Tempus

ICo-op
Industrial Cooperation and Creative Engineering Education based on Remote Engineering and Virtual Instrumentation

# Presentation of *ZNTU (P08)*

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Ph.D., associate professor

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***Zaporizhzhya National Technical University***

# ZNTU departments, involved to development of learning modules

- Electrical and Electronics Apparatuses Department
- Software Tools Department
- HR management and Labor Economics Department

# Development of learning modules

**Development of learning modules using laboratory GOLDI infrastructure:**

- Control System of Electrical Machines and Apparatuses (Michael Poliakov)
- Technologies and systems of virtual and remote engineering (Anzhelika Parkhomenko, Olga Gladkova)
- Quality of Informational Systems (Galina Tabunshchyk)

**Development of transversal learning module:**

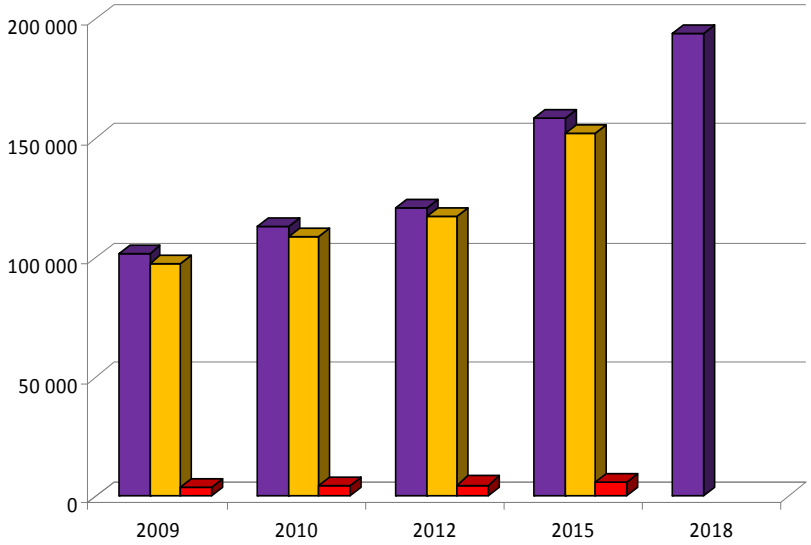
- HR Management of innovative enterprises (Elena Vasilieva, Andrei Sokolov, Andrei Karpenko, Denis Vasilychev)

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

- This course provides students in the fields of Systems Software, Information Technologies of Design, Electronics & Electrotechnics with skills and knowledge required for design and production activity based on virtual engineering and remote experiment.

- After completing this course the student will know the principles of embedded systems based on microcontrollers design and implementation and be able to design Hardware and Software of embedded systems using technologies and systems of virtual and remote engineering.

