



Tempus

Development of Embedded System Courses with implementation
of Innovative Virtual approaches for integration of Research,
Education and Production in UA, GE, AM



Final Report

About ZNTU (P04) activities

December 2013-February 2017



Outline

1. Courses development & pilot teaching
2. Equipment & learning tools
3. Dissemination
4. Printing&Publishing
5. Quality
6. Multiplier effects
7. Work in progress



Courses development & pilot teaching





Main Indicators

Involved Faculties (3):

Faculty of Computer Science and Technologies, Faculty of Radio Electronics and Telecommunication, Engineering Physics Faculty.

Involved Departments (4):

Software Tools, Radio-engineering and Telecommunication, Informational Technologies of Electronic Devices, Engineering Mechanics.

Involved Specialties (5):

Information Technology of Design, Software systems, Artificial intelligence systems, Radiotechnics, Radio Electronic Devices and means

Involved Teachers (13):

Galina Tabunshchyk, Anzhelika Parkhomenko, Sergiy Serdjuk, Sergii Morshchavka, Andriy Parkhomenko, Olexiy Pharaphonov, Myhailo Polyakov, Marina Mischenko, Tatyana Kapliencko, Olga Gladkova, Natali Myronova, Zhanna Kaminskaya, Olga Petrova

Developed/adapted Courses (19)



Courses for pilot teaching (spring /fall semesters 2016)

1.	Operating Systems / Embedded OS
2	Technologies and systems of virtual and remote engineering / MCAD structural design, Creo
3	Technologies and systems of computer-aided design / Arduino
4	Electronics and electrotechniks / Arduino
5	Multimedia information technologies and systems / Remote Labs and Virtualization, Arduino
6	CAD/ ECAD electronic design, ALTIUM
7	Digital Electronics and Microprocessors/Digital Electronics
8	Microprocessors in Systems and Devices
9	Quality Engineering
10	Software Quality and Testing
11	Human-Computer Interaction
12	Modern CAD/CAM/CAE / MCAD structural design, Creo
13	Physical basics of modern information technologies / Arduino
14	Programming C
15	Microprocessors hardware
16	Software for Embedded System Delopment



Pilot teaching

	Number of courses	Number of students
Spring semester	10	203
Fall semester	12	352

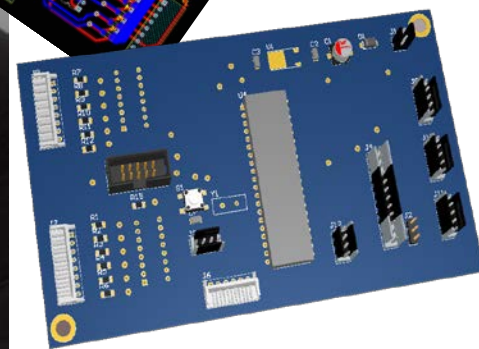
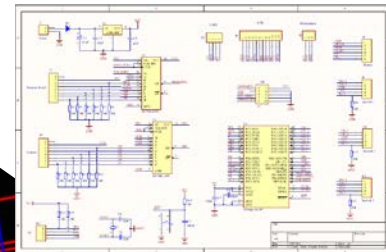
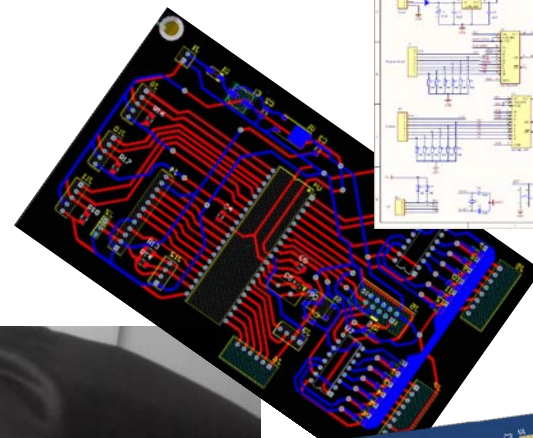
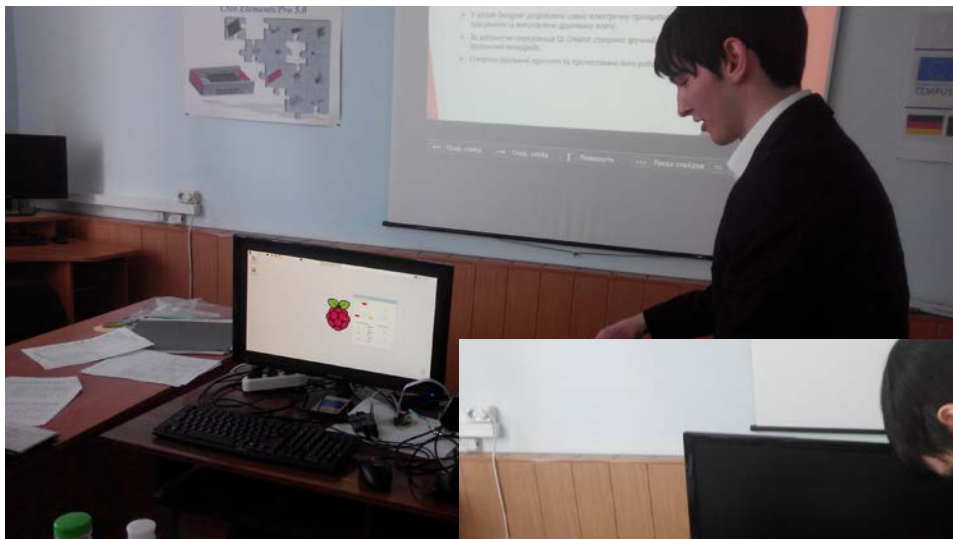


Students' specific work supervising

	Bachelors' and Specialists' degree works (Number of students)	Masters' degree works (Number of students)	Course Projects (Number of students)
G. Tabunshchyk	3	4	5
A. Parkhomenko	5	3	3
S. Morshchavka	1	-	14
S. Serdiuk	1	-	3



Students' best practices: FPV Auto Project

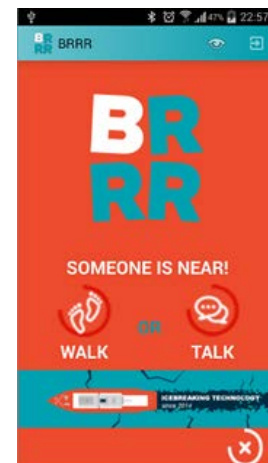




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Students' best practices: Smart Campus



