

KU LEUVEN



CybPhys project

an instructive experience

meeting human and scientific capital

Joan Peuteman

Final Conference: April 28 (2023).

Erasmus+: Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems (CybPhys)



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Basic goal and the very beginning

Management meetings & workshops

English language courses

E-library and ICT-based tools

Pedagogical competences

Student training

The future



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Basic goal and the very beginning

The wide project goal of the CybPhys project is to **upgrade bachelor/master-level curricula** and study programs according to Bologna practices in **Belarus and Ukrainian universities** in the area of Cyber-Physical Systems modelling and simulation.

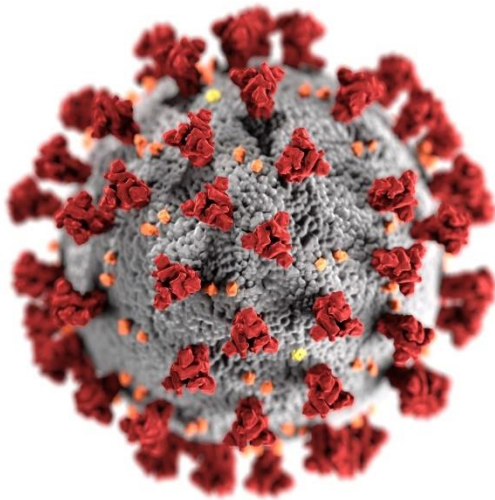
We actually started in December 2019 in Minsk in Belarus.



Basic goal and the very beginning

Learning to collaborate is stronger than

- political decisions,
- a COVID-19 pandemic,
- war.



Basic goal and the very beginning

One learns to collaborate, across borders, **by simply doing it**. By

- **examining the labour market situation** and opportunities in the partnership countries,
- together **developing new course materials**, including e-books,
- integrating the new course materials in the curricula,
- developing a **Shared Modelling and Simulation Environment platform**,
- gaining experience with **ICT-based pedagogical tools**,
- ...



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Management meetings & workshops

We had management meetings & workshop at **different locations.**



Minsk, Belarus



Riga, Latvia



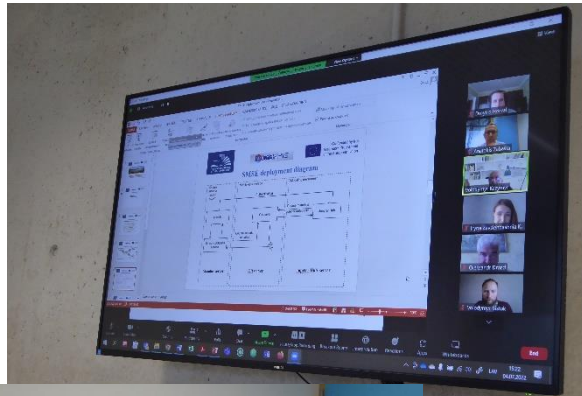
Bruges, Belgium



Nicosia, Cyprus

Management meetings & workshops

We had management meetings & workshops: **online and in hybrid format.**



July 4-5, 2022
hybrid format
KULeuven Bruges and online



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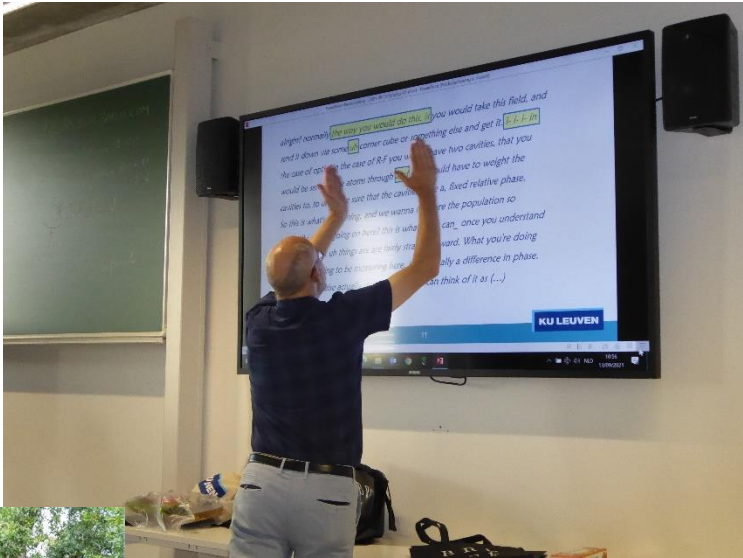
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English language courses

