DesIRE

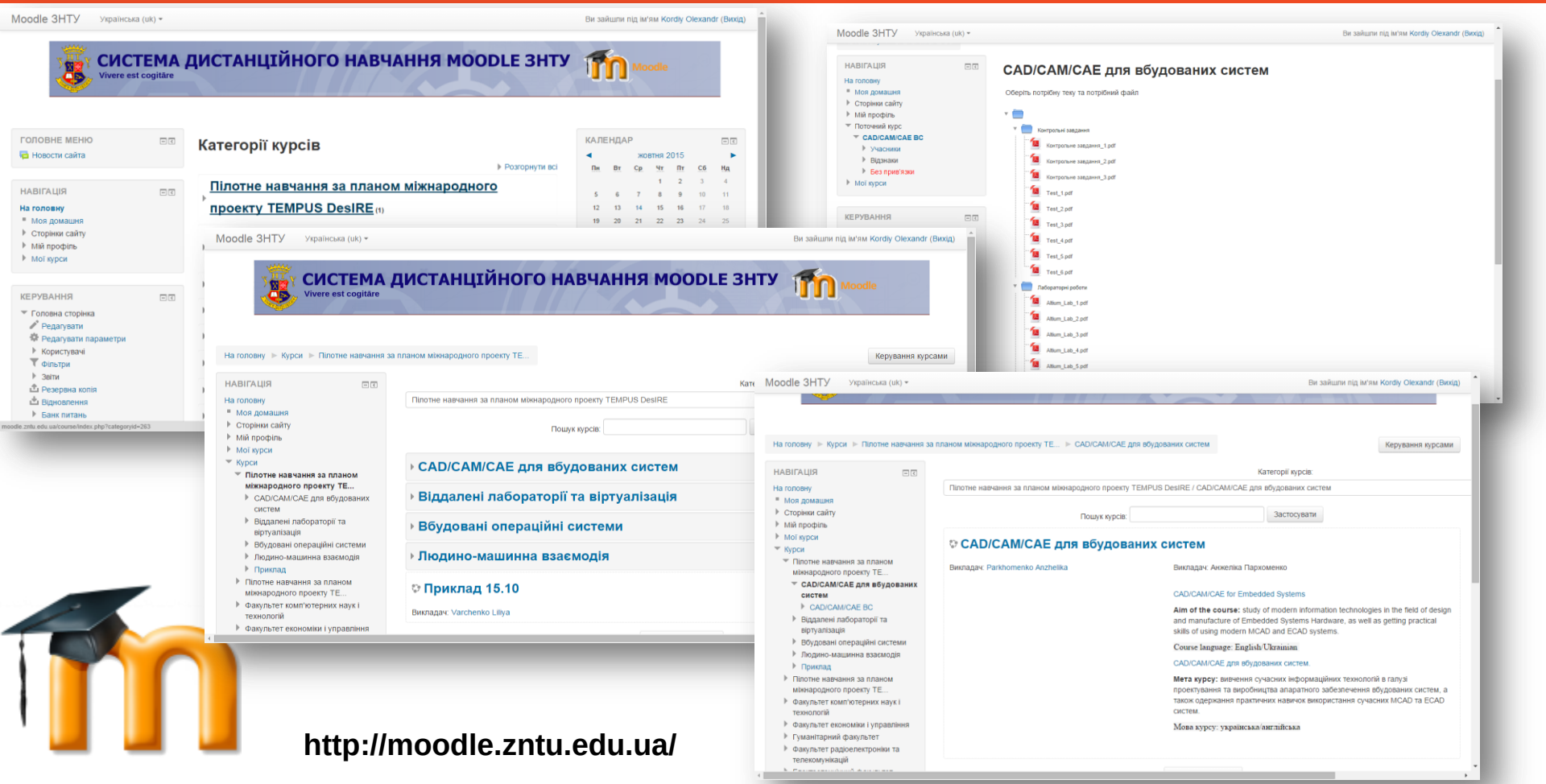
Presentation of P04
Zaporizhzhya National Technical University (ZNTU)
Zaporizhzhya, Ukraine

Work in Embedded Systems Laboratory.

Best students practices.

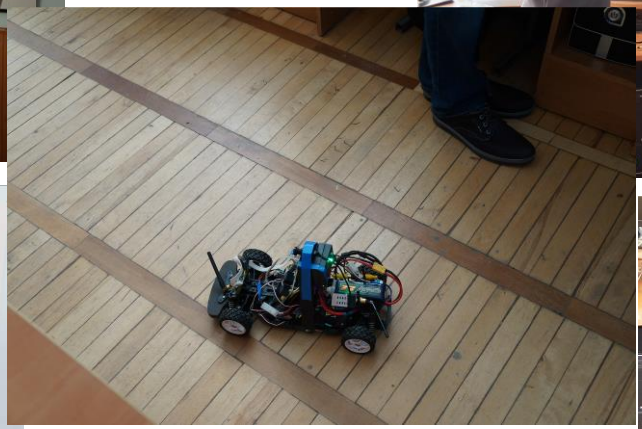
Anzhelika Parkhomenko

PhD, Associate professor



http://moodle.zntu.edu.ua/

FPV auto project



Zaporizhzhya,
October 15, 2015

Moving objects control systems

Basic software requirement:
•minimum response time for input parameters;

Basic hardware requirements:
•compactness;
•energy consumption minimization.

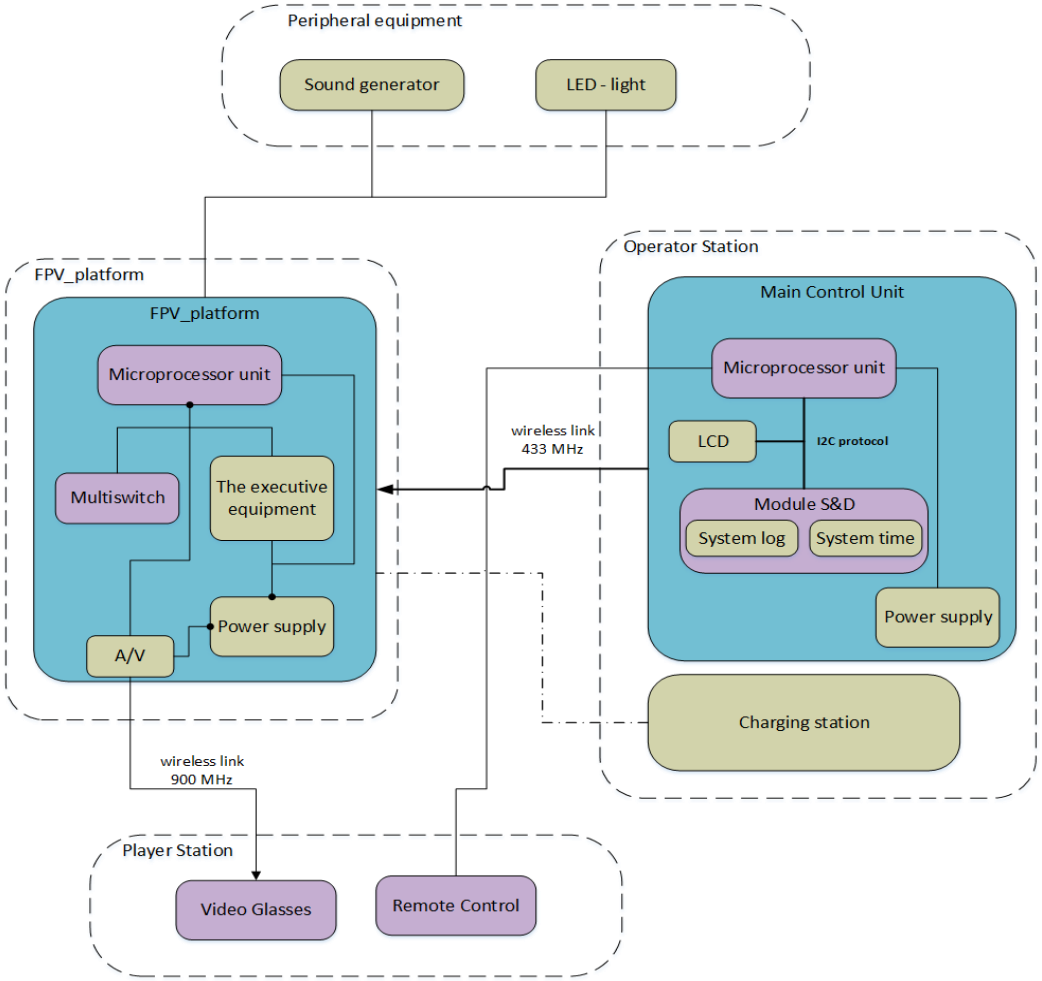
Basic system requirements
•expected behavior of the system;
•reliability;
•durability.

System architecture

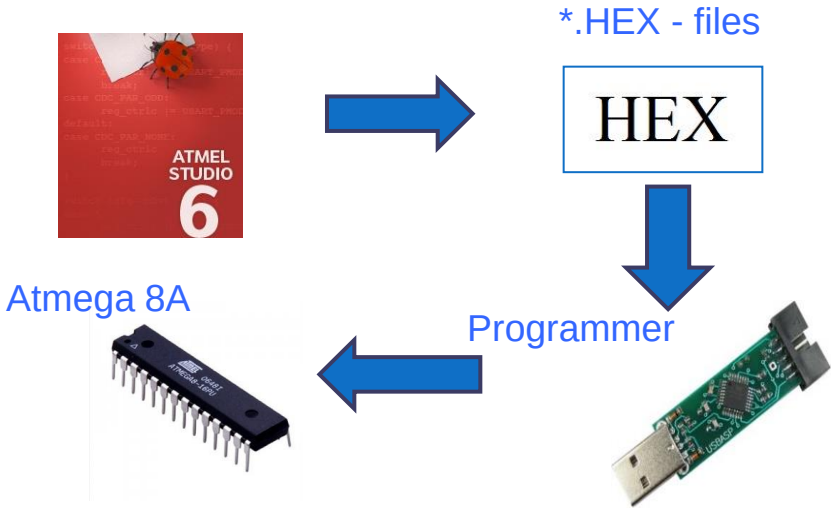
Programmable components

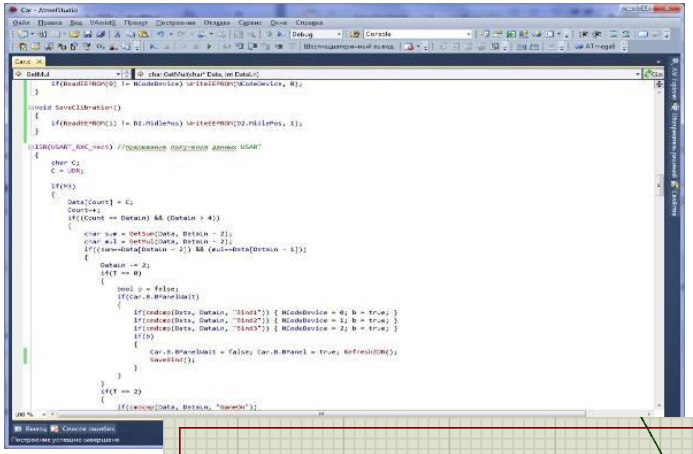
Completed solutions

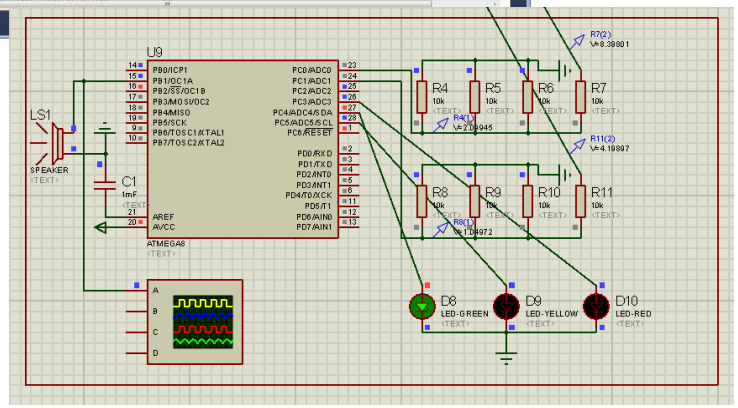
Constructive components



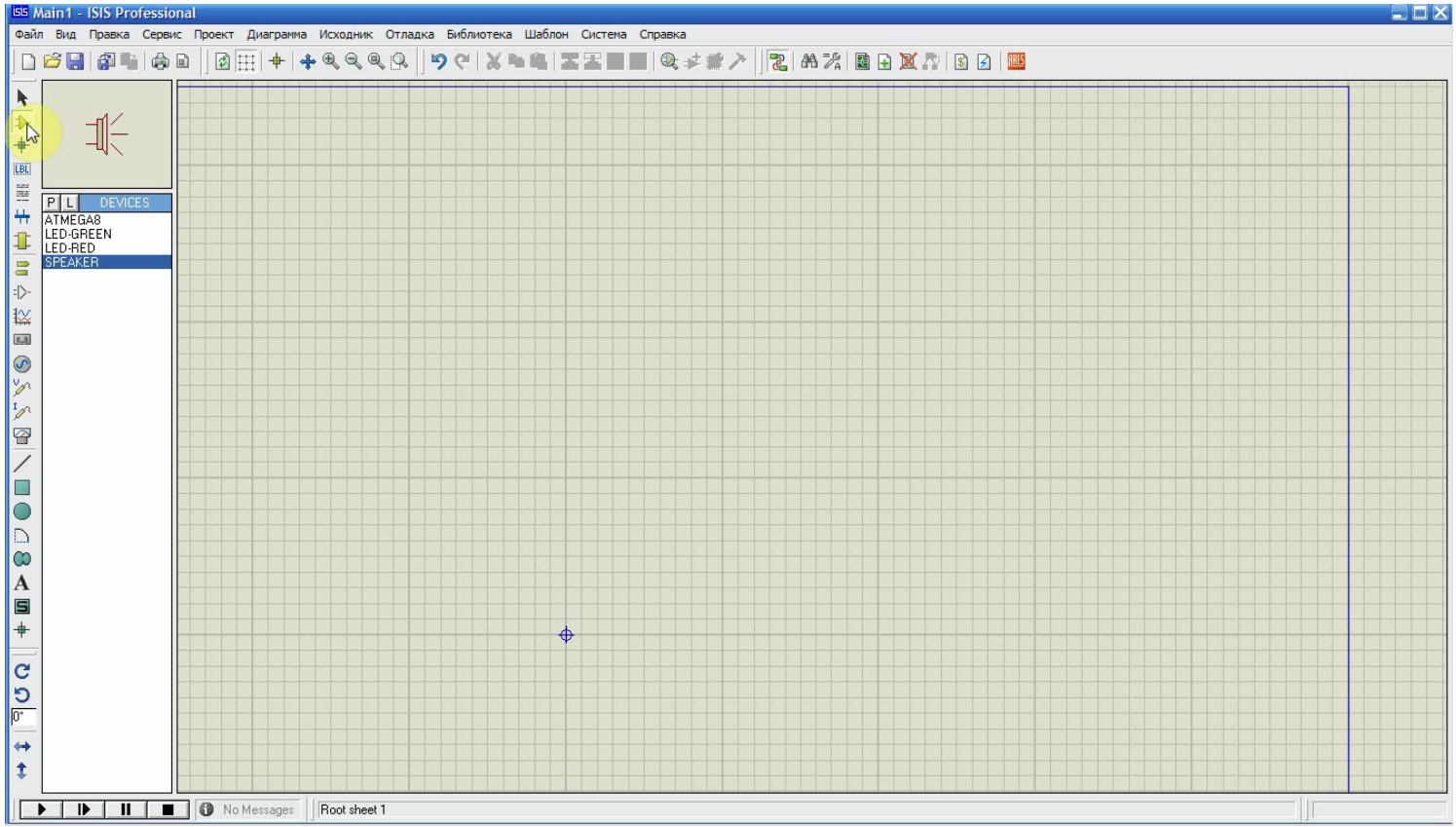
Development of programs for the microcontroller



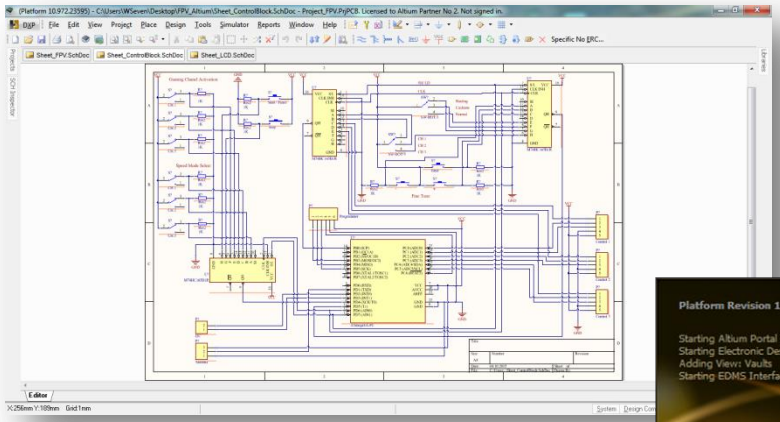


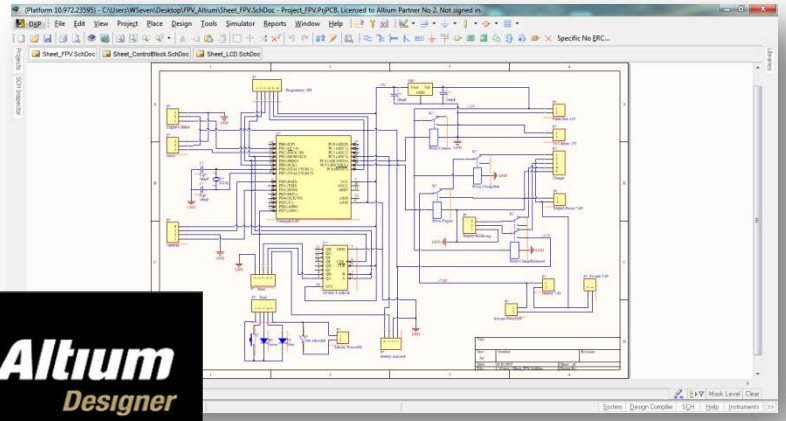


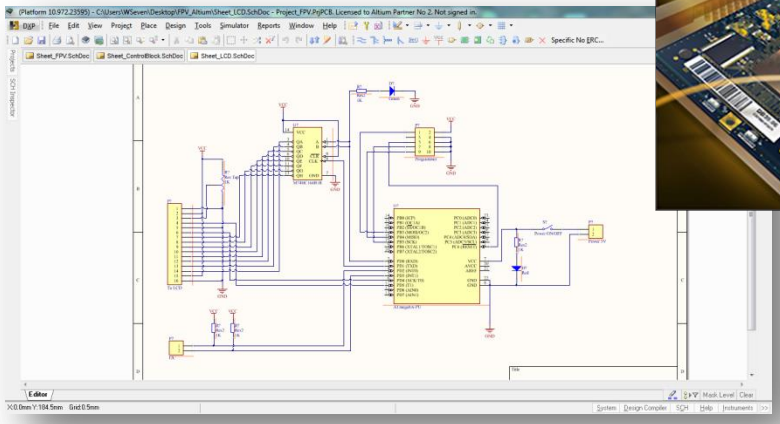
Simulation of programs for the microcontroller

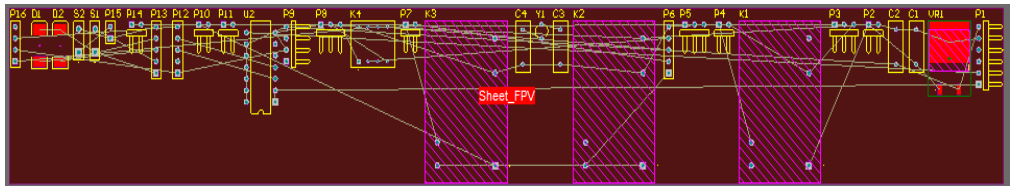


Creation and investigation system virtual prototype

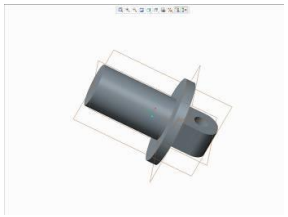








Creation and investigation system virtual prototype



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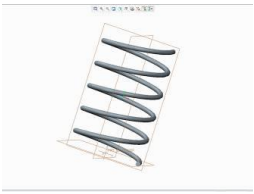
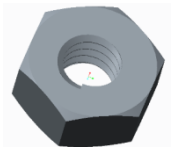
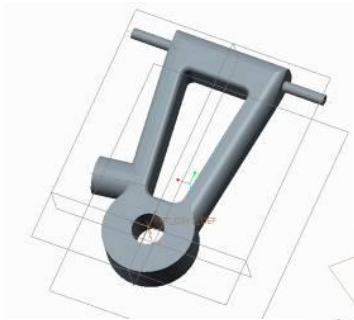
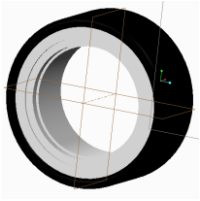
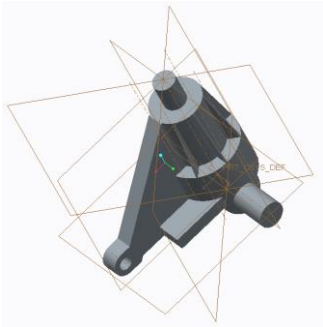
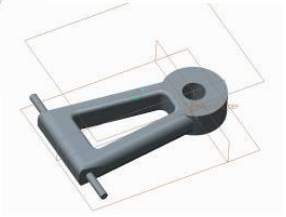


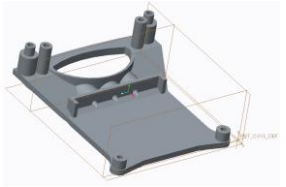