TMMA-ZNTU Start-up



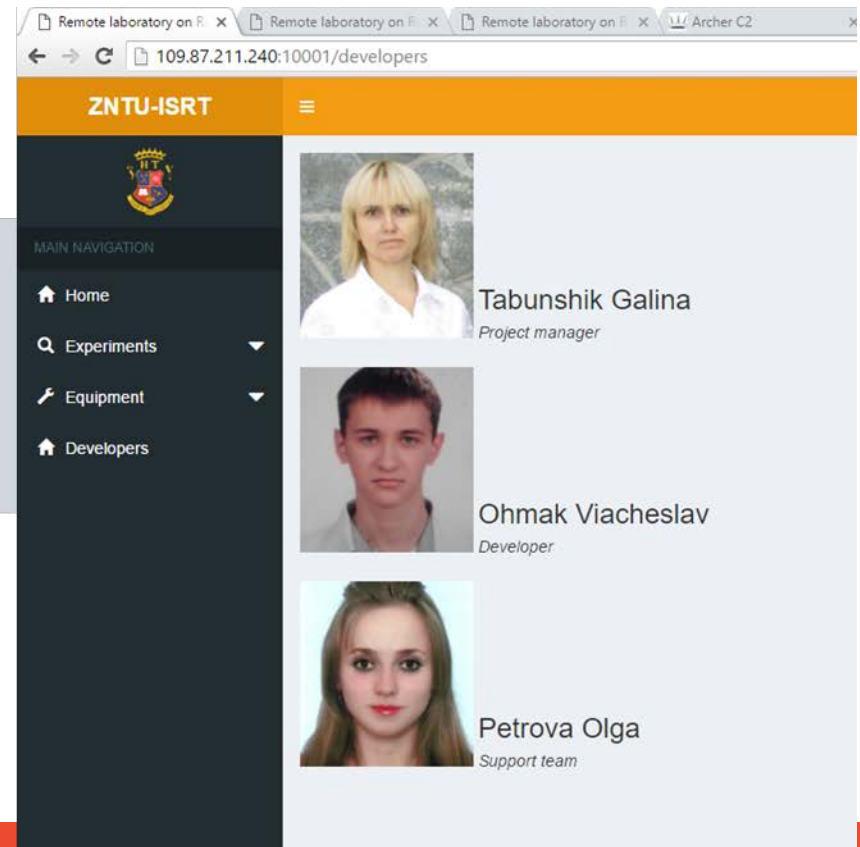
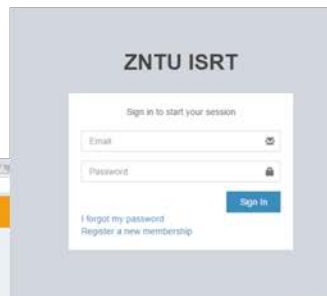
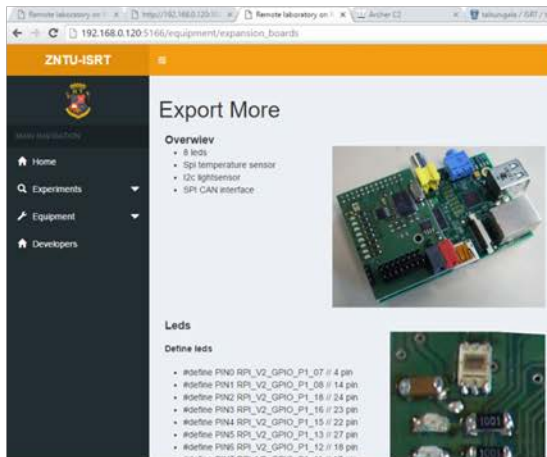


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Students' best practices: Informational Systems on Reliability Tasks

Nodejs JavaScript





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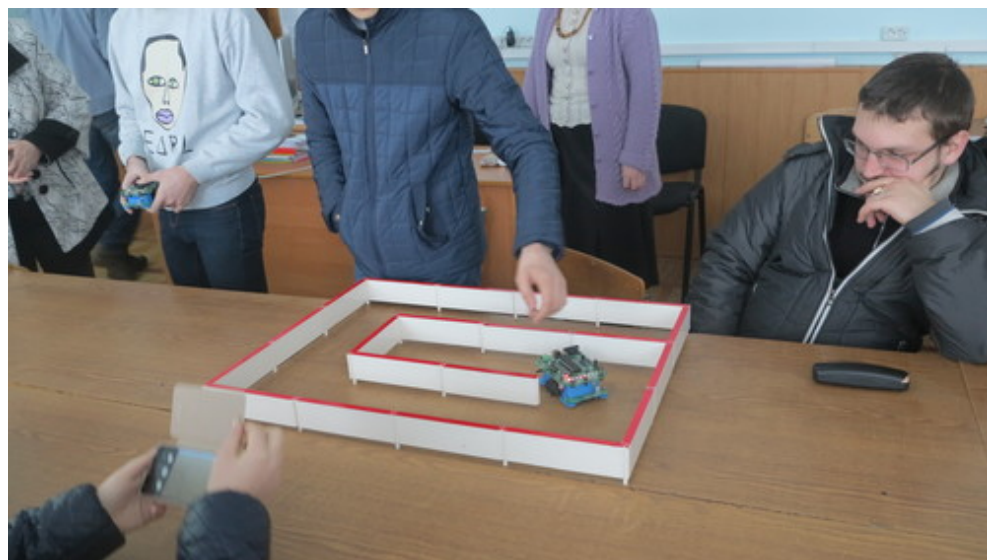
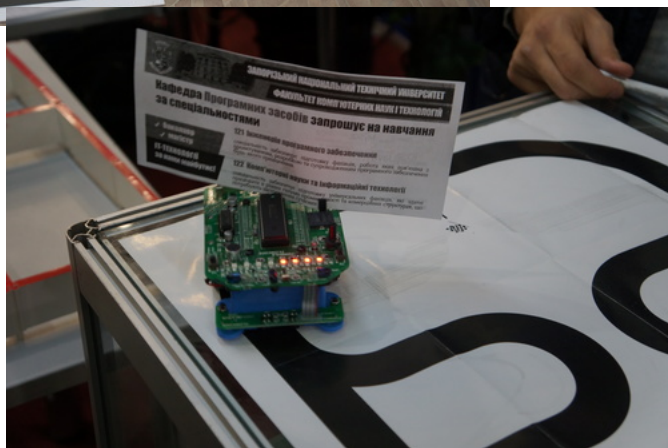
Students' best practices: SMART LIFE Project



<http://www.zntu.edu.ua/stem-osvita-zaporizkogo-krayu-2016>



Students' best practices: FC Buggy Project

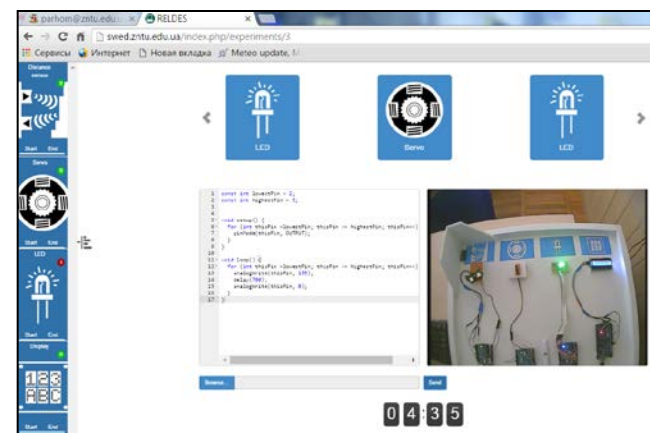
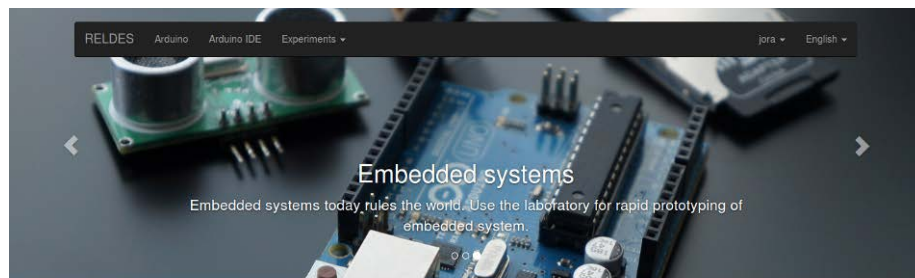