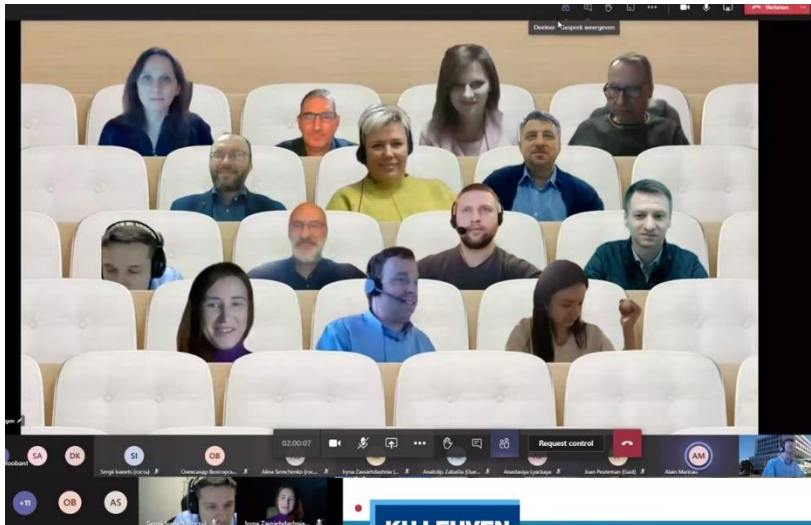
Live English language trainings for teaching professors organised by KU Leuven in Bruges (Belgium).



September 2021

English language courses

Preparatory online English language trainings for teaching professors organised by KULeuven.

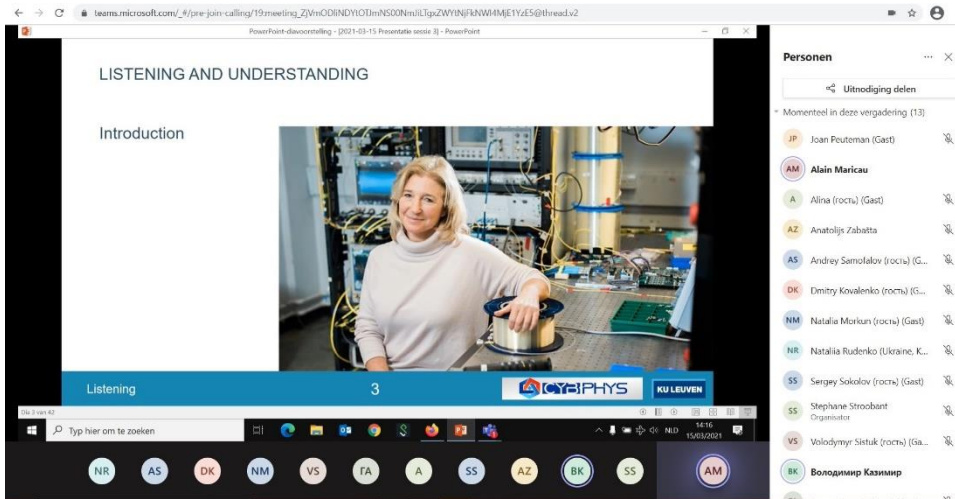
A screenshot of a presentation slide from a Microsoft Teams meeting. The slide is titled "Grammar – verbforms and tenses" and is slide 36. It discusses the use of prepositions and verb phrases. The text on the slide includes: "But lithium metal stores a lot of charge per unit weight, and that's what is attractive about ~~been~~/being/ ~~to be~~ able to use it as the negative electrode (...).", "That is attractive about this metal." (with "about" highlighted in yellow and "this metal" in a box), and "That is attractive about being a teacher. living in Europe." (with "about" highlighted in yellow and "being a teacher. living in Europe." in a box). A diagram shows "Preposition + noun phrase" leading to "verb phrase" and then "Preposition + verb '-ing' + complements". The slide also features the CYBIPHYS logo and the KU LEUVEN logo. A chat window on the right shows messages from participants.

