Itasdi

Innovative Teaching Approaches in development of Software Designed Instrumentation and its application in real-time systems

Modification of LabVIEW Graphical Programing course

Faculty of Technical Sciences

Ss. Cyril and Methodius University
Faculty of Electrical Engineering and Information Technologies

Zagreb University of Applied Sciences

School of Electrical Engineering
University of Belgrade

Faculty of Physics
Warsaw University of Technology

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Code WEB/ISVU	23480/155990	**ECTS**	4.0	**Academic year**	2018/2019
Name	LabView graphic programming				
Status	5th semester - Electrical power engineering (Redovni elektrotehnika) - elective course5th semester - Control and computer engineering in automation (Redovni elektrotehnika) - elective course3rd semester - Communication and computer technology (Redovni elektrotehnika) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (6+24+0+0) 60
Teachers	Lectures:1. pred. Ivan Lujo , dipl.ing. Lectures:2. Tomislav Novak mag. ing. inf. et comm. techn. Auditory exercises:pred. Ivan Lujo , dipl.ing. Auditory exercises: Tomislav Novak mag. ing. inf. et comm. techn. Laboratory exercises:pred. Ivan Lujo , dipl.ing. Laboratory exercises: Tomislav Novak mag. ing. inf. et comm. techn.				
Course objectives	students will be familiar with basic graphic programming and the examples of the LabView programming tool applications				
Learning outcomes:	1.to recognize the difference between the graphical and textual (command line) programing approach. Level:6 2.ability to create virtual measuring instrument whose functions are performed by using a computer . Level:6,7 3.ability to integrate a computer and LabView software package into a measurement process and data display. Level:6,7 4.ability to design a software application for measurements using graphical programming language. Level:6 5.ability to recognize a possibility for using computer as a measuring instrument. Level:6 6.connecting the computer with other "outside" units (electronics, mechanics,...). Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Simulations Modelling Discussion Questions and answers				
Methods of carrying out auditory exercises	Laboratory exercises on laboratory equipment Group problem solving Discussion, brainstorming Computer simulations Interactive problem solving Workshop				
Methods of carrying out laboratory exercises	Laboratory exercises on laboratory equipment Laboratory exercises, computer simulations Group problem solving Discussion, brainstorming Computer simulations Workshop Other				
Course content lectures	1.Introduction to LabView environment, 2h, Learning outcomes:1 2.Basics of LabView environment , 2h, Learning outcomes:1 3.Elements of control flow of the LabView program execution, 2h, Learning outcomes:1,3 4.Elements of control flow of the LabView program execution, 2h, Learning outcomes:1,3 5.Fields and other complex data types , 2h, Learning outcomes:3,4 6.Fields and other complex data types , 2h, Learning outcomes:3,4 7.Graphical presentation of data, 2h, Learning outcomes:3,4 8.Graphical presentation of data, 2h, Learning outcomes:3,4 9.Creating text and files, 2h, Learning outcomes:1,3 10.Measurement and signal generating, 2h, Learning outcomes:1,3 11.Digital and analog inputs and outputs, 2h, Learning outcomes:2,3,4,6 12.Digital and analog inputs and outputs, 2h, Learning outcomes:2,3,4,6 13.Measuring instrument control, 2h, Learning outcomes:2,4,5,6 14. Advanced LabView structures and functions , 2h, Learning outcomes:2,4,5,6 15.Communication with other software and hardware equipment, 2h, Learning outcomes:4,5,6				
Course content auditory	1.No class, 2h 2.No class, 2h 3.Solving more difficult laboratory exercise assignments, 2h 4.No class, 2h 5.No class, 2h 6.No class, 2h 7.Solving more difficult laboratory exercise assignments, 2h 8.No class, 2h 9.No class, 2h 10.No class, 2h 11.No class, 2h 12.Solving more difficult laboratory exercise assignments, 2h 13.No class, 2h 14.No class, 2h				

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	15.No class, 2h
Course content laboratory	1.Test 2.Test 3.Introduction and basic elements of LabView environment, variable types, 2h, Learning outcomes:1,3 4.LabVIEW execution control elements, 2h, Learning outcomes:1,3,4 5.Complex operations in LabVIEW, random number generation, 2h, Learning outcomes:1,3,4 6.Test, 2h 7.Text and textual manipulation (string operations), 2h, Learning outcomes:2,5,6 8.Complex data types, arrays, 2h, Learning outcomes:2,5,6 9.Clusters and State machine, 2h, Learning outcomes:2,5,6 10.Test, 2h 11.Data acquisition, 2h, Learning outcomes:2,3,5 12.7 segment display and acquired data manipulation, 2h, Learning outcomes:3,5,6 13.File data storage, 2h, Learning outcomes:3,5,6 14.Test, 2h 15.No class
Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers Overhead projector Operating supplies Special equipment
Exam literature	J. Travis, J. Kring - LabVIEW for Everyone: Graphical Programming Made Easy and Fun, III izdanje, Prentice Hall, 2006 National Instruments web stranice: http://www.ni.com/academic/students/learnlabview/
Students obligations	50% of totally possible points covering lab attendance and knowledge checks
Knowledge evaluation during semester	Three knowledge checks during the semester 75% Lab attendance (beside tests) 25% Total of 50% needed for a passing grade
Knowledge evaluation after semester	Written test - 50% needed for a passing grade Oral examination - 50% needed for a passing grade
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	93491;
Proposal made by	Ivan Lujo, Msc. Lecturer