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Students' best practices: Remote lab RELDES





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Students' best practices: Remote lab IoT & Smart House

RELDES Arduino Arduino IDE Experiments Smart House & IoT RELDES API Log in English

Illumination control

2010/01/01 00:08:12 DCS-2121

On Off ☒ Y

Включенность освещения

771

Експеримент дозволяє вивчати технологію керування освітленням використовуючи кольорову стрічку та звичайну білу світлодіодну стрічку.

У експерименті використовуються наступне обладнання:

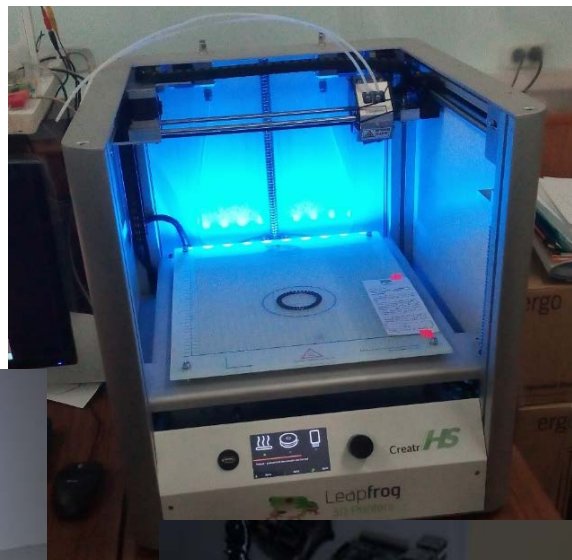
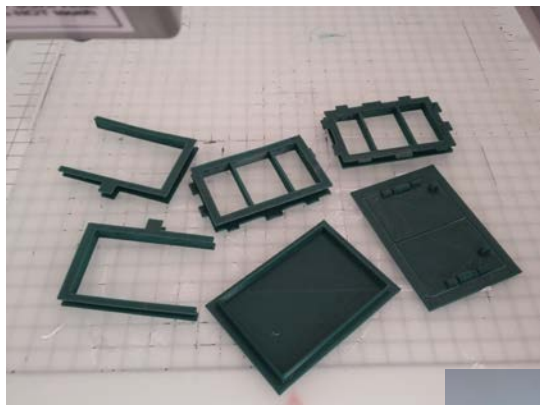
- Arduino Nano
- Модуль реле
- Драйвер квантичний L298
- RGB світлодіодна стрічка
- Біла світлодіодна стрічка

Таким чином експеримент дозволяє навчатися керуванню освітленням у приміщенні та вивчати принципи створення подібних систем.





Students' best practices: 3D printing technologies

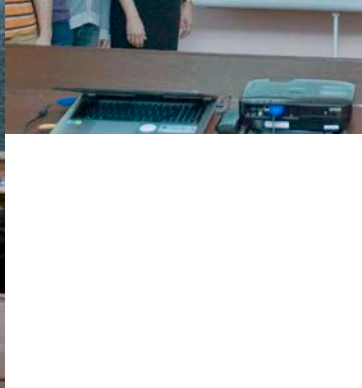




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Conference “ZNTU Science Week» (April, 2016)



<http://www.zntu.edu.ua/integraciya-tehnologiy-internet-things-v-proces-pidgotovky-it-fahivciv>



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International scientific-practical conference (September, 2016)



<http://www.zntu.edu.ua/zvit-pro-robotu-specialnoyi-sekciyi-vbudovani-system-ta-iot-desire>



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Report on Pilot Teaching by ZNTU students, October 2015



<http://zntu.edu.ua/?q=node/3897>



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Report on Pilot Teaching by ZNTU students, November 2016



