

I. IDENTIFICATION DATA

Thesis title:	Design and Construction of an Omnidirectional Base for Student Robotics Platform
Author's name:	Václav Veselý
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Cybernetics
Thesis reviewer:	Jakub Cmíral
Reviewer's department:	Siemens, Siemensova 1, Stodůlky, 155 00 Praha 13

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	extraordinarily challenging
<i>How demanding was the assigned project?</i>	
<p>The main goal of the thesis was to create an educational robotic platform for university students. Work combines hardware and software design of the robotic platform and a couple of example lessons for bachelor's students. Hardware was previously designed as part of the semestral project and should be verified in the thesis. Software should consist of a simple microcontroller code for hardware and a high-level control framework using Robotic Operating System (ROS). Work should also include an example of a bachelor's lesson using the robotic platform.</p> <p>Multidisciplinary knowledge from hardware to software design and the basics of teaching is needed to fulfill the thesis assignment successfully. The assignment meets the scope of the master thesis.</p>	

Fulfilment of assignment	fulfilled with minor objections
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
<p>The thesis consists of 4 parts split into multiple chapters, plus an introduction and conclusion. The introduction clearly describes the goal of the thesis and provides an overview of available solutions. The first part describes the hardware. Each part of the platform is described separately (body, motors, batteries, etc.), and each choice is justified. This part includes designed PCBs and chosen "off-the-shelf" components. The second part consists of firmware design for microcontrollers. This part shows a connection diagram of the platform and describes the thinking process behind the low-level software design. The 3rd part describes a high-level control framework in ROS, including a start-up sequence, robot model and its kinematics, and Gazebo simulation. The last part shows the 14 example lessons for students and describes 3 in detail. Illustrated lessons include prerequisites, duration, lesson plan, assignment, and assessment. The conclusion nicely summarizes the work and suggests further improvements.</p> <p>On the other hand, no chapter shows some extensive testing of the platform. This missing piece slightly devalues the work.</p>	

Methodology	outstanding
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
<p>The author showed how to design a robotics course, including hardware, from scratch. The author worked with several "off-the-shelf" components and designed his PCBs and models for the platform. The choice of each component was argued upon. The software implementation and thinking behind it were described. A whole course outline, together with some lesson examples, was shown.</p>	

Technical level	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the</i>	

student explain clearly what he/she has done?

The chosen solution is comparable with State-of-the-Art solutions. And unlike most, it employs possible community support/fixing by putting everything into the open-source, including hardware and lessons.

Formal and language level, scope of thesis

A - excellent.

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The author's language is more than sufficient for the master's thesis. The author composed the thesis using TeX and showed a good feel for the composition of the thesis.

Selection of sources, citation correctness

A - excellent.

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

Sources in the thesis are cited correctly. And their selection suffices.

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

Please insert your comments here.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

@Part 2:

Having a top view of the fully assembled internals with highlighted pieces would be nice. Have you considered using screw-in connectors for USB/HDMI to ensure they will not come loose over time? Why did you decide not to equip the robot with a camera since one of your lessons mentions gesture recognition?

@10.6:

More hardware and software tests would be nice since this is the only one I found. Can you provide some videos of the running robot during the presentation and upload them to YouTube or a similar platform? IMHO, such videos or tests would significantly increase the value of the work and overall grade.

@Part 4:

Have you considered providing this lesson to CTU with the cooperation of your supervisor? Or do you plan to provide workshops with a structure presented in the thesis?

@Conclusion:

It would be nice to have a more detailed comparison between SRobot and TurtleBots equipped with RPLidar A3 and an extra onboard PC (some NUC) since their overall price would be comparable. And can you highlight the advantages of your robot more since these robots are the closest competitors?

Do you plan to continue the work or try to apply for some grant with it since the platform seems nice for education?

The grade that I award for the thesis is B - very good.

Date: **25.8.2023**

Signature: