

Laboratory's Report in Computer Engineering, Group 6

Debugging and Testing Lego-Robot Program

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Summary

We were introduced to how to analyse a programming code so we can make it work. We have to analyse the code, debug it and test it over and over again until it properly worked. We learned about how loops worked and how identifying the right sensor input is so important for the proper execution of the program. The robot needed the right type of feedback to be able to process the data and transform it after into machine language, to be able to follow the program.

It is necessary a background knowledge to be able to succeed on the project. And, overall, to be able to succeed in handling all the challenges that are going to be presented throughout the duration of our studies as IT engineers and even beyond.

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1. Introduction

We were introduced to programming through a programming lab where we have to check the code in a program and try to find the errors, debug them and test the program for its effectiveness. To be able to succeed with this we needed to learn the basics of NXC language so we were able to understand the program code. To have a deep knowledge of the concepts of programming is very important nowadays for all IT engineers due to all the digital technological advances that they are involved with.

1.1 Background

As an engineer you are involved in many engineering design processes where you have to be able to define the task ahead, analysing possible strategies, create a working plan and execute it. Some of these plans include creating a program to reach your goal or edit an already made program. Therefore it is important to learn those different aspects of being an engineer like programming.

1.2 Purposes and Objectives

The task aims to provide a relatively simple way to introduce programming. Throughout pair programming both students can help each other. In this way students can be introduced in group work training. The task also aims to provide training in debugging and testing, and thus provide a basis for effective programming work in the future. Students can gain an understanding of how small and simple errors in the code can produce unexpected results at runtime, and thus contribute to an accuracy mindset.

2. Implementations

We started by downloading the software Drivrutin till LEGO so the computer was able to find the Lego-Robot when it was engaged and Bricx Command Center to edit the source code, compile the code and flash the robot. Then we opened the example code and compiled it to find the possible errors.

At first we analysed the code by parts by identifying the different routines or subroutines that the program have. Then we try to identify the errors in each routine or subroutine so we could make the different routines worked independently from each other checking the congruency of the variables and data types names, checking the arguments or checking the inputs where the sensors where connected to the main body. And then founded a way so all the routines could work together. We used the Programming LEGO NXT Robots guide as source for finding possible solutions and then tested them. When we runned out of possible solutions we asked help from our teacher.

3. Results

We succeed in finding the errors and debugging our program code after a lot of tries. Our debugging is as follows:

Line Number	New Code	Comments
2	#define SpeedSlow 60	Lowered the speed to make it easy to follow the line
3	#define SpeedFast 80	Lowered the speed to make it easy to follow the line
34	string groupMembers[] = {	Change the value of the variable from int to string
35	“Miriam”,	Change number for our names
36	“Valtteri”	Change number for our names
40	void printNamesToScreen(string groupMembers[])	Change the string name from name to groupMembers
44	for(i = 0; i < ArrayLen(groupMembers); i++) /* Loopar igenom listan med namn */	Change the string name from name to groupMembers
46	TextOut(0, (LCD_LINE2 - (8*i-16)), groupMembers[i]);	Change the string name from name to groupMembers
46	TextOut(0, (LCD_LINE2 - (8*i)), groupMembers[i]);	Erase -16 so the names will not be displaced by 16 places to the side
76	lightIntensity = SensorRaw(IN_3);	Change the input number so the car can receive the data from the light sensor
92	OnFwd(OUT_A, SpeedFast);	Change the speed argument so each OUT_A can have different speed
100	OnFwd(OUT_B, SpeedSlow);	Change the speed argument so each of OUT_B can have different speed
108 to 114	Precedes(readTouchSensors, followLine);	Change the other in line of the Precedes routine so the 6 SetSensorType can be run first

115	//dance();	Comment dance() so it will not be executed
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4. Analysis

The lab took quite some time because of the lack of previous knowledge in programming. It took a lot of time to analyse the code. But after a while of analysing each part separately, we started to understand how each routine worked individually. In the program the most important task were followLine and readTouchSensors. We understood that the task followLine was a loop where, throughout reading the data coming from the light sensor (with two predefine values: TopThreshold and BotThreshold), it adjust the speed of each of the right and left wheel so the robot could turn and follow the curve line until it hit the wall. This is when the touch sensor came into the game, making the robot produce a tone, write our names in the display and stop.

5. Discussion

Through this experiment I have learned a lot about how a program code works. It was really interesting; but the lack of previous knowledge was an obstacle to perform better in this task. It was like throwing someone into the pool without that person having the knowledge about how to swim. At the end I succeed and understood most of the routines of the program code. It is necessary a background knowledge to be able to succeed in debugging a program code. It's not enough to read a manual but to have hands-on labs so we can really understand how this works. We need to understand the programming concepts to be able to use them. Developing the knowledge is vital now in this era of full digital technology

References

1. <http://bricxcc.sourceforge.net/nbc/nxcdoc/nxcapi/index.html> (NXC Programmer's guide (API))
2. <https://bilda.kth.se/courseId/10164/content.do?id=21060029> (Programming LEGO NXT Robots using NXC Tutorial)
3. <https://bilda.kth.se/courseId/10164/content.do?id=21060029> (Bricx Command Center software)
4. <https://bilda.kth.se/courseId/10164/content.do?id=21060029> (Drivrutin till LEGO NXT för Windows)
5. <http://bricxcc.sourceforge.net/nbc/nxcdoc/nxcapi/index.html> (NXC Programmer's Guide)

Appendix



KUNGLIGA TEI

Sök bland kurser, persone

KTH / SOCIAL / DAGBOK

Dagbok

I din dagbok kan du reflektera över dina studier och din personliga utveckling. Du kan använda sökverket för att hitta tillbaka till gamla reflektioner.

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Egen anteckning | nyss

I have my first lab with programming a Lego car. It was a difficult task! Challenging and at the same time intimidating. We worked in pairs. I work with Valtteri and together we tried to analyse the program to know how it works and tried to figure out what was wrong. It was my first time with programming so it was really difficult! But at the end we figure it out everything. We had help of course but we learn a lot today! Amazing!

Kommentera inlägget ...

e_C_Program... SF_Diagnostic_To... linefollower.nxc Daintro rapport... Felsökning i NXC...