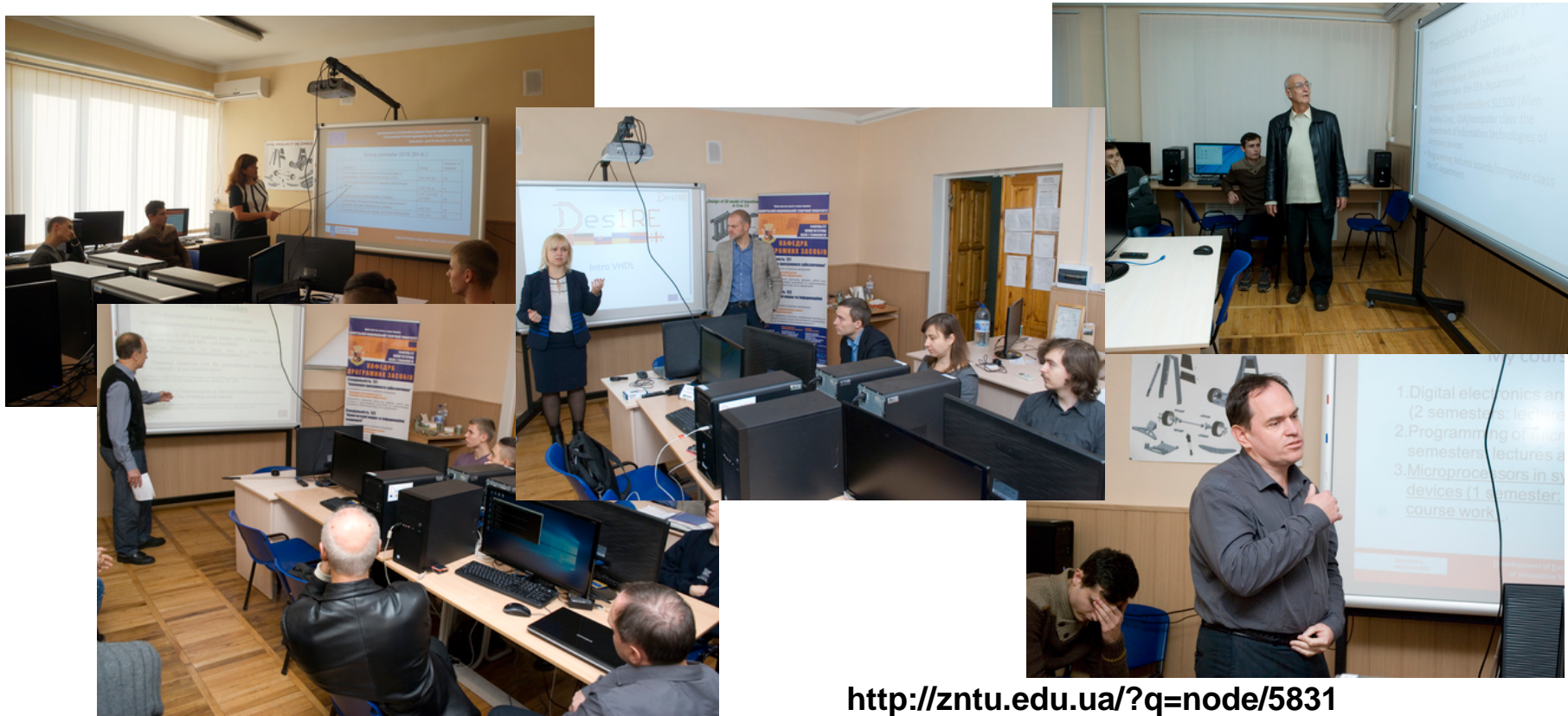
<http://zntu.edu.ua/?q=node/5831>



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Report on Pilot Teaching by ZNTU teachers, November 2016



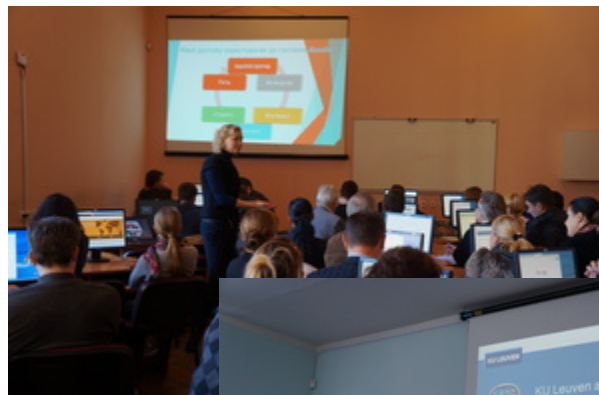
<http://zntu.edu.ua/?q=node/5831>



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Master Classes in ZNTU



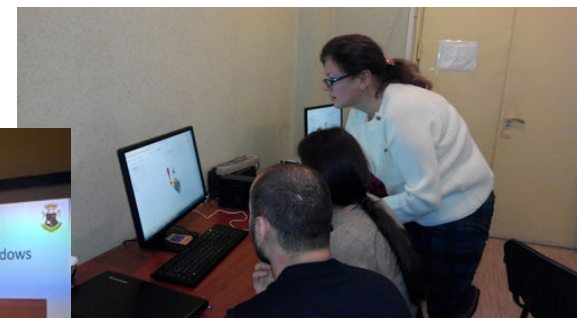
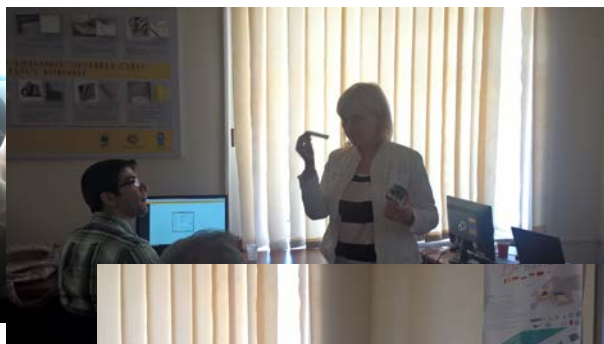
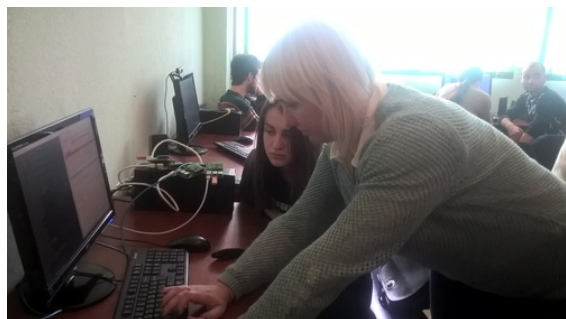
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<http://zntu.edu.ua/?q=node/3965>



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Master classes in Erevan and Tbilisi



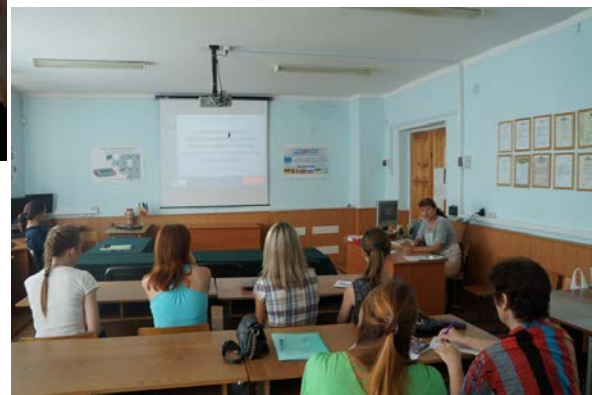
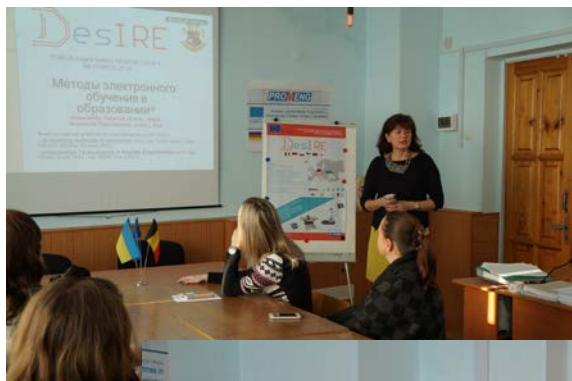
<http://zntu.edu.ua/?q=node/6135>



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Teaching for teachers in ZNTU



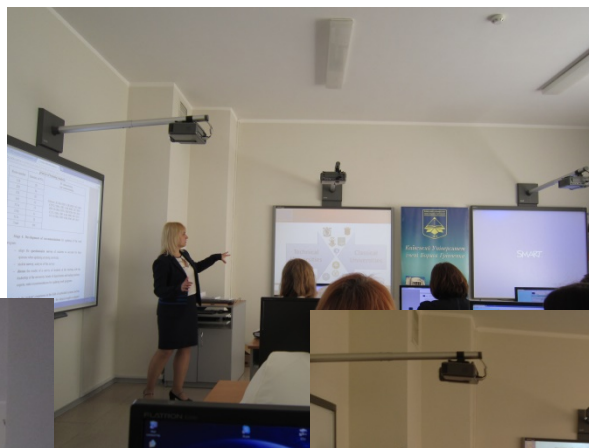
<http://zntu.edu.ua/seminar-metody-dystanciynogo-elektronnogo-navchannya-v-osviti>



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Teaching for teachers in Kiev



<http://zntu.edu.ua/?q=node/3330>



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FABBERS training on 3D technologies



