

# **Todo list**



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# Noget med Computer Vision

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Project Report  
Group 18gr842

Aalborg University  
Vision, Graphics and Interactive Systems

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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.



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## AALBORG UNIVERSITY STUDENT REPORT

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Noget med Computer Vision

**Abstract:**

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Computer Vision

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





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# Chapter 1

## Introduction

For the miniproject 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.

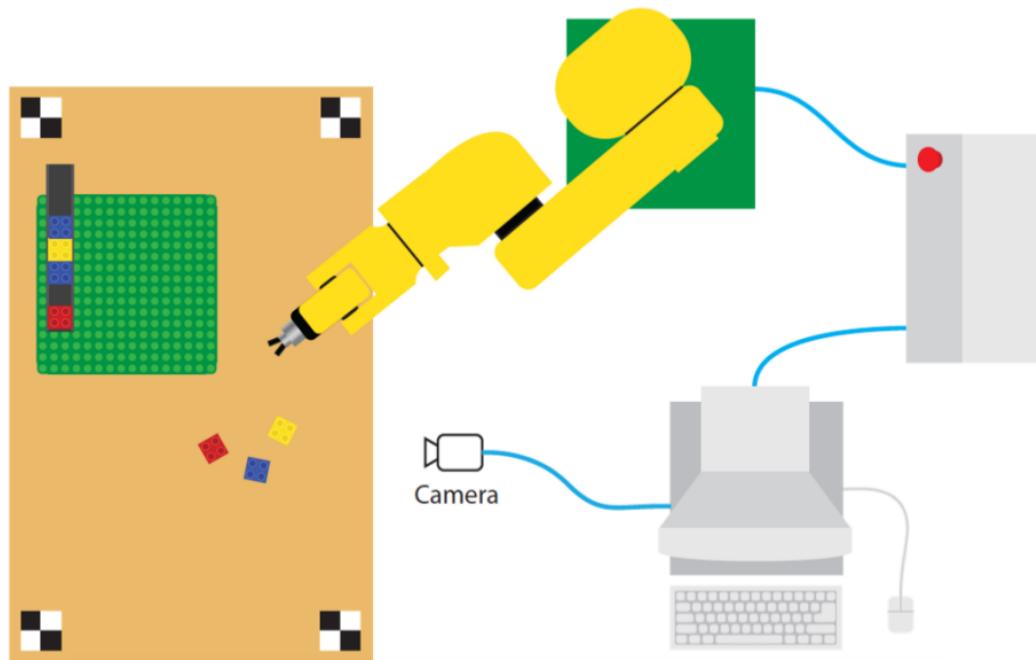


Figure 1.2

# Chapter 2

## Setup

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

- 6 Degree of Freedom Universal Robot
- Logitech Webcam 1080p
- Matlab 2018a
- Lego Duplo bricks
- Parallel Gripper

The robot cell can be seen in Figure 2.1. The red square marks the zone where the bricks are placed. The Universal Robot (UR) can then grab them where 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 tools is known, except it is flipped on one of the axis.

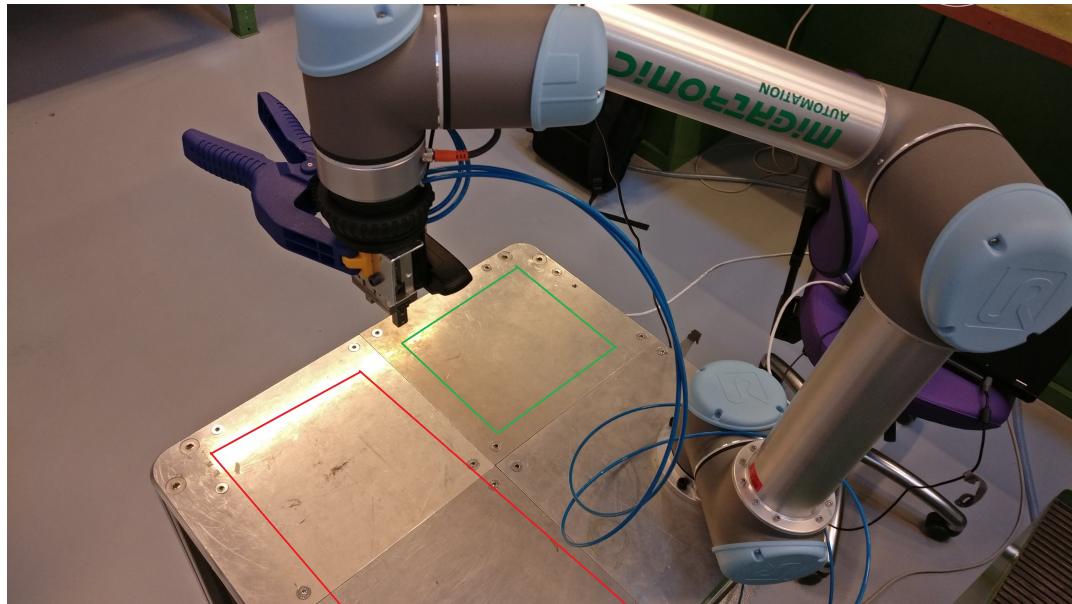


Figure 2.1

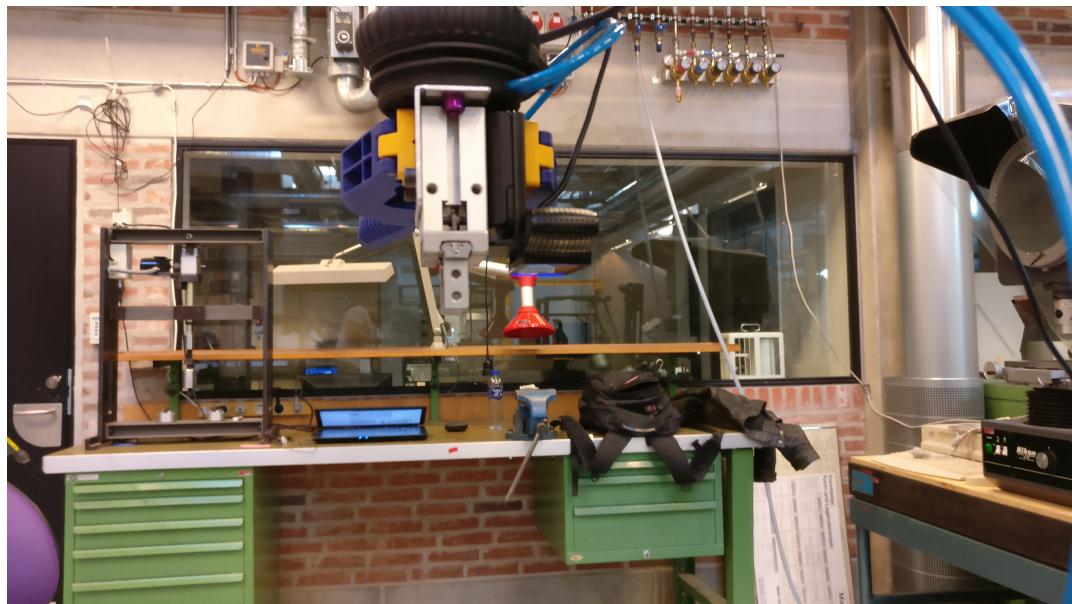


Figure 2.2

# Bibliography