Chernihiv Polytechnic National University

Erasmus+ project 609557-EPP-1-2019-1-LV-EPPKA2-CBHE-JP

"Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems", Acronim "CybPhys"

Riga, April 27-28, 2023

CybPhys CPNU outcomes

1. Establishing of New Education Program "Computer engineering and Industrial Automation" (accreditation: 2021, graduation: 2021, 2022, 2023 -planned)

2. Developing and testing of 5 new master courses and 2 updated bachelor courses.

3. Participation in two e-books:

     - Model-oriented control in Intelligent Manufacturing Systems (leader - CPNU)

     - Cyber-Physical Systems modelling and simulation

4. Creation a two new Cyber-Physical Systems Modelling & Simulation laboratory

5. Developing the Sharing Modelling and Simulation Environment (SMSE)

6. Mobility

7. Dissemination and Sustainability

8. Financial reports

Courses developing and testing

1. 5 new master's courses for new master's educational program   credits
   "Computer Engineering and Industrial Automation":

• Programming of automation systems	5
• Modeling and measurement of physical processes in robotics	5
• Model-oriented control in digital manufacturing	5
• Design and modeling of power electronics components	5
• Simulation of Manufacturing Environment	5

2. Upgrading of two bachelor's courses for bachelor's program
   "Electronics of robotic systems and complexes":

• Introduction to electronic systems	6
• Development of electromechanical robotic systems	4
Total:	**35**

3. Testing by student, teaches and stakeholders – 2021, 2022

E-books developing

1. Developed E-book *(leader – CPNU, RTU and V. M. Glushkov Institute of Cybernetics of NASU)*

   Model-oriented control in Intelligent Manufacturing Systems

   1 Intelligent Manufacturing Systems and Industry 4.0 Concept
   2 The principles of Model-oriented control
   3 Implementation Models of Control Algorithms
   4 Predictive Models and Dynamic Model Checking
   5 Recovery Models and their Construction
   6 Software and Hardware Tools for MOC
   7 Examples of MOC application
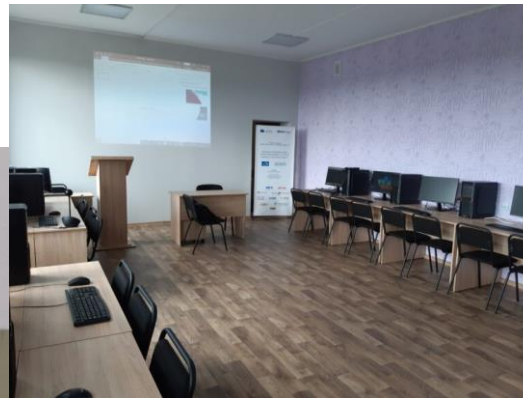
   Published by RTU Press
   Riga Technical University, 2022. – 258 pages.

2. Participation in developing of e-book
   Cyber-Physical Systems modelling and simulation (*leader – University of Cyprus*)
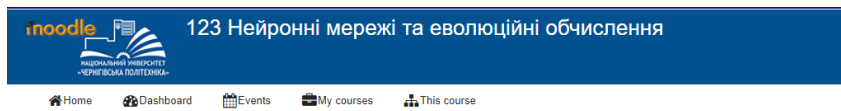
3 equipment purchases

