



Co-funded by the
Erasmus+ Programme
of the European Union



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

609557-EPP-1-2019-1-LV-EPPKA2-CBHE-JP – ERASMUS+ CBHE

**Final Conference
April 28th 2023**

Anatolijs Zabashta,
Project coordinator
Riga Technical University

Day 2: Friday, April 28th, Conference, Azenes 12/1 - 414

Registration	09:45	
Conference opening	10:00	RTU
Greeting from ERASMUS+ NCP of Ukraine	10:15	ERASMUS+ NCP of Ukraine
Greeting from the Ministry of Education and Science of Ukraine	10:30	Igor Taranov, general director of Science and innovation department
Greeting from Latvian National Education Development Agency Erasmus+ Program Department	10:45	Antra Meņģele, Head of Program Management Department
Demonstration of Ukrainian universities achievements in the CybPhys	11:00	CPNU, KhNAHU, KNU
KNU, KhNAHU and CPNU students experience and achievements in CybPhys	11:45	Ukrainian partners
Coffee brake	12:15-12:45	
Presentations of Ukrainian stakeholders from KhNAHU, CPNU and KNU	12:45	-P. Sokhin - "ELCARS" -L. Sarayeva - "Avtodom Kharkiv" -R. Bahach - Chairman of the cycle commission "Electrical engineering and electromechanics" -D.Bespalov, Head of LLC Pro-Mobility (KNU)
EU partners testimonials about cooperation, achievements and future plans	13:30	KU Leuven, UCY and RTU
CybPhys Sustainability Plan beyond the project	14:00	RTU, All partners
Lunch	14:30-15:15	
The visiting of RTU Scientific Library	15:15	RTU
Conclusions, next steps.	16.30	RTU, all partners
The end of the day 2	17:00	

Sustainability Plan

- To **maintain bachelor and master study programs** in the field of Cyber-Physical Systems
 - Study programs and lab practices will be offered to other HEIs of Ukraine.
 - Didactic materials are allocated on university's websites for free using by other HEIs
 - Promotion of the curricula among industrial partners
- To **developed competences, knowledge skills and internationalisation** of the academic staff of involved Ukrainian HEIs
 - Short training courses, workshops for exchange of knowledge and experience of involved Ukrainian universities teachers
 - International mobilities of Ukrainian and EU partner universities' academic and administrative staff, and students
 - Common **research papers** with EU partners (RTU-KhNAHU, RTU-CPNU, RTU-KNU)

- **Strengthening of innovation capacity** of Ukrainian universities
 - Conclusion of **Cooperation agreements** with the companies and research institutions, which work in the field of CPS, to attract investment to labs
 - To ensure funding for regular annual maintenance and **upgrading of the equipment**
 - Participation in international and EU supported projects
 - Sustainability of developed SMSE platform
 - Elaboration of the projects proposals to be implemented in international partnerships in EU financed programs: ERASMUS+, HORIZON, etc.
- Created base for development of Ukrainian **ecosystem in field of Cyber-Physical Systems**
 - To arrange informative campaigns and sessions
 - scientific-practical conferences, forums, round tables, seminars and other events, etc.

Sustainability of the project results – common future projects with Ukrainian partners

- “Cross-cutting and multilevel model for education and professional qualifications in the field of Artificial Intelligence for Digital Industry”, ERASMUS+ Partnerships for Innovation, September 2022
- “Digital transformation of HEIs education process in Ukraine and Moldova for sustainable engagement with enterprises” – ERASMUS+ CBHE, February 2023
- “Creating United Ukrainian Digital Education Ecosystem «UNItY – University to You”, ERASMUS+ CBHE, February 2023
- “Human-centred education in the age of AI industry Education 5.0 – Crafts 5.0 - Industry 5.0” – ERASMUS+ Partnerships for Innovation, May 2023

Our History







View

Volodymyr Kazymyr	Anatolijs Zabašta	Joan Peuteman	Татьяна Палиева	Nadezhda Kunicina
Sammy Verslype	Vitalii Tron (KNU)	Natalia Melkun	Irina Zavisiehdashnia	Alexander Fedotov
Dzianis Marmysh	Volodymyr Sistuk	Andrii	Serhii Ruban	Lyudmila Kruhlenko
Дмитрий Ковал...	Irina Ciornei (KI...	Андрей Самофа...	Alexander Fedot...	
		stella		

Serhii Ruban	Anatolijs Zabašta	Volodymyr Kazymyr
Volodymyr Sistuk	Oleksandr Drozd	Vitalii Tron
Sammy Verslype	Elias	Ludovic Espeel
Sammy Verslype	Elias	Ludovic Espeel

Юрій Монастирський (Криворізький національний універ...	Anatolijs Zabašta	Volodymyr Sistuk	Андрій Гнатов
Shchasiana Arhun	Irina Kulitane	Joan Peuteman	Irina Ciornei KIOS
Nadezhda Kunicina	Oleksandr Drozd	Dmytro Horval	Volodymyr Kazy...

