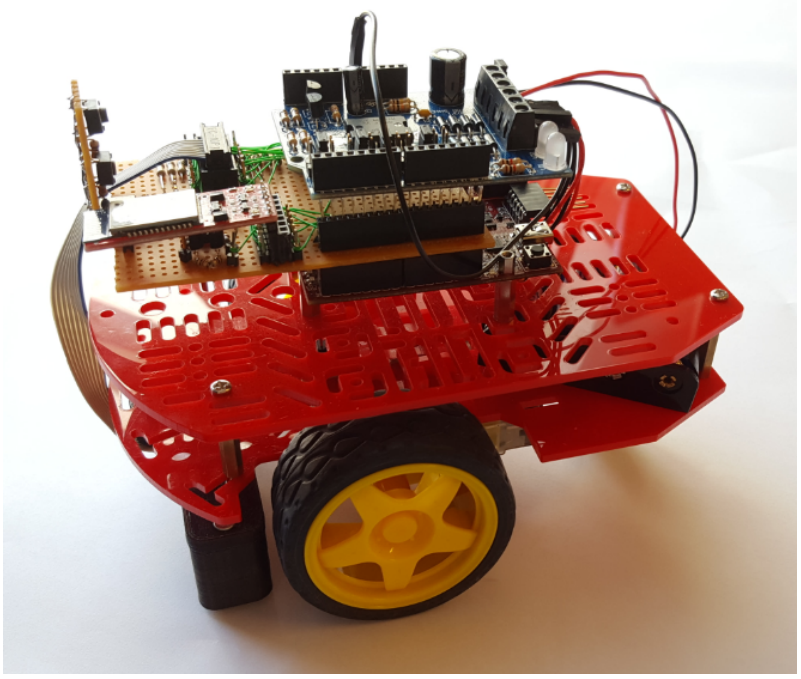
Uddannelse i virkeligheden

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

Uddannelse i virkeligheden

IT-technology
Sofiendalsvej 60
9200 Aalborg SW
http://www.ucn.dk/

Title:

Autonomous Object Avoidance Robot

Project Period:

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Projectgroup:

Group 2

Group participants:
Benjamin Nielsen
Henrik Jensen
Martin Nonboe
Nikolaj Bilgrau

Supervisors:
Jesper Kristensen
Steffen Vutborg

Pages:

Appendices:

Completed:

Preamble

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.

Benjamin Nielsen	Henrik Jensen
Martin Nonboe	Nikolaj Bilgrau

Table of Contents

1 Introduction **1**

2 Analysis **2**
2.1 Problem statement 2
2.2 Problem analysis 2

3 Requirements specification **3**

4 Hardware section **4**
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 tranceiver 4

5 Software section **5**
5.1 Analog to digital conversion 5
5.2 PID controller 5
5.3 Pulse-width modulation 5
5.4 The interface 5

6 Test **6**
6.1 Unit Testing 8
6.2 Integration Testing 8
6.3 System Testing 8
6.4 Acceptance Testing 8

7 Conclusion **9**

8 Appendices **10**
8.1 Group collaboration agreement 10

9 List of references **11**

List of Figures **12**

List of Tables **13**

10 Software appendix **14**
10.1 C code 14
10.2 C# code - interface 16

Bibliography **17**

Glossary

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

1 Introduction

Analysis 2

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 need a way to control its movement and direct current to function optimal.
The robot needs a way to effectively regulate speed and also steer itself autonomously. To dictate how quickly the robot moves, the robot will need some system that allows it to move around on a flat surface, the robot needs to be able to move around from point A to point B. .

2.2.2 Predetermined end point

2.2.3 Obstacles avoidance

Requirements specification 3

Beskriv section [1]

-]The robot needs line following capabilities
- The robot needs object avoidance
- The robot should make use of an H-bridge
- The robot should make use of Motors
- The robot needs a way to implement motor control
- The robot should make use of a micro-controller unit
- The robot should make use of the Magician chassis

Hardware section 4

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 tranceiver

Software section 5

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

Skriv en fucking Conclusion!!

Appendices 8

8.1 Group collaboration agreement

8.1.1 Contact Information

Table 8.1: Contacts

Benjamin Nielsen	Tlf: 30427645	@: yipiyuk5@gmail.com
Henrik Jensen	Tlf: 28568934	@: henrik_kort@hotmail.com
Martin Nonboe	Tlf: 23827566	@: nonsens_4@hotmail.com
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

List of Figures

Page

List of Tables

8.1 Contacts 10

Page

Software appendix 10

10.1 C code

main.c:

ADC.c:

10.2 C# code - interface

Bibliography

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