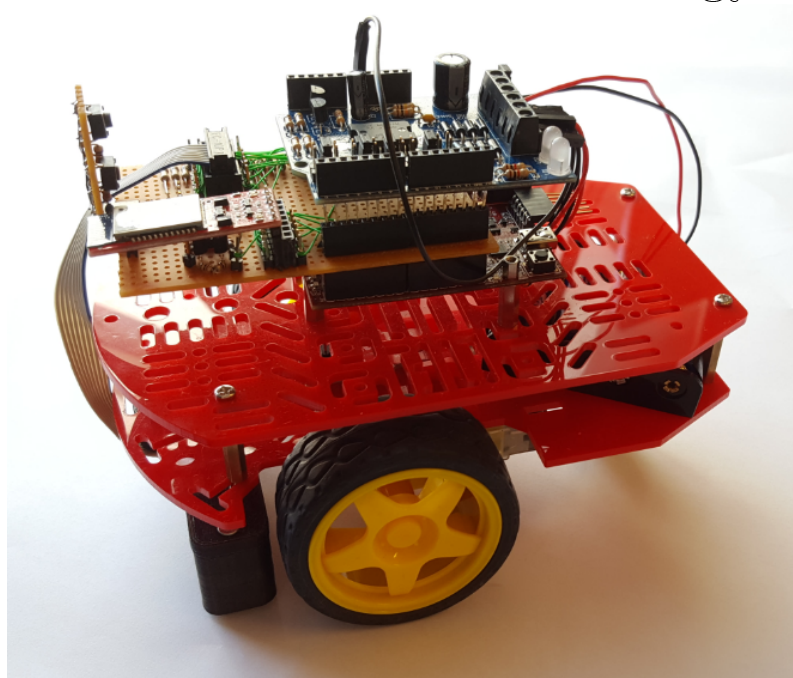


Fall Semester 2016

# Autonomous Object Avoidance Robot

Group 2

## 3. Semester IT-Technology



Group members: Benjamin Nielsen - Henrik Jensen - Martin Nonboe - Nikolaj Bilgrau

Supervisor: Jesper Kristensen - Steffen Vutborg

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Title:

Autonomous Object Avoidance  
Robot

Project Period:

3. Semester | Spring semester 2016

Projectgroup:

Group 2

Group participants:

Benjamin Nielsen  
Henrik Jensen  
Martin Nonboe  
Nikolaj Bilgrau

Supervisors:

Jesper Kristensen  
Steffen Vutborg

Pages:

Appendices:

Completed:

# Preamble

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This project was written by group 2, for the third semester on the IT-electronics education at university college Nordjylland, Sofiendalsvej 60. The project goal is to make a line following robot.

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Benjamin Nielsen

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Henrik Jensen

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Martin Nonboe

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Nikolaj Bilgrau

# Table of Contents

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<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Analysis</b>	<b>2</b>
2.1	Problem statement . . . . .	2
2.2	Problem analysis . . . . .	2
<b>3</b>	<b>Requirements specification</b>	<b>3</b>
<b>4</b>	<b>Hardware section</b>	<b>4</b>
4.1	Hardware diagram . . . . .	4
4.2	Analog-to-digital converter . . . . .	4
4.3	The chipKIT Uno32 board . . . . .	4
4.4	The motor shield - PKA03 . . . . .	4
4.5	The Bluetooth transceiver . . . . .	4
<b>5</b>	<b>Software section</b>	<b>5</b>
5.1	Analog to digital conversion . . . . .	5
5.2	PID controller . . . . .	5
5.3	Pulse-width modulation . . . . .	5
5.4	The interface . . . . .	5
<b>6</b>	<b>Test</b>	<b>6</b>
6.1	Unit Testing . . . . .	8
6.2	Integration Testing . . . . .	8
6.3	System Testing . . . . .	8
6.4	Acceptance Testing . . . . .	8
<b>7</b>	<b>Conclusion</b>	<b>9</b>
<b>8</b>	<b>Appendices</b>	<b>10</b>
8.1	Group collaboration agreement . . . . .	10
<b>9</b>	<b>List of references</b>	<b>11</b>
	<b>List of Figures</b>	<b>12</b>
	<b>List of Tables</b>	<b>13</b>
<b>10</b>	<b>Software appendix</b>	<b>14</b>
10.1	C code . . . . .	14
10.2	C# code - interface . . . . .	16
	<b>Bibliography</b>	<b>17</b>

3D print	3-Dimensional printing
ADC	Analog-digital conversion
GUI	Graphical User Interface
IDE	Integrated Development Environment
MCU	Microcontroller Unit
PCB	Printed Circuit Board
PID	Proportional-integral-derivative
PWM	Pulse-width modulation
THT	Through-hole-technology
UART	Universal Asynchronous Receiver/Transmitter

# Introduction 1

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Indledning til afsnittet af analyse

## 2.1 Problem statement

The problem presented to the group is how to make a robot move from point A to point B, with the help of different sensors, including ultrasound and infrared, and to make use of autonomous algorithms to avoid obstacles.

Problem statement:

- Bot should be able to move from A to B
- Should be able to stop at a predetermined point
- Manoeuvre around obstacles

## 2.2 Problem analysis

### 2.2.1 Mobility from A to B

The robot receives a coordinate to reach, and will use its own starting point to determine a direction to drive towards the given coordinate. The robot will utilize an H-bridge to control its motors and direct current through the motors. This way, the robot can effectively regulate speed and also steer itself autonomously.

To dictate how much current the motors receive, the programming will utilize pulse width modulation (PWM), this allows the motors to have a determined 'uptime', so that it drives and steers in the desired way.

The robot will also utilize front-facing sensors to detect obstacles. In the case that it detects these, it will utilize ultra-sound to determine size and shape, so that it can navigate past these and continue on its path towards point B.

### 2.2.2 Predetermined end point

### 2.2.3 Obstacles avoidance



# Requirements specification 3

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Beskriv section [1]

# Hardware section 4

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Beskrivelse af afsnit

## 4.1 Hardware diagram

Beskrivelse af hardware diagram

### 4.1.1 Sensor choice

### 4.1.2 Another sensor choice?

## 4.2 Analog-to-digital converter

ADC diagram

This products usage of ADC

## 4.3 The chipKIT Uno32 board

## 4.4 The motor shield - PKA03

### 4.4.1 The H bridge

## 4.5 The Bluetooth transceiver

# Software section 5

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Beskriv Software section

## 5.0.1 Software diagram

## 5.1 Analog to digital conversion

## 5.2 PID controller

### 5.2.1 Proportional control(P)

### 5.2.2 Integral control(I)

### 5.2.3 Derivative control(D)

### 5.2.4 Loop tuning

### 5.2.5 Steady-state error

### 5.2.6 Stability

Table manual explained

### 5.2.7 PID Implementation

## 5.3 Pulse-width modulation

### 5.3.1 Duty cycles

## 5.4 The interface

# Test 6

---

Beskriv test section



## 6.1 Unit Testing

### 6.1.1 Sensor

Setup

Results

### 6.1.2 DC Motors

Setup

Results

### 6.1.3 H-Bridge

Equipment

Setup

Results

### 6.1.4 PWM

Equipment

Setup

Results

### 6.1.5 ADC

Equipment

Setup

Results

## 6.2 Integration Testing

### 6.2.1 PWM motor control

Equipment

Setup

Results

### 6.2.2 Robot to Interface communication

Equipment

Setup

Results

## 6.3 System Testing

Equipment

Setup

Results

# Conclusion 7

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Skriv en fucking Conclusion!!

# Appendices **8**

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## 8.1 Group collaboration agreement

### 8.1.1 Contact Information

Table 8.1: Contacts

Benjamin Nielsen	Tlf: 30427645	@: yipiyuk5@gmail.com
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Nikolaj Bilgrau	Tlf: 29802715	@: nikolajbilgrau@gmail.com

### 8.1.2 Workflow

### 8.1.3 Deadline

### 8.1.4 Milestones and goals

Gerne en kalender der viser dage arbejdet!



# List of references 9

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# List of Figures

---

Page

# List of Tables

---

8.1	Contacts . . . . .	10
		Page

# Software appendix 10

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## 10.1 C code

main.c:

ADC.c:

## 10.2 C# code - interface

# Bibliography

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- [1] placeholderAuthor. *placeholderTitle*. 2016. URL: <http://www.ucn.dk>.