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

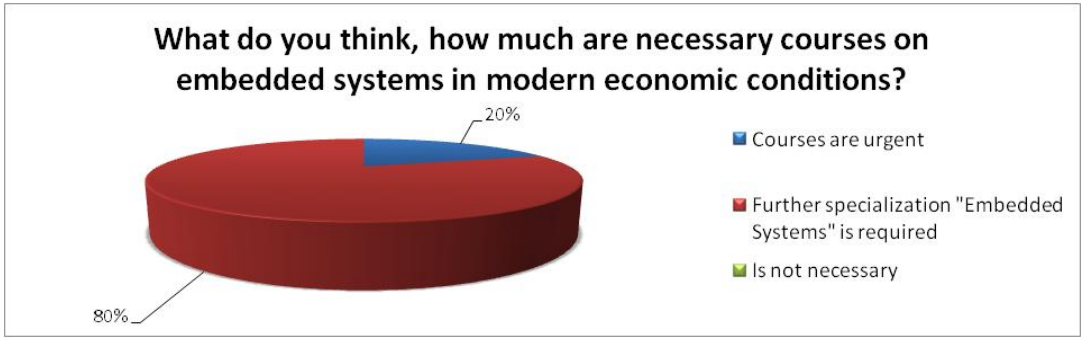


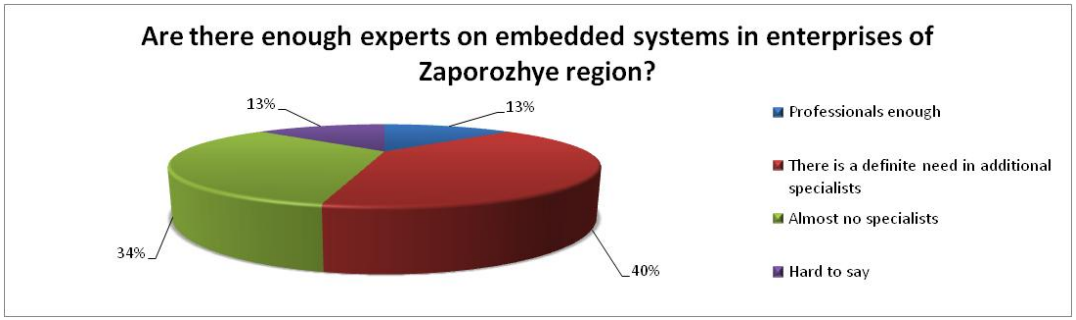

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

**Participated in the survey**
**15 companies – employers:**

- NPP Hartron-Yukom,
- JSC ZTR,
- Motor Sich,
- KP NPK Iskra,
- "Brig-Retail" Ltd,
- Bmuse,
- Cupid,
- LLC "Prohservys",
- Energoavtomatizatsia,
- LynxInnovation and others.

## Employers opinion analysis



# Course Overview: Technologies and Systems of Virtual and Remote Engineering

**Skills and/or knowledge:**

- exploring new approaches to design and production activity based on virtual and remote engineering;
- study of embedded systems hardware and software features of realization;
- exploring stages and approaches to design of embedded systems based on microcontrollers;
- familiarizing with tools for creating and managing requirements to embedded systems and project documentation;
- study of Integrated Development Environments for computer-aided design of software and hardware of embedded systems based on microcontrollers;
- software-oriented design of embedded control systems by using Atmel Studio and lab GOLDI;
- hardware-oriented design of embedded control systems by using Altium Designer and CREO;
- creating and testing embedded systems' virtual prototype;
- gain experience of the remote experiment in the field of design.

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

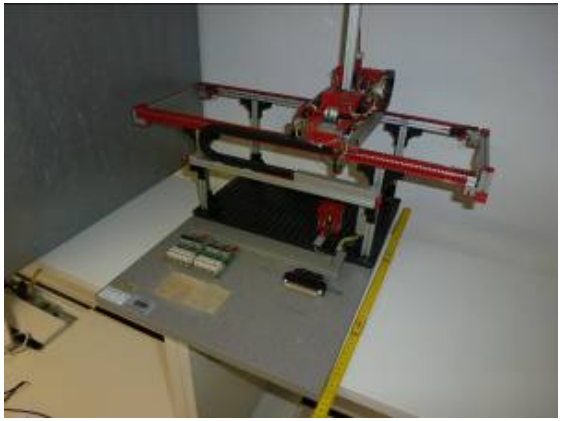
**Main topics:**

- New approaches to design and production activity based on virtual engineering and remote experiments
- Analysis of Embedded Systems features and market
- The phases of the life cycle of embedded system
- Embedded systems requirements analysis and creation of project documentation
- Approaches to embedded systems hardware realization
- Embedded systems based on microcontrollers. Stages of microcontroller system design
- Atmel microcontrollers architecture
- Approaches to embedded systems software realization
- Software engineering medium Atmel Studio
- Design of embedded control systems by using Altium Designer
- Design of embedded control systems by using Creo
- Design of embedded control systems by using lab GOLDI
- Testing embedded systems' virtual prototype

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

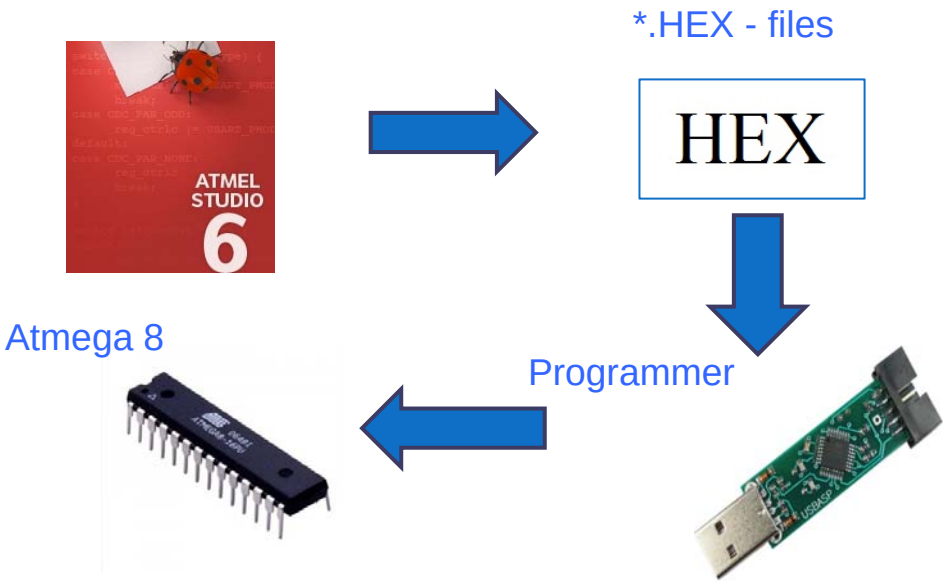
**Remote Experiments, using remote laboratory GOLDI:**

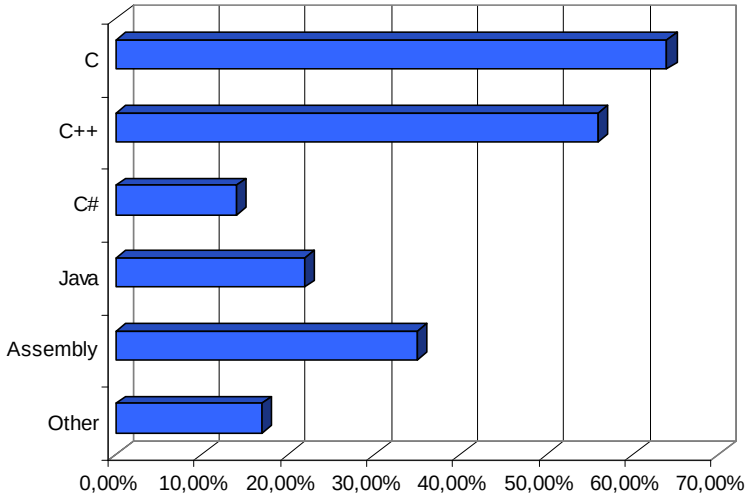
- Research of model "Elevator“
- Research of model "3-axis table“
- Research of model "Production line“
- FPGA rapid prototyping

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

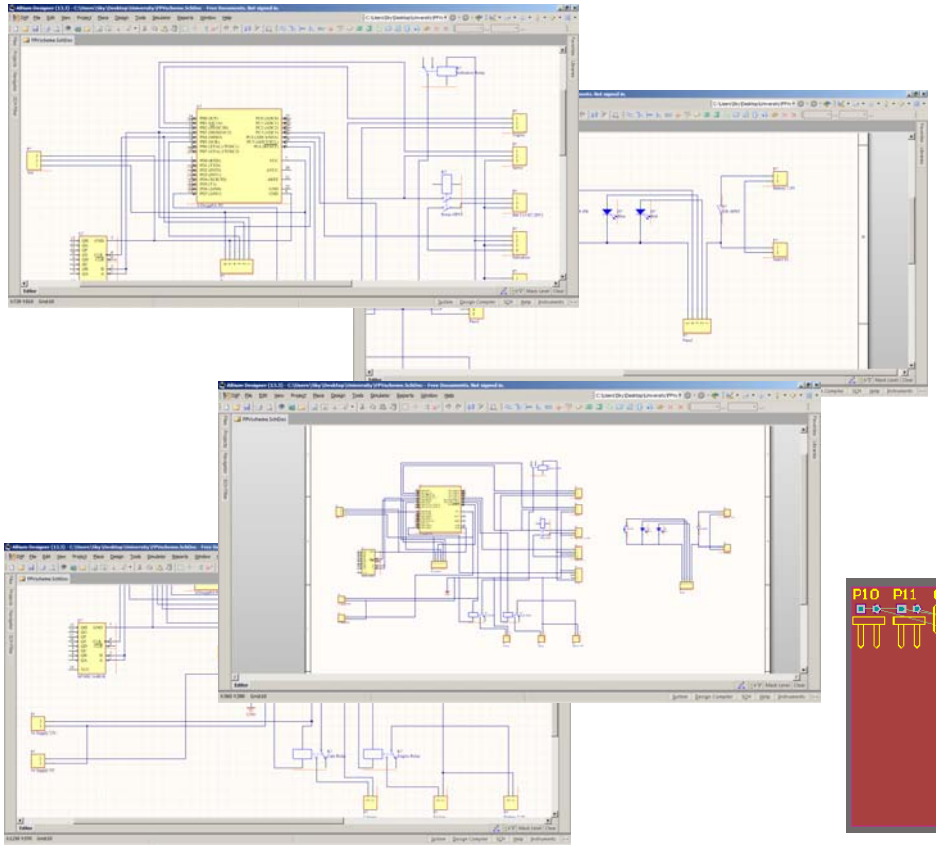
**Lab Works:** Embedded systems software development by using Atmel Studio

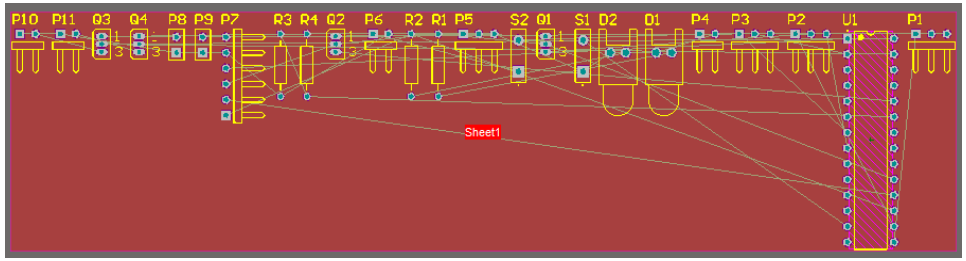


# Course Overview: Technologies and Systems of Virtual and Remote Engineering

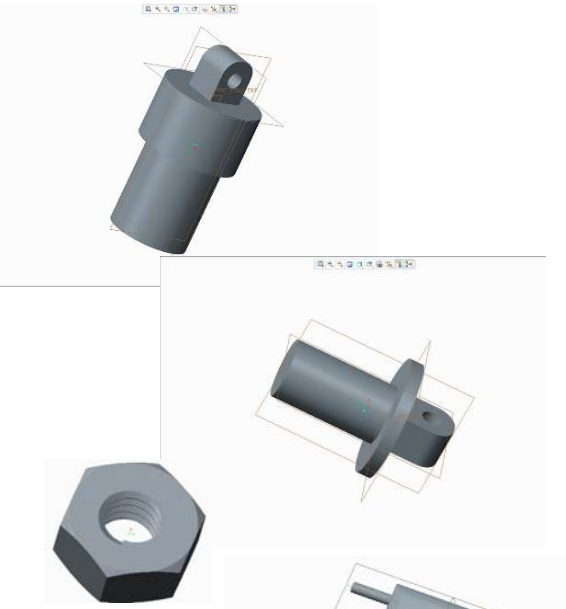
**Lab Works:** Embedded systems hardware development by using Altium Designer

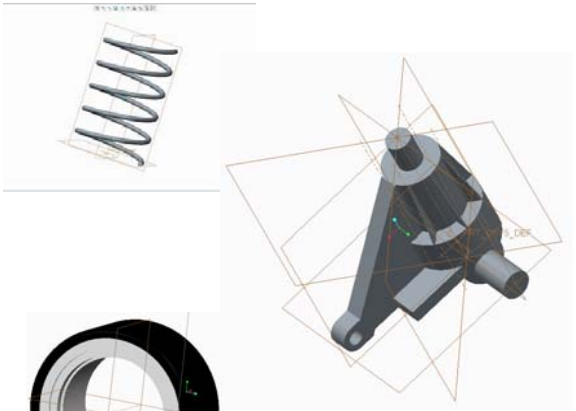


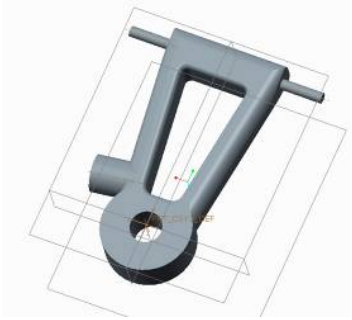
# Course Overview: Technologies and Systems of Virtual and Remote Engineering

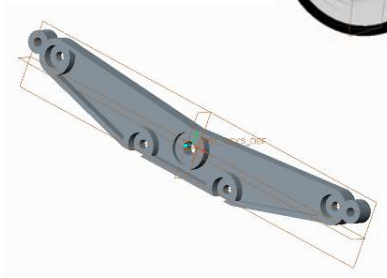
**Lab Works:** Embedded systems hardware development by using PTC Creo