A screenshot of a presentation slide for "Warming up for September". The slide is blue and white. It features the KU LEUVEN logo and "Campus Brugge" at the top. The main text reads "Warming up for September" and "CYBIPHYS". Below that, it says "Session 1" and "Alain Maricau". The date "11 January 2021" is at the bottom right. On the right side, there is a cartoon illustration of a woman standing and a man sitting at a table eating a hot chocolate bun. The cartoon is signed "ABACALL". Below the cartoon, there is a quote: "When the doctor told you to warm up before exercising, I don't think he meant with hot chocolate and hot cross buns."

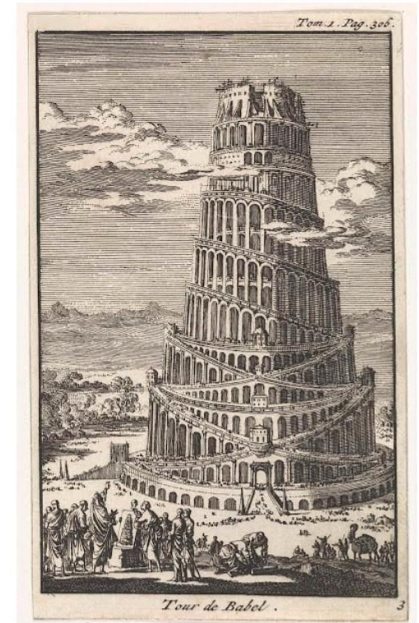
January, February and March 2021

English language courses

Listening to each other and understanding each other.



The opposite of “confusion of the language”.



Tower of Babel
Jan Luyken

Tower of Babel
Pieter Brueghel the Elder



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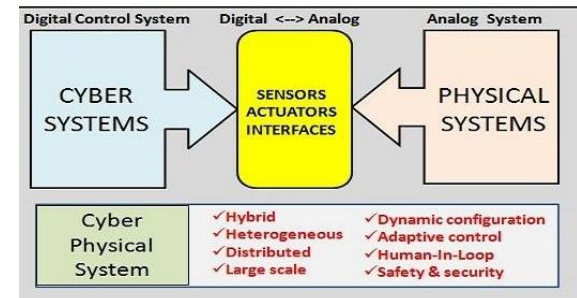
The future



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E-library and ICT-based tools

All partners collaborated to write **e-books** dealing with several aspects related to Cyber-Physical Systems.



In combination with the **development of the e-book** on “Cyber-Physical Systems for clean transportation” and other contributions to e-books:

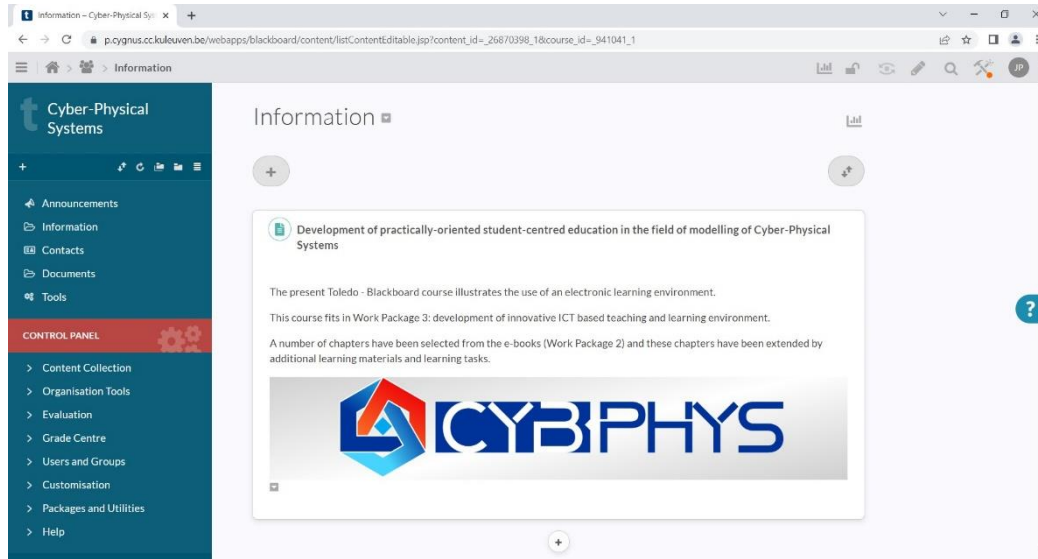
- The KU Leuven has shown the possibilities of the use of a **Virtual Learning Environment** based on these course materials
 - This information has been useful during our **meetings**.
 - This information has been useful during the **teacher training organized in September 2021**.

= development and use of “good practices”.

E-library and ICT-based tools

Developping and using “good practices” with

- **Blackboard – Toledo: ‘Cyber-Physical Systems’**



Roadmap

Enjoy "CybPhys" i.e. "Cyber-Physical Systems" and go for a full comprehension of the concepts outlined in Chapter 4. Here is the menu to follow in a chronological order:

- Take note of the learning outcomes before starting to study.
- Examine the pre-requisites to reveal any lack of foreknowledge.
- Study the presentation giving an introduction to EMC and EMI. The presentation itself and an MP4-file providing an explanation is available.
- Read carefully and try to understand the theoretical lecture "EMC related aspects of Cyber-Physical Systems in cars".
- Check your knowledge by answering the open-ended check questions.
- Evaluate yourself by performing the test with the closed-ended check questions (multiple choice questions).

Learning outcomes

- Having insight in the basics on EMC and EMI.
- Understanding the importance of EMC when designing and manufacturing modern cars.
in overview of the most common electronic components in a car.
anding the use of a CAN bus and the EMC-related aspects.
anding the difference between electrostatic and magnetic coupling and how EMI problems can be reduced.

uisites

This folder contains course documents which provide the student information concerning the use of linear and nonlinear systems. The use of Newtonian mechanics and Lagrangian equations has been illustrated.

Chapter 4: EMC related aspects of Cyber-Physical Systems in cars

This folder contains course documents which provide the student an introduction to EMC (Electromagnetic Compatibility) and applies this knowledge to automotive electronics (including the CAN bus).

EMC related aspects of Cyber-Physical Systems

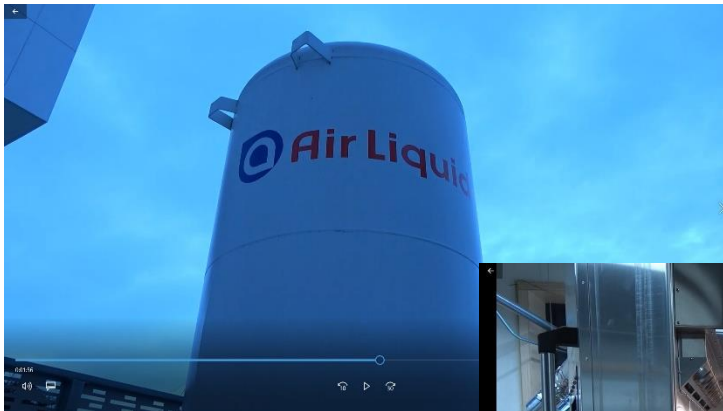
This folder contains a number of movies explaining basic topics on Electro Magnetic Compatibility.

E-library and ICT-based tools

Developping and using “good practices” with

- **Blackboard - Toledo: ‘Cyber-Physical Systems’**

Integrating pedagogical movies (multimedia materials).



The emission level of the laptop will be measured.

- The last sweep provides the maxima.
- The emission of the laptop is lower than the emission limit (red)



E-library and ICT-based tools

Developping and using “good practices” with



- **Moodle:** ‘Cyber-Physical Systems’

DEMO COURSE: CHAPTER 15: THE IMPACT OF ELECTRICAL VEHICLES ON THE POWER GRID

This chapter contains course documents which provide the student insight in the way the use of electric vehicles (implying loading the batteries of the vehicles) has an impact on the electrical power grid.

 Roadmap chapter 15



Click on 'Roadmap' to see the information.

 Learning outcomes chapter 15



Click on 'learning outcomes' to see the information.

 Pre-requisites chapter 15



Click on 'pre-requisites' to see the information.

 Theoretical lecture "The impact of electrical vehicles on the power grid"



Read carefully the document en try to understand the theoretical lecture on "The impact of electrical vehicles on the power grid".

 Assignment: consulting scientific papers



Having studied the theoretical lecture on "The impact of electrical vehicles on the power grid", consider the three papers below which inspired to a large extent the theoretical lecture.

Have a closer look at these three papers and

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Pedagogical competences

European and Ukrainian partners learn from each other.