<http://www.zntu.edu.ua/suchasni-tehnologiyi-maybutnim-studentam>

PTC Training



<http://zntu.edu.ua/?q=node/6135>



Equipment & learning tools





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Smart lab a.53a



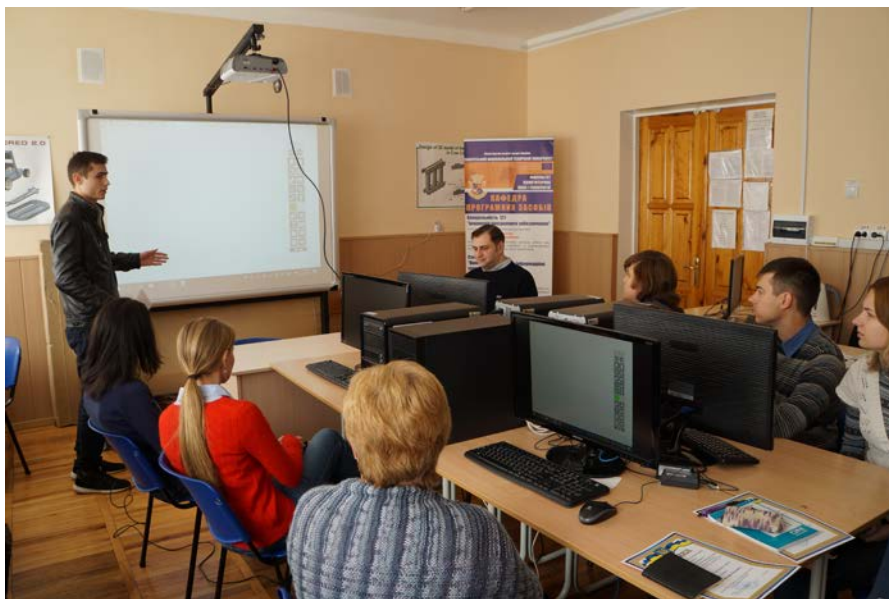
<http://zntu.edu.ua/?q=node/3897>



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New learning tools – first Interactive complex in ZNTU



<http://zntu.edu.ua/vprovadzhennya-suchasnyh-interaktyvnyh-tehnichnyh-zasobiv-v-navchalnyy-proces-zntu>



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New e-learning courses

The image displays a composite of three screenshots related to the Zaporizhzhya National Technical University (ZNTU) e-learning platform.

- Top Left:** The ZNTU website homepage. It features the university's name in Ukrainian and English, navigation links, and a prominent banner for the project: "Development of Embedded System Courses with implementation of Innovative Virtual approaches for integration of Research, Education and Production in UA, GE, AM 544091-TEMPUS-1-2013-1-BE-TEMPUS-JPCR". Logos for Tempus and DesIRE are also visible.
- Top Right:** The Moodle LMS interface. The header reads "СИСТЕМА ДИСТАНЦІЙНОГО НАВЧАННЯ MOODLE ЗНТУ". The main content area lists courses, including "Пілотне навчання за планом міжнародного проекту TEMPUS DesIRE" and "Пілотне навчання за планом міжнародного проекту TEMPUS (Co-op)".
- Bottom:** A detailed view of a specific course page in Moodle. The title is "Валідація та верифікація цифрових систем керування". It includes a description, a list of topics, and a sidebar with a navigation menu. The DesIRE logo is prominently displayed at the bottom of this section.

The URL for the course page is provided as: <http://moodle.zntu.edu.ua/course/index.php?categoryid=263>



Dissemination Printing&Publishing



<http://zntu.edu.ua/?q=node/2198>

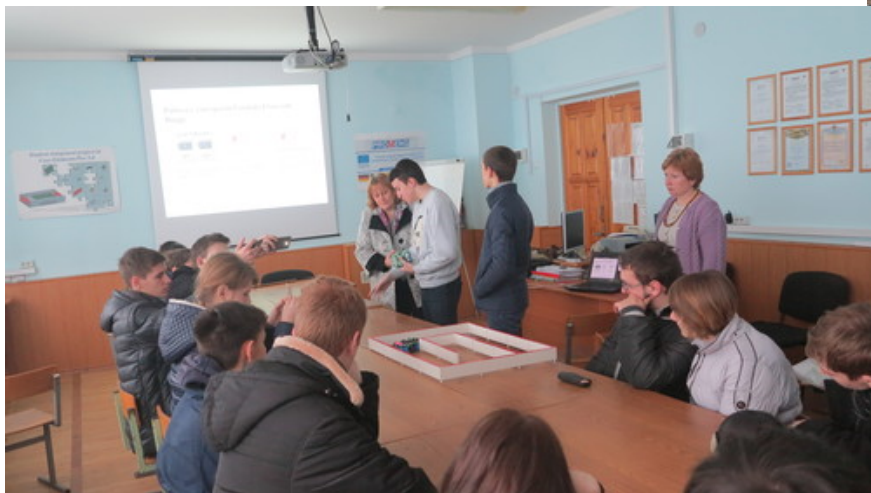




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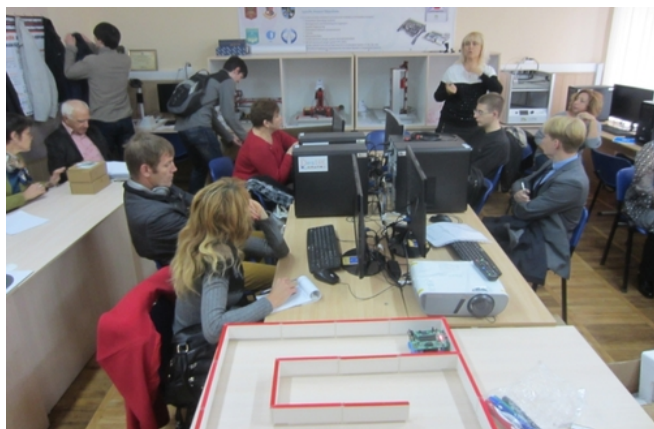
Meetings with scholars



<http://www.zntu.edu.ua/suchasni-tehnologiyi-maybutnim-studentam>



Meetings with school teachers



<http://www.zntu.edu.ua/stem-osvita-zaporizkogo-krayu-2016>

<http://zntu.edu.ua/mizhproektna-vzayemodiya-tempus-ceres-ta-desire-peredacha-dosvidu-roboty-z-obdarovanoyu-moloddyu-u>



Meetings with colleagues from another universities



<http://zntu.edu.ua/zadachi-inzhenerenoyi-osvity-dlya-promyslovoyi-revolyuciyi-40>



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Participation in regional and state exhibitions