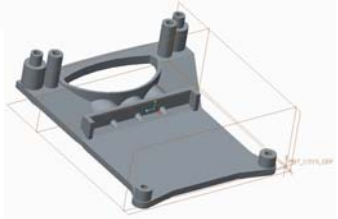











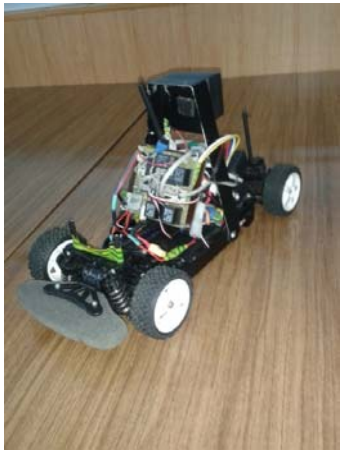


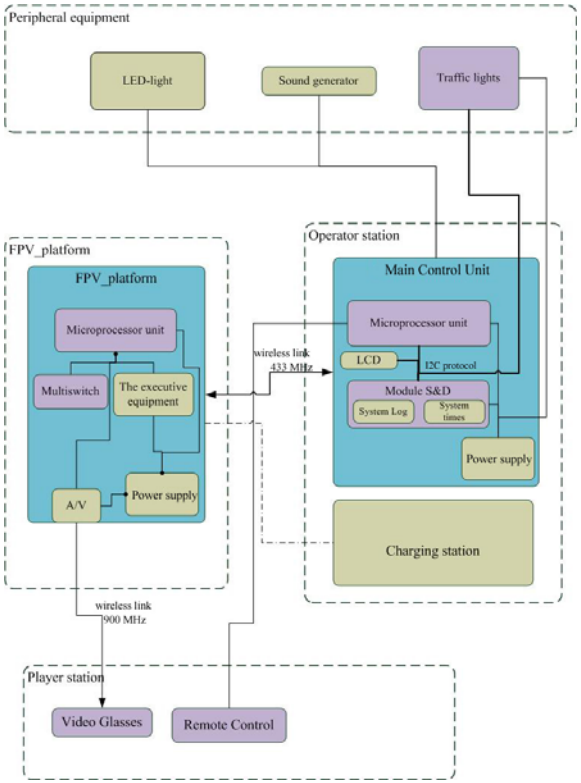


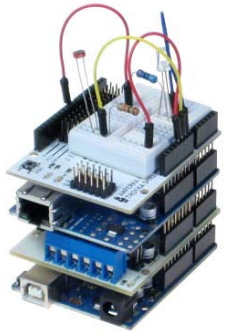
Anzhelika Parkhomenko

# Course Overview: Technologies and Systems of Virtual and Remote Engineering

**Integrated Project:** Development of embedded system based on microcontrollers using virtual engineering and remote experiment (Atmel Studio, PTC Creo, Altium Designer, GOLDI)





# Course Overview: Technologies and Systems of Virtual and Remote Engineering

1) Parkhomenko, A. Computer-aided design of electronic means in mediums Creo and Altium Designer / A.V.Parhomenko, A.V.Prytula, V.M.Kryschuk. - Zaporozhye: Dike pole, 2013. - 240 p.
2) Anzhelika Parkhomenko. Investigation of peculiarities of analysis of system and software requirements for designing automated system / Anzhelika Parkhomenko, Olga Gladkova // Proceedings of XII International Conference «The Experience of Designing and application of CAD Systems in Microelectronics (CADSM 2013)», Lviv: 2013. - P.268-270.
3) Anzhelika Parkhomenko. Analysis and application of existent approaches in microcontroller system designing / Anzhelika Parkhomenko, Olga Gladkova // Proceedings of IX-th International Conference «PERSPECTIVE TECHNOLOGIES AND METHODS IN MEMS DESIGN (MEMSTECH 2013)», Lviv: 2013. - P.59-61.
4) Anzhelika Parkhomenko. Investigation of peculiarities software development for embedded systems / Anzhelika Parkhomenko, Olga Gladkova // Proceedings of XII International Conference “Modern Problems of Radio Engineering, Telecommunications and Computer Science” (February 25 – March 1, 2014, Lviv-Slavske, Ukraine), Lviv: 2014. - P.
5) Parkhomenko A.V. Virtual Tools and Collaborative Working Environment in Embedded System Design / A.V. Parkhomenko, O.N. Gladkova // Proceedings of XI International Conference on Remote Engineering and Virtual Instrumentation (REV2014) (26-28 February, 2014, Porto, Portugal) Porto: Polytechnic, 2014. - P. 91-93.
6) Olga Gladkova. Development and practical application of requirements model for designing embedded systems / Olga Gladkova, Anzhelika Parkhomenko, // Proceedings of IX-th International Conference «PERSPECTIVE TECHNOLOGIES AND METHODS IN MEMS DESIGN (MEMSTECH 2014)», Lviv: 2014. - P.

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