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# ITASDI PROJECT

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

Erasmus+ KA2 2018-1-RS01-KA203-000432

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### Modification of course "Principles of the Virtual Instruments Design"

Syllabus

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# 1 Topics

This intellectual output is focused on modification of "Principles of the Virtual Instruments Design" course, which consists of lectures and laboratory exercises.

In the lecture part of the course, the educational materials (slides) were modified by improving existing topics and extending them. Additionally the software examples were prepared separately for different lectures, which allows students to learn topics in practical way. The prepared materials allowed to change educational methodology to put emphasis on practical use of knowledge. The modified lectures are:

1. "Wprowadzenie do LabVIEW" (en. Introduction to LabVIEW),
2. "Typy danych" (en. Data types),
3. "Struktury programistyczne, obsługa błędów" (en. Programming structures, error management),
4. "Wykresy, rejestry przesuwne, tworzenie subVI oraz zapis do pliku" (en. Plots, shift register, subVI creation, data saving to files),
5. "Zmienne lokalne, globalne oraz funkcjonalne" (en. Local, global and functional variables),
6. "Wzorce programistyczne" (en. Programming Design Patterns),
7. "Synchronizacja, zaawansowane wzorce projektowe" (en. Synchronization, advanced programming design patterns).

Additionally, the video lecture about for loop was prepared. This lecture allows students to better understand the loop topic in LabVIEW language. The video was published on youtube project channel: <https://www.youtube.com/watch?v=eC8F58CV3dI> .

The laboratory part of the course was also modified by preparing more intuitive instruction to laboratory called: "Property Nodes, Zmienne współdzielone i funkcjonalne" (en. Property Nodes, Shared and functional variables). The way of presenting relevant information was improved, new topics were added and tasks for students were modified in cooperation with University of Novi Sad and Ss. Cyril and Methodius University in Skopje. Additionally the quiz for students was added to check their knowledge.

Moreover, a new laboratory exercise has been added with the title: "Współpraca LabVIEW z Arduino" (en. Cooperation LabVIEW with Arduino Board). An instruction for the laboratory, tasks for students, solutions for tasks in a format compiled for students and in a modifiable version for the instructors were created. The materials were prepared in cooperation with the University of Novi Sad and the University of Belgrade. This exercise is focused on practical skills and allows students to connect different technology together. This kind of skills are desirable on the labor market.

Number of modified lectures: 7.

Number of all lectures in course: 11.

Number of modified/created laboratory exercises: 2.

Number of all laboratory exercises: 13.

Percentage of modified course:  $[(7 + 2)/(11 + 13)] \cdot 100\% \approx 38\%$ .

## 2 Educational resources

The list of educational resources:

1. "Wprowadzenie do LabVIEW" (en. Introduction to LabVIEW),
  - lecture -  
[http://fizyka.if.pw.edu.pl/%7Eelabe/data/\\_uploaded/file/pppw/Wyklad/Wykladifinal.pdf](http://fizyka.if.pw.edu.pl/%7Eelabe/data/_uploaded/file/pppw/Wyklad/Wykladifinal.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=280>



- software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu1.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu1.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=281>
2. "Typy danych" (en. Data types),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad2.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad2.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=282>
  - software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu2.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu2.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=283>
3. "Struktury programistyczne, obsługa błędów" (en. Programming structures, error management),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad3.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad3.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=284>
  - software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu3.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu3.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=285>
  - video -  
<https://www.youtube.com/watch?v=eC8F58CV3dI>
4. "Wykresy, rejestry przesuwne, tworzenie subVI oraz zapis do pliku" (en. Plots, shift register, subVI creation, data saving to files),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad4.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad4.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=286>
  - software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu4.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu4.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=287>
5. "Zmienne lokalne, globalne oraz funkcjonalne" (en. Local, global and functional variables),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad5.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad5.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=288>
  - software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu5.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu5.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=289>
6. "Wzorce programistyczne" (en. Programming Design Patterns),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad6.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad6.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=290>



- software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu6.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu6.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=291>
7. "Synchronizacja, zaawansowane wzorce projektowe" (en. Synchronization, advanced programming design patterns),
- lecture -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Wyklad7.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Wyklad7.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=292>
  - software examples -  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Wyklad/Materialy\\_do\\_wykladu7.zip](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Wyklad/Materialy_do_wykladu7.zip)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=293>
8. Laboratory called: "Property Nodes, Zmienne współdzielone i funkcyjne" (en. Property Nodes, Shared and functional variables)  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Lab8.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Lab8.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=294>
9. Laboratory called: "Współpraca LabVIEW z Arduino" (en. Cooperation LabVIEW with Arduino Board)  
[http://fizyka.if.pw.edu.pl/%7Elabe/data/\\_uploaded/file/pppw/Lab13.pdf](http://fizyka.if.pw.edu.pl/%7Elabe/data/_uploaded/file/pppw/Lab13.pdf)  
<http://itasdi.uns.ac.rs/mod/resource/view.php?id=295>