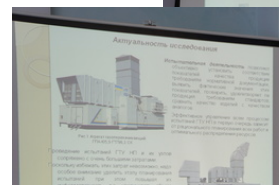
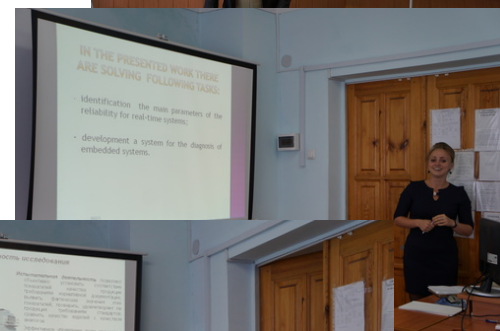
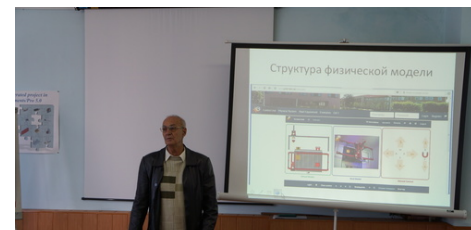
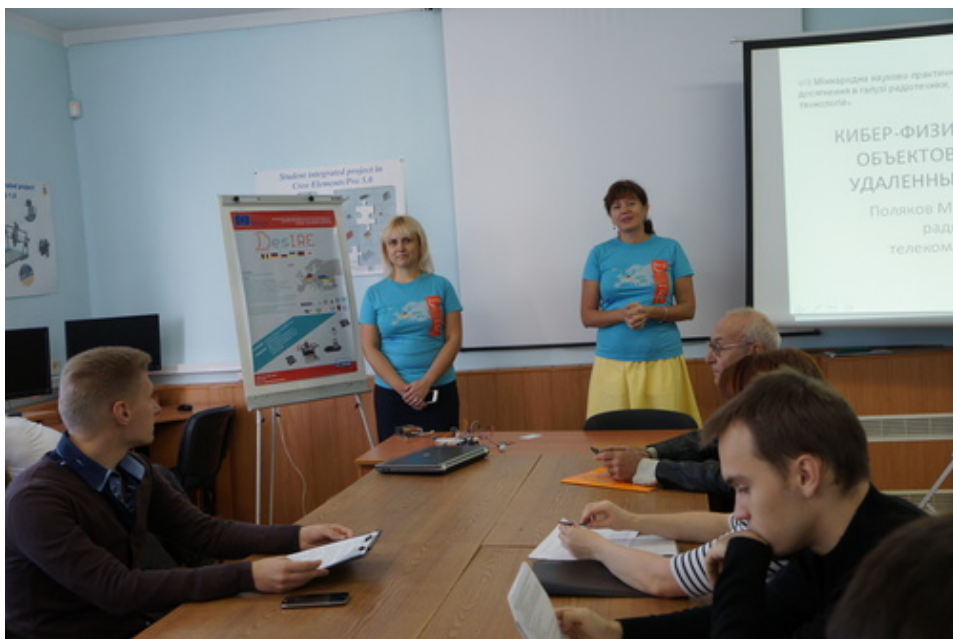




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Special session ES&IoT, September 2016



<http://zntu.edu.ua/zvit-pro-robotu-specialnoyi-sekciyi-vbudovani-system-ta-iot-desire>



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Participation in DESIRE Symposium



Proceedings of the
**International Symposium on
Embedded Systems and Trends in
Teaching Engineering**
Nitra 2016



The Tempus project DESIRE:

Development of Embedded System Courses with Implementation of Innovative Virtual
Approaches for Integration of Research, Education and Production in UA, Ge, AM

ORGANIZED BY

Constantine the Philosopher University in Nitra

Faculty of Education

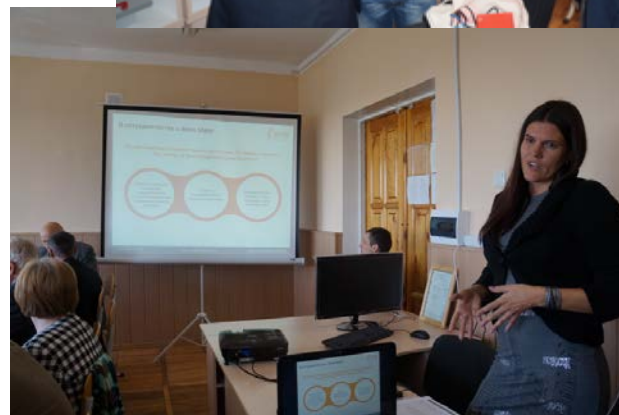
Department of Technology and Information Technologies



<http://zntu.edu.ua/integraciya-zntu-do-yevropeyskogo-osvitnogo-prostoru>



Meetings with representatives of companies



<http://www.zntu.edu.ua/integraciya-tehnologiy-internet-things-v-proces-pidgotovky-it-fahivciv>
<http://zntu.edu.ua/?q=node/3897>



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Dissemination materials

2006-2009	2010-2013	2012-2016	2013-2016	2015-2020
EU-UA JOINT MASTER COURSE IN SOFTWARE ENGINEERING JEP-26182-2005 Main results: New Curriculum & Syllabi (11 disciplines) for Master Degree in specialty «Automated systems software» New laboratory of Software Engineering (room 58) Staff training in EU universities (9 teachers) EU-UA Master Degree diplomas (5 students)  HTTP://OLD.ZNTU.EDU.UA/BASE/13/F001/X2/UKR/TEMPUS.HTML	PRACTICE ORIENTED MASTER PROGRAMMES IN ENGINEERING IN RU, UA, UZ 510920-TEMPUS-1-2010-1-DE-TEMPUS-JPCR Main results: New Syllabi (9 disciplines) for Master Degree in specialties «Systems software» and «Information technology of design» New laboratory of CAD/CAM/CAE with licensed software Altium Designer and Creo (room 57) Staff training in EU universities (5 teachers) Distance pilot teaching «Modern TRIZ» (7 students) Publishing of four students' textbooks Agreements on cooperation with enterprises: Motor Sich, Khartron-YUKOM, Zaporizhtransformator  HTTP://WWW.PROMENG.EU/ HTTP://PROMENG.ZNTU.EDU.UA/	INDUSTRIAL COOPERATION AND CREATIVE ENGINEERING EDUCATION BASED ON REMOTE ENGINEERING AND VIRTUAL INSTRUMENTATION 530278-TEMPUS-1-2012-1-DE-TEMPUS-JPHES Main results: New Syllabi (4 disciplines) for industrial enterprises staff New laboratory of Remote engineering (room 53a) Staff training in EU universities (5 teachers) Pilot teaching for representatives of enterprises and companies, ZNTU teachers and students (47 participants, 78 training certificates) Students' textbooks publishing (Ukrainian/English languages) Agreements on cooperation with companies: PROCOM, Brig Retail  HTTP://WWW.JCO-OP.EU HTTP://ZNTU.EDU.UA/70-NODE/2126	DEVELOPMENT OF EMBEDDED SYSTEM COURSES WITH IMPLEMENTATION OF INNOVATIVE VIRTUAL APPROACHES FOR INTEGRATION OF RESEARCH, EDUCATION AND PRODUCTION IN UA, GE, AM 544091-TEMPUS-1-2013-1-BE-TEMPUS-JPCR Main results: New Syllabi (17 disciplines) for Bachelor and Master Degree in specialties «Systems software», «Information technology of design» and «Artificial intelligence systems» New laboratory of Embedded systems (room 53a) Staff training in EU universities (5 teachers) Pilot teaching for ZNTU teachers and students Publishing of three students' textbooks Agreements on cooperation with companies: AKTIV, Noosphere Ventures, Livestream LLC  HTTP://ZNTU.EDU.UA/70-NODE/2198 HTTP://TEMPUS-DESIRE.EU/	ERASMUS + KEY ACTION 1 2015-1-BE02-KA107-012245 KU LEUVEN (BELGIUM) Main results: Second cycle / Student mobility for studies to KU Leuven from ZNTU (spring semester 2016, three students) Staff mobility for teaching to KU Leuven from ZNTU (spring semester 2016, 1 professor of Software Tools department) Third cycle / Student mobility for studies to KU Leuven from ZNTU (fall semester 2015/spring semester 2016, two PhD students) Agreements on cooperation: Inter-institutional agreement: 2015-2017 between Zaporizhzhya National Technical University (Ukraine) and KU Leuven (Belgium) Bilateral agreement for Academic cooperation between Ilmenau University of Technology (Germany) and Zaporizhzhya National Technical University (Ukraine) Bilateral agreement for Academic cooperation between Thomas More Mechelen Antwerpen (Belgium) and Zaporizhzhya National Technical University (Ukraine) Bilateral agreement for Academic cooperation between Slovak University of Agriculture in Nitra (Slovak) and Zaporizhzhya National Technical University (Ukraine) Bilateral agreement for Academic cooperation between University of Konstantin Philedor in Nitra (Slovak) and Zaporizhzhya National Technical University (Ukraine) Bilateral agreement for Academic cooperation between Transilvania University of Brasov (Romania) and Zaporizhzhya National Technical University (Ukraine)



