

Semester project on signals in robot systems

BEng in Robot Systems

3. Semester

Group 3

Authors

| Name | Username | Birthday |
|---------------------|----------|------------|
| Noah V. Vryens | novry24 | 01/04/2002 |
| Rasmus K. Nielsen | rasni19 | 25/12/1997 |
| Emma B. Rasmussen | erasm24 | 15/05/2001 |
| Jannick H. Irvold | jairv24 | 23/10/2002 |
| Eymundur Ó. Pálsson | eypal24 | 31/08/2002 |

Supervisor

Thorbjørn M. Iversen
thmi@mmmi.sdu.dk

December 1, 2025

Test Abstract

Contents

| | | |
|----------|--------------------------------------|-----------|
| 1 | Introduction | 1 |
| 1.1 | Project Goals | 1 |
| 1.2 | Problem Definition | 1 |
| 1.3 | Constraints & Limitations | 1 |
| 1.4 | System Overview | 1 |
| 2 | Machine Vision | 2 |
| 2.1 | Calibration | 2 |
| 2.2 | Homography | 2 |
| 2.3 | Finding circular objects | 2 |
| 2.4 | Implementation with OpenCV | 2 |
| 3 | Trajectory Planning | 3 |
| 3.1 | Physics | 3 |
| 3.2 | Kinematics | 3 |
| 3.2.1 | MATLAB Communication | 3 |
| 4 | Robot Control | 4 |
| 4.1 | Gripper | 4 |
| 4.2 | UR5 | 4 |
| 5 | Data Collection | 5 |
| 6 | Evaluation | 6 |
| 7 | Discussion | 7 |
| 8 | Conclusion | 8 |
| 9 | References | 9 |
| A | Distribution of tasks | 10 |
| B | Code | 11 |

1 Introduction

1.1 Project Goals

1.2 Problem Definition

1.3 Constraints & Limitations

1.4 System Overview

2 Machine Vision

2.1 Calibration

2.2 Homography

2.3 Finding circular objects

2.4 Implementation with OpenCV

3 Trajectory Planning

3.1 Physics

3.2 Kinematics

3.2.1 MATLAB Communication

4 Robot Control

4.1 Gripper

4.2 UR5

5 Data Collection

6 Evaluation

7 Discussion

8 Conclusion

9 References

A Distribution of tasks

B Code