1. The opening of the new CPS modeling and simulation laboratory (2021)
2. New SMSE servers and ICT infrastructuer - 2022
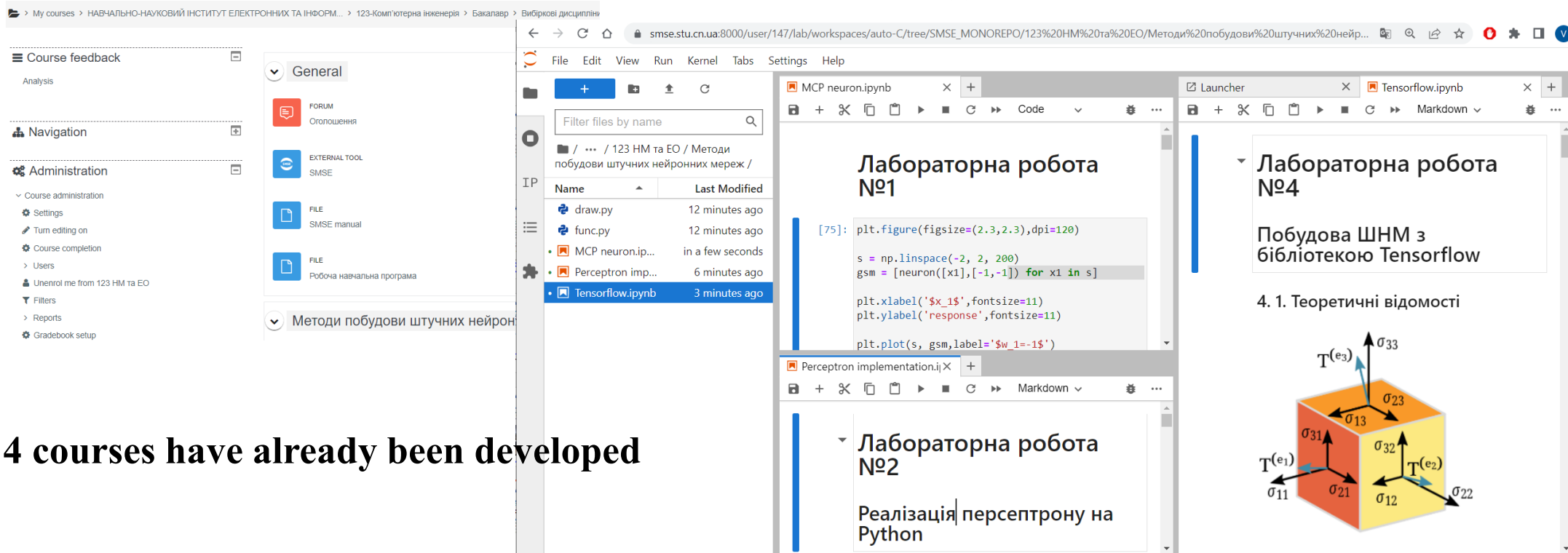1. New SMSE leducation aboratory - 2023

In 2023, thanks to this laboratory, a new national project "A multi-agent system for the protection of critical infrastructure facilities based on a swarm of multicopter drones" was won.

Shared Modelling and Simulation Environment (SMSE)

SMSE provides educational participants with shared, controlled access to modeling course materials and modeling tools using Moodle and Jupyter Notebook documents through the Jupyter Virtual Lab.

From Moodle to Jupyter Lab

4 courses have already been developed

Mobility

- 3 student schools in Riga Technical University, KE Leuven, University of Cyprus
- Teacher English school in KU Leven university
- 6 offline and monthly on-line meeting Highly qualified teaching staff, familiar with modern needs, educational technologies and targeting needs.

Dissemination and Sustainability

1. Project site developed
https://stu.cn.ua/mizhnarodna-diyalnist/mizhnarodni-programy-ta-proekty/proyekt-cybphys/

2. Project documentation on CPNU Moodle located
https://eln.stu.cn.ua/course/index.php?categoryid=476

3. Two participation in Erasmus+ days in Ukraine with information of project

4. https://stu.cn.ua/

▶ Youtube   f Facebook
📷 Instagram   ✈ Telegram

5. Three agreements of cooperation were signed:
- Riga Technical University (2022)
- KU Leuven University (2023)
- Association of Industrial Automation of Ukraine (APPAU) (2021)

Financial report

Budget Headings	1. Grant Awarded (in EUR)	2. Budget Spent (in EUR)
1. Staff Costs	23 856,00	20 420,00
2. Travel Costs	8 865,00	5 775,00
3. Costs of Stay	22 560,00	15 970,00
4. Equipment Costs	73 040,00	72 646,05
5. Subcontracting Costs	6 500,00	6 542,56
6. Exceptional Costs	0,00	0,00
Total Grant requested from the European Union	134 821,00	121 353,61

Advance payments : 121 339