SOFTWARE TOOLS DEPARTMENT
TEMPUS & ERASMUS+

10

YEARS EXPERIENCE
2006-2016

64, ZHUKOVSKY STR. ZAPORIZHCHYA 09063 UKRAINE WWW.ZNTU.EDU.UA
GALINA.TABURSKICH@GMAIL.COM ANZHELIKA.PARKHOMENKO@MAIL.RU

<http://www.zntu.edu.ua/yuviley-kafedry-programnyh-zasobiv>



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New Textbooks





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Papers& Patents





Quality





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Questionary for students' survey

1. Evaluation of the overall impression of the course
2. Evaluation of the teaching methodology
3. Evaluation of the technical and social competence of the teacher
4. Documentation for participants
5. Remote laboratories
6. Assessment of the course usefulness
7. Suggestions for improving course

АНКЕТА УДОВЛЕТВОРЕННОСТИ УЧАСТНИКОВ ОБУЧЕНИЕМ
по курсу Введение в электронную микроэлектронику

Сроки обучения: с 01.09 по 24.12
Преподаватель 1: Бондарь И.И. Преподаватель 2: _____ Преподаватель 3: _____

Уважаемый участник!
Помогите нам в улучшении наших курсов, полностью заполните эту анкету.
Большое спасибо!

Обратите внимание на предложенную Систему оценивания:
1 = плохо, 2 = скорее плохо, чем хорошо, 3 = скорее хорошо, чем плохо, 4 = хорошо, 5 = очень хорошо

ДАННЫЕ УЧАСТНИКА		Фамилия, Имя: на рус. и вкл. по	
ЗНТУ			
Факультет	<u>РТ</u>	на рус.	<u>Бондарь Игорь</u>
Специальность	<u>«Информационные системы»</u>	вкл. по	<u>Бондарь Игорь</u>
Курс	<u>1-й</u>		
Группа	<u>РТ-984</u>		

1) ОБЩЕЕ ВПЕЧАТЛЕНИЕ О КУРСЕ

	хорошо	плохо
1.1. Курс соответствовал всем моим личностным требованиям	<input type="checkbox"/>	<input type="checkbox"/>
1.2. Я могу рекомендовать курс другим	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.3. Соотношения между содержанием и длительностью сбалансировано	<input checked="" type="checkbox"/>	<input type="checkbox"/>

2) ПРЕПОДАВАТЕЛИ

	Преподаватель 1					Преподаватель 2					Преподаватель 3				
2.1. Методология															
Способ представления и точное использование технических ресурсов позволяют преподавателю достигать хороших результатов	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Теория и практика были сбалансированы	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Правильное управление временем помогло адекватно достичь цели и реализовать задачи курса	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2. Технические и социальные компетентности															
Инструктор:															
- казался очень уверенным в теме	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- логично передавал содержание	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- адекватно отвечал на вопросы и потребности участников	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- создавал позитивную атмосферу в группе	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- демонстрировал предмет, давая практические примеры	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Мое общее впечатление	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 = плохо, 2 = скорее плохо, чем хорошо, 3 = скорее хорошо, чем плохо, 4 = хорошо, 5 = очень хорошо

3) ДОКУМЕНТАЦИЯ ДЛЯ УЧАСТНИКОВ

	1	2	3	4	5
Документация для участников	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- понятна	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- легко воспринимаема	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- хорошо читаема	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
- иллюстрирует материал для обучения	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Мое общее впечатление	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

4) Удаленные лаборатории

	1	2	3	4	5
Был ли возможен постоянный доступ к удаленным лабораториям?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Было ли использование удаленных лабораторий полезным для укрепления теоретических знаний?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Насколько надежны были использованные удаленные лаборатории?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Мое общее впечатление	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6) ПРИМЕЧАНИЯ

Что дало мне изучение курса Введение в электронную микроэлектронику

Понять, что такое электронная микроэлектроника и как она работает в различных системах.

Что бы я изменил(а) (что нужно улучшить):

Добавить больше практических заданий.

Подпись, дата 12.12.2016
Игорь

Co-funded by the Tempus Programme of the European Union

DesIRE



Participants of the survey (70 st.)

First year of study: Electronics and electrotechniks (33 st.)

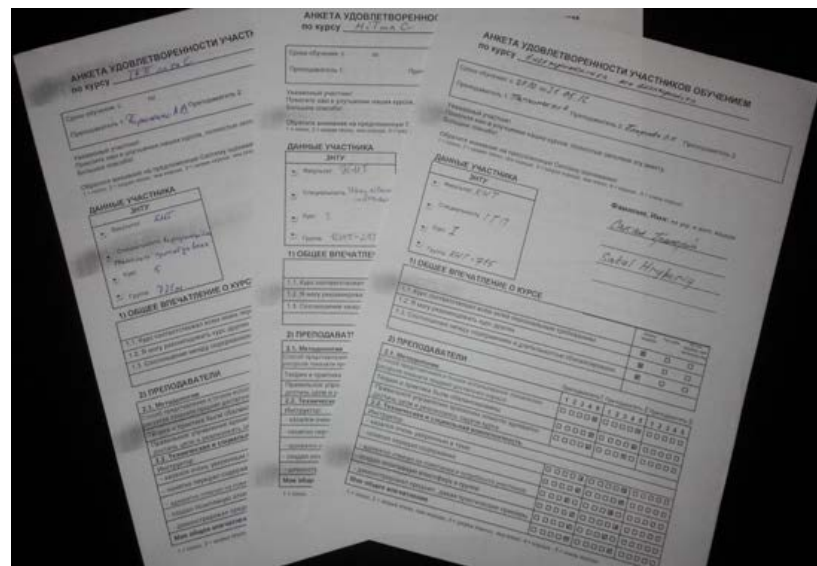
Second year of study: GUI development (14 st.)