Exchanging knowledge and experience

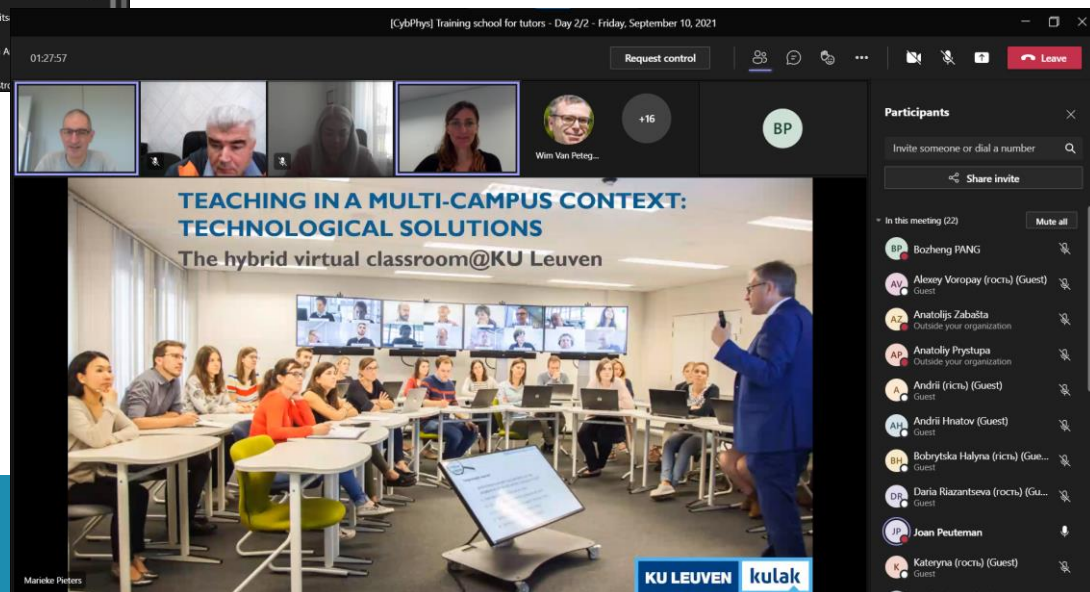
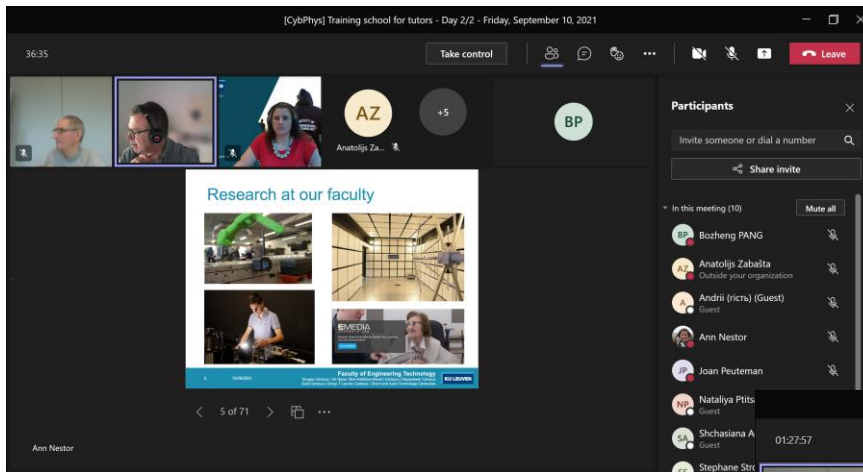
Teacher training on September 9-10th (2021)

(MS TEAMS
due to
COVID-19
pandemic)



Pedagogical competences

The teacher training was dedicated to **ICT-based competences**, **pedagogical competences** and **scientific/technical competences**.



Pedagogical competences

The teacher training was dedicated to **ICT-based competences**, **pedagogical competences** and **scientific/technical competences**.

- Introduction: opening of the training school
- Innovative teaching using a digital learning environment
- Integrating students in the didactical process: what and how?
- Preparing students for the labour market
- Academic literature
- Innovative teaching in a multi-campus context
- Teaching in a multi-campus context: technological solutions
- Distance learning: innovative interuniversity collaboration
- Technical innovations: Electromagnetic Compatibility
- Technical innovations: development of an electric car.

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Student training

The CybPhys project included the participation of Ukrainian students at **student trainings in Riga, Nicosia and Bruges.**

Students from KhNAHU, KNU and CPNU visited KULeuven in Belgium (Bruges) in February 2022.



