Assessment 4 Description

1 Introduction

Vision gives systems the ability to "see" their environment, and in conjunction with some form of intelligence, make decisions about what they should do with this information. For example, a mobile robot with a camera and machine-learning algorithm can decide whether to avoid an object in its camera's field of view or move towards it. In this way, desirable behaviour can be achieved using vision.

In this assessment, you are to design a system that can pick and place electronic Surface Mount Device (SMD) components onto a Printed Circuit Board (PCB) and validates their correct alignment using vision.

2 Aim

The aims of this assessment are to:

- "Apply the principles and technologies in intelligent machine design and integration".
- "Demonstrate familiarity with industrial vision systems and vision-based automatic systems".

3 Objective

The objective of this assessment is to:

- Design an intelligent machine using a systematic design process.

4 Necessary Competencies

This assessment relies on the following competency:

- None.

5 Requirements

This assessment has the following requirement:

- None.

6 Resources

For this assessment, the following resource is available:

- None.

7 Submission

Figure [1] illustrates the recommended file structure for this assessment.

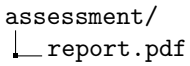

Figure 1: Recommended submission file structure.

It is expected that the submission includes:

- Concepts.
- Developments.
- Evaluations.
- A final design.
- A machine-vision algorithm.
- A short description of the machine's operation.
- A critical reflection of your design process.

Upload the submission as a single .zip file.

8 Grading

This assessment corresponds to "Test 2" and accounts for 10% of the course's final grade.

The following rubric will be used to mark this assessment:

Table 1: Marking Rubric.

E Range (0-39.99)	**D Range (40-49.99)**	**C Range (50-64.99)**	**B Range (65-79.99)**	**A Range (80-100)**
Inadequate	*Poor*	*Adequate*	*Good*	*Excellent*
A concept is presented. A few developments are presented and changes described. A final design is presented. A machine vision algorithm is described.	A few concepts are presented. A few developments are presented and changes described. A final design is presented and described. A machine vision algorithm is described.	Some concepts are presented and evaluated. Some developments are presented and changes described and evaluated. A final design is presented and described. A machine vision algorithm is described. A description of the employed design process is presented.	Multiple concepts are presented and evaluated using a quantitative assessment. Multiple developments are presented and changes described and discussed, and evaluated using a quantitative assessment. A final design is presented and described and discussed. A machine vision algorithm is described and discussed. A critical reflection of the employed design process is presented.	Several concepts are presented and evaluated using an appropriate quantitative assessment. Several developments are presented and changes described and discussed, and evaluated using an appropriate quantitative assessment. A final design is presented and described and discussed in detail. A machine vision algorithm is described and discussed in detail. A detailed critical reflection of the employed design process is presented.