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Modifications of the course:

- Definition of student projects
- Example applications for each course chapter
- Student homework projects definition and correspoding labview applications.

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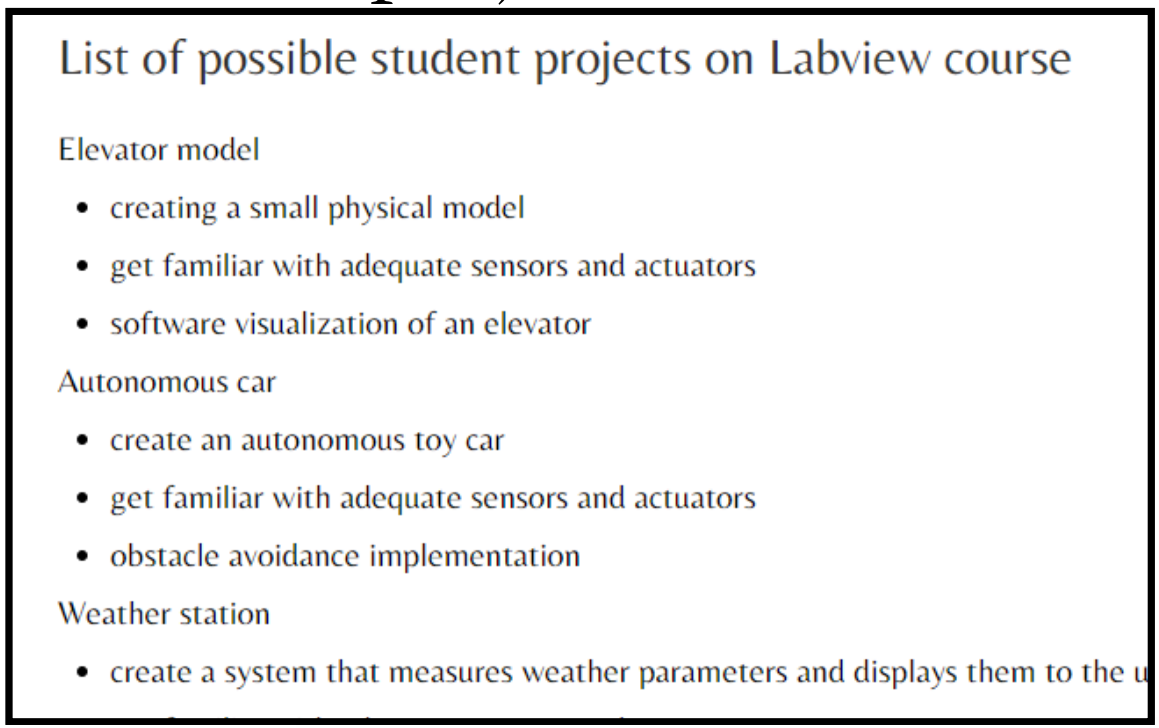
Definition of student projects

- A set of student projects was created.
- Students can choose a project from the list to work on.
- Some projects are intended for diferent team sizes.



List of possible student projects on Labview course

Elevator model

- creating a small physical model
- get familiar with adequate sensors and actuators
- software visualization of an elevator

Autonomous car

- create an autonomous toy car
- get familiar with adequate sensors and actuators
- obstacle avoidance implementation