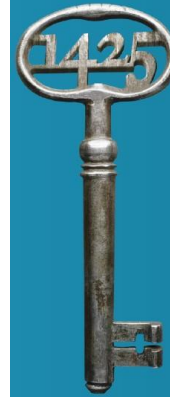
Student training

The student training included **scientific and technical topics**.

- the use of biodiesel,
- wind energy,
- environmentally friendly polymers,
- system identification, machine learning, safety critical systems,
- artificial intelligence,
- recycling building materials,
- rehabilitation sciences,
- geotechnics: a natural protection of the coast line,
- Electro Magnetic Compatibility and Electro Magnetic Interference,
- lighting technology,

and... more.

Student training



Wind energy
WIND ENERGY: OVERVIEW



KU LEUVEN

INTRODUCTION TO EMC



student training at KULeuven
February 7th to February 18th, 2022

Faculty of Engineering Technology



Student training

The student training included **European history and culture.**



visiting the beguinage in Bruges



visiting Ghent

Student training

The last day, the students presented their experiences in Belgium.



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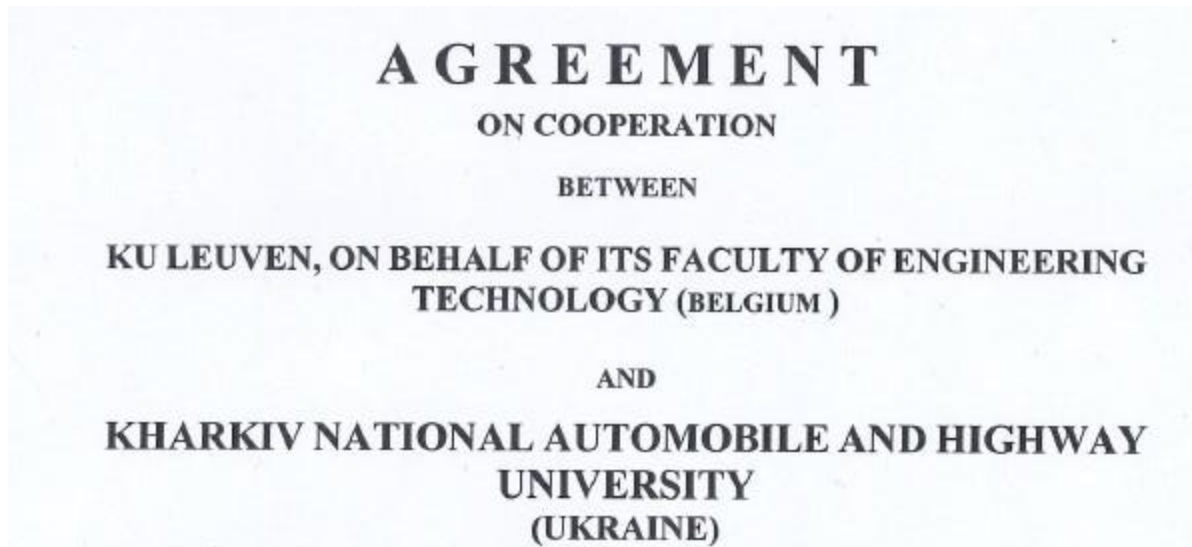
The future



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The future

Collaboration remains important in the future. **Bilateral agreements** are a way to **stimulate** this **collaboration**.



Bilateral agreement has been signed.

The future

Collaboration remains important in the future. **Bilateral agreements** are a way to **stimulate** this **collaboration**.

KU LEUVEN



AGREEMENT FOR STUDENT EXCHANGE PROGRAMME BETWEEN
CHERNIHIV POLYTECHNIC NATIONAL UNIVERSITY, EDUCATIONAL-SCIENTIFIC
INSTITUTE OF ELECTRONIC AND INFORMATION TECHNOLOGIES
And
FACULTY OF ENGINEERING TECHNOLOGY AT KU LEUVEN

KU LEUVEN

STUDENT EXCHANGE AGREEMENT
between

Kyryvi Rih National University, Ukraine
on behalf of its Faculty of Information Technology

and

KU Leuven, Belgium

Procedures to sign the bilateral agreements are running.

The future

Collaboration in the future: We know each other and **we learned to collaborate**. That's perhaps the most important gain.



That's not only the case for professors, but also for students.

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Thank you for your attention!

Questions?



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