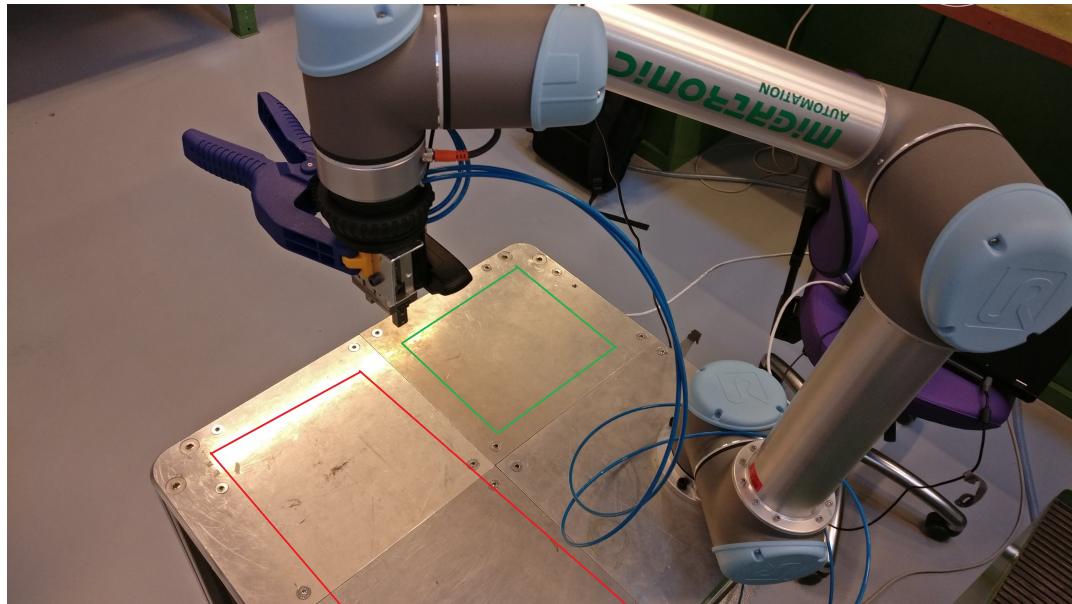


Figure 2.1

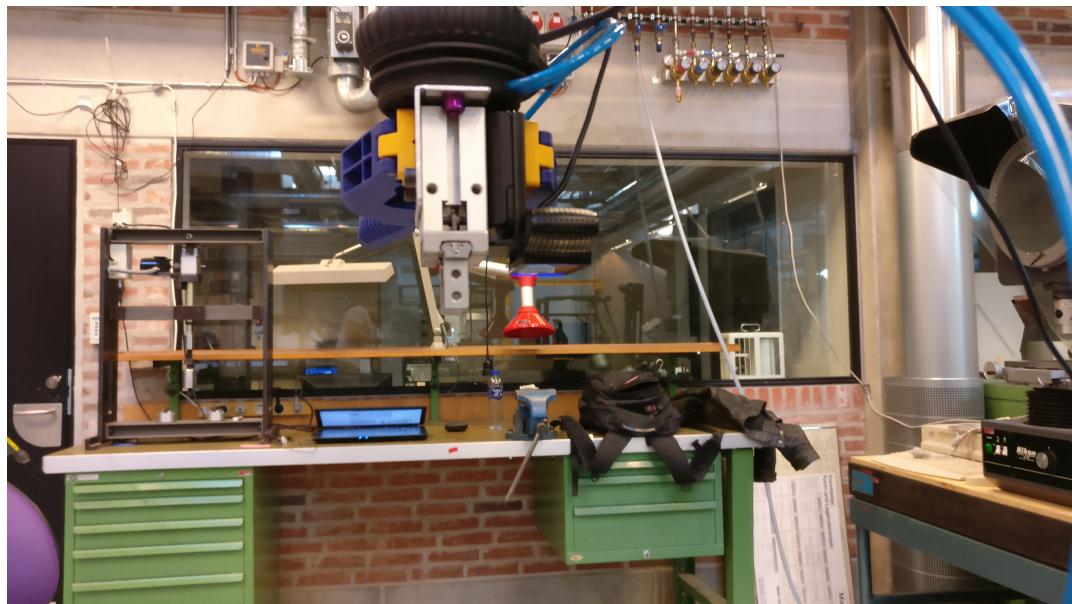


Figure 2.2

# Bibliography