Weather station

- create a system that measures weather parameters and displays them to the u

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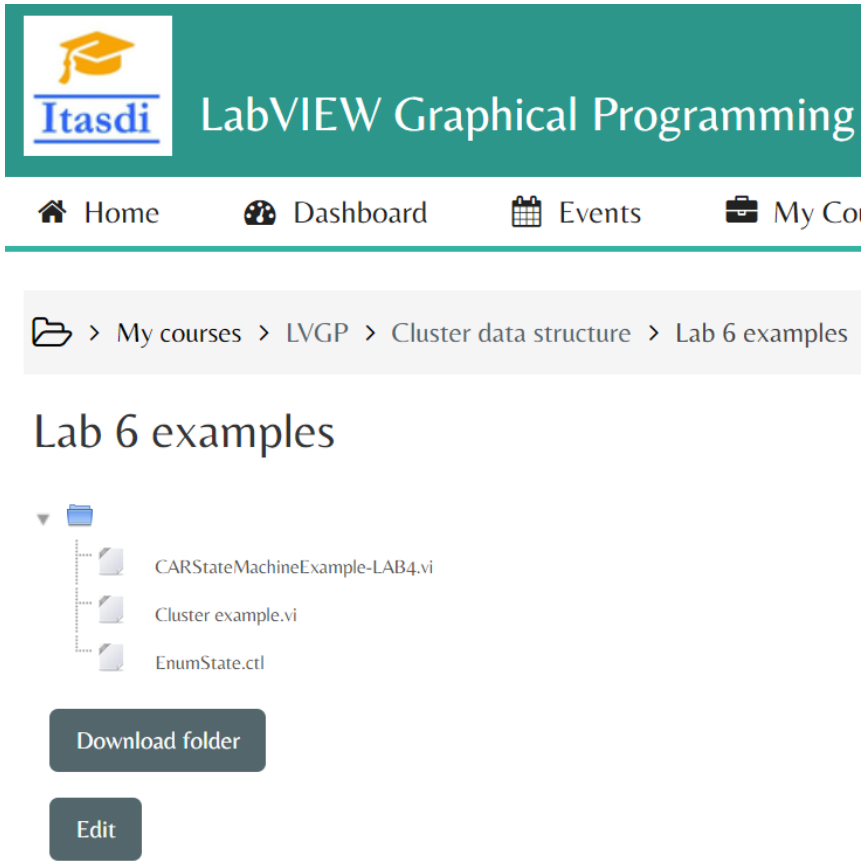
Example applications for each course chapter

- There are 9 main chapters in the course
  - Example applications were programmed for each of the chapters.
  - Programms were documented in English.



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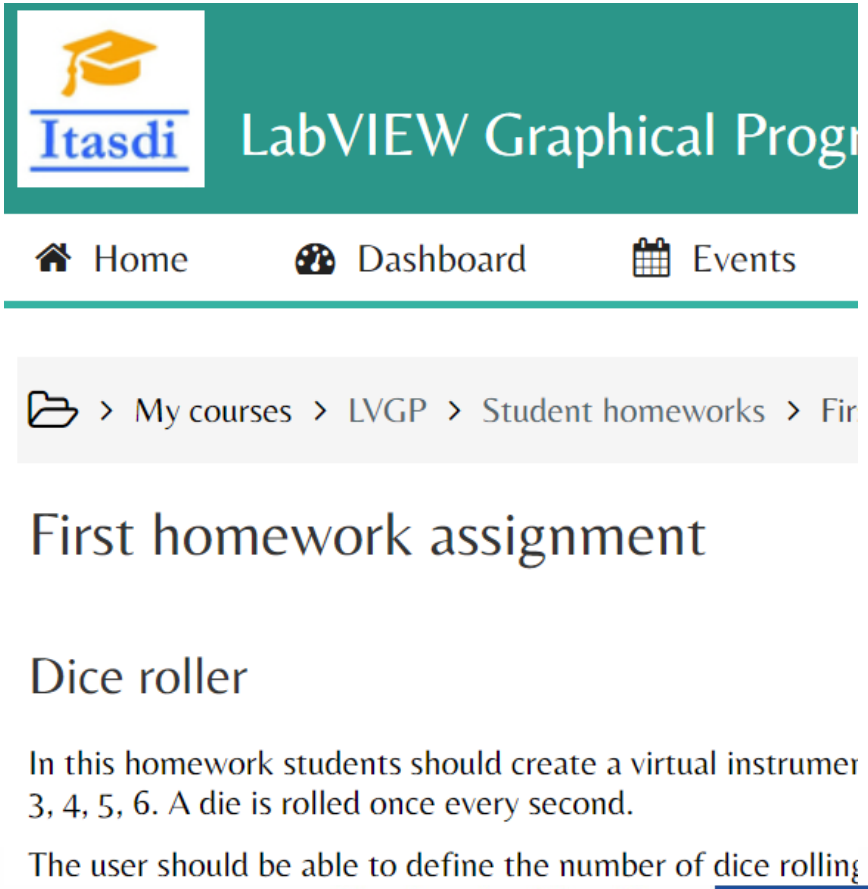
Student homework projects definition and correspoding labview applications.

- Four student homeworks were defined.
- Each homework assignment is intended for a specific part of the course.
- The solutions for homeworks were implemented so after the homework deadline expires the students can see how the solution should look like.



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