ENERGYCON 2022
IEEE International Energy Conference

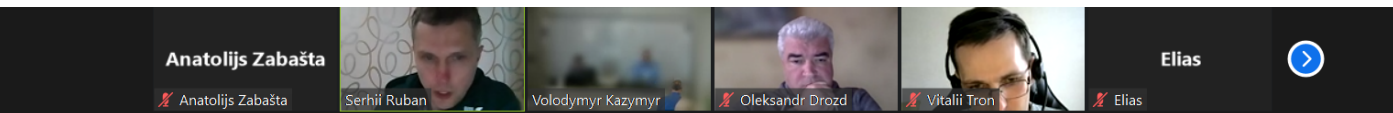
Riga, Latvia

Latvenergo

IEEE Region 8

IEEE

IEEE



Browser tabs: Kypci identification and modelin..., Lab3_1.ipynb - JupyterLab, Криволиній національний ун..., Google Перекладач

URL: smse.stu.cn.ua:8000/user/22804/lab/tree/work/Lab3_1.ipynb

File Edit View Run Kernel Tabs Settings Help

Launcher x Lab1.ipynb x Lab3_1.ipynb x +

Filter files by name

/work/

Name	Last Modified
lab1	3 months ago
car_suspension.png	3 days ago
Carsuspension.m	3 days ago
Engine.m	3 days ago
Engine1.png	5 days ago
Example1.ipynb	6 days ago
ident_Lab6.ipynb	2 hours ago
Lab1.ipynb	a minute ago
Lab3_1.ipynb	4 hours ago
Lab3_2.ipynb	4 hours ago
Lab3_3.ipynb	4 hours ago
Lab3.ipynb	4 hours ago
legd.m	2 hours ago
Magnet.m	4 hours ago
magnet.png	2 days ago
Movement Dynamics.csv	a day ago
MovingBody.m	5 days ago
Temp_real4.mat	2 hours ago
Temp.m	a minute ago
Untitled.ipynb	17 hours ago

осільки розтяг вертної пружини дорівнює різниці $x_1 - x_2$ зміщення її кінців.

Силу тертя F_{tr} прямо пропорційна відношній швидкості тіла, тому

$$F_{tr} = -b \cdot \frac{dx_1}{dt} - b \cdot \frac{dx_2}{dt}$$

На тіло маси m_2 окрім зовнішньої сили $f(t)$, діють також сила пружності F_{p1} та сила тертя F_{tr} , спрямовані вниз (при $x_1 > x_2$), та сила пружності $F_{p2} = k_2 \cdot x_2$, спрямована вгору (при $x_2 > 0$).

Згідно із другим законом Ньютона, складаємо рівняння руху тіла

$$m_1 \cdot \frac{d^2 x_1}{dt^2} = -F_{p1} - F_{tr}$$

$$m_2 \cdot \frac{d^2 x_2}{dt^2} = f(t) + F_{p1} + F_{tr} + F_{p2}$$

або, враховуючи вирази для F_{p1} , F_{p2} та F_{tr} , маємо

$$m_1 \cdot \frac{d^2 x_1}{dt^2} = -k_1 \cdot (x_1 - x_2) - b \cdot \left(\frac{dx_1}{dt} - \frac{dx_2}{dt} \right)$$

$$m_2 \cdot \frac{d^2 x_2}{dt^2} = f(t) + k_1 \cdot (x_1 - x_2) - b \cdot \left(\frac{dx_1}{dt} - \frac{dx_2}{dt} \right) + k_2 \cdot x_2$$

Завдання. Виконати дослідження руху системи при дії зовнішньої сили $f(t)$, що змінюється за законом

$$f(t) = U \cdot \sin(\omega \cdot t)$$

# експерименту	m_1, кг	m_2, кг	k_1, Н/м	k_2, Н/м	b, Н·с/м	u, Н	ω, рад/с	t_k, с
1	1200	50	100	300	0,3	150	2·π	40
2	1400	60	150	250	0,25	100	2·π	40
3	1500	100	200	300	0,3	150	2·π	50
4	1250	70	100	250	0,25	120	π	50
5	1350	50	250	200	0,3	120	π	100

```
[1]: %%%file Carsuspension.m
function dy = Carsuspension(t, y)
m1 = 1200;
m2 = 50;
k1 = 100;
k2 = 300;
b = 0.3;
```

Browser tabs: Course: KU Leuven test, Course: KU Leuven test, Exercises Ma... (auto-C: 2) - Jup..., Perceptron i... - JupyterLab

URL: eln.stu.cn.ua/course/view.php?id=6729

Apps: Lessonrooster, Webtechnologie, Tools, STEM, Data, Toledo Portal, KU Loket

SMSE, CYBIPHYS, Co-funded by the Erasmus+ Programme of the European Union

Home Dashboard My courses

LE Edit mode

Course Settings Participants Grades Reports More

General

- FORUM: Announcements
- FILE: SMSE manual pdf (Mark as done)
- EXTERNAL TOOL: SMSE on stu.cn.ua (Mark as done)
- FILE: Exercises Matplotlib (Mark as done)

Solutions

- FILE: Exercises Matplotlib solutions (Mark as done)

https://eln.stu.cn.ua/mod/resource/view.php?id=237922

Perceptron impl...ipynb SMSE-manual_12.pdf

Alles bekijken



Thank you for the questions!