Third year of study: Multimedia information technologies and systems (3 st.);

Microprocessors hardware (10 st.)

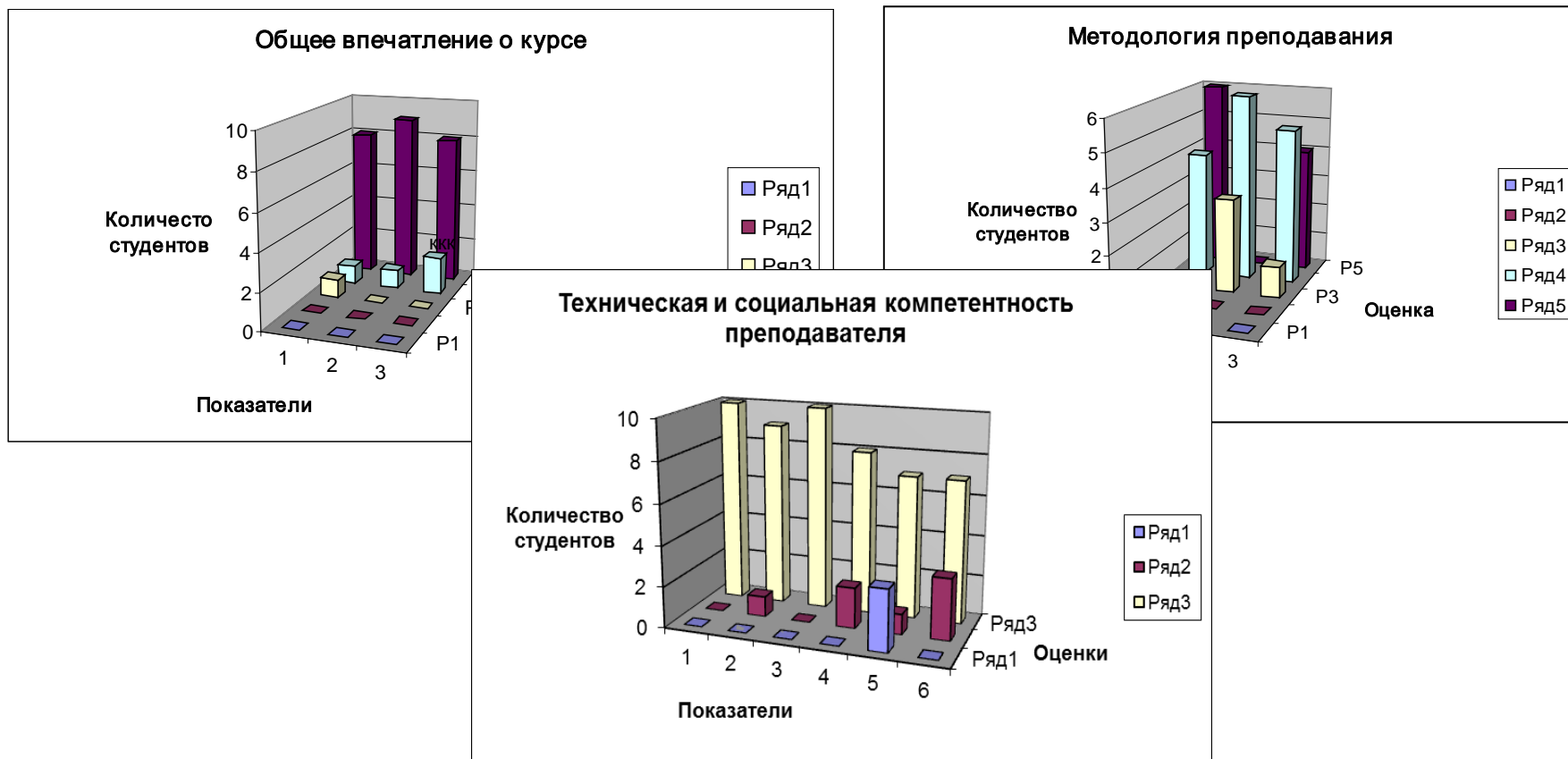
Fourth year of study: Embedded OS (7 st.);

Fifth year of study: Technologies and systems of computer-aided design (3 st.)





Outcomes from the survey





Multiplier effects





PhD students' works

1. Gladkova Olga
2. Petrova Olga
3. Zalubovskiy Yaroslav
4. Sokolianskiy Alexandr

State funding for research projects

- State funded research work «Intelligent methods of remote technical object control systems diagnostics (2015-2016)
- State funded research work «Information system for minicomputer distributed systems diagnostics in a multicomponent environment» (2017-2019)

Agreements on cooperation with companies

1. Vanderslab
2. AKTIV
3. Noosphere Ventures
4. Livestream LLC





Tempus

Development of Embedded System Courses with implementation of Innovative Virtual approaches for integration of Research, Education and Production in UA, GE, AM

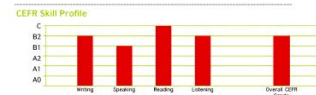
Unexpected outputs: MSc In Programmable Electronics And Wireless Embedded Systems



Candidate Report

Candidate Name: Anzhelika Parkhomenko Test Date: 04/11/2016
Organization: BC Commercial - Ukraine Kyiv Test Package: Aptis - Listening Reading Speaking and Writing

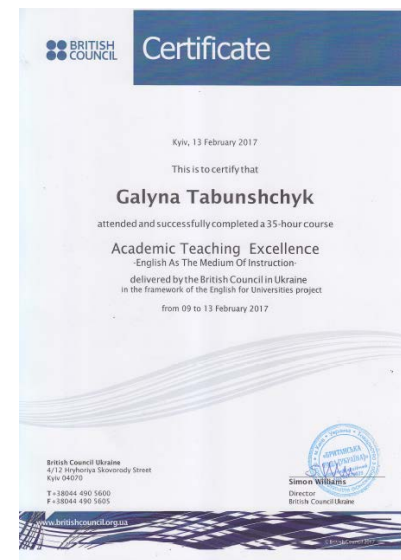
Scale Score	
Skill Name	Skill Score
Listening	32/50
Reading	48/50
Speaking	38/50
Writing	42/50
Final Scale Score	160/200
Grammar & Vocab	30/50



Please turn over for CEFR Skill Descriptors



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Work in progress

1. Final report
2. Problems with 3D scanner using Windows 10
3. Equipment purchase
4. Extra materials for printing and publishing



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of Innovative Virtual approaches for integration of Research,
Education and Production in UA, GE, AM

Thank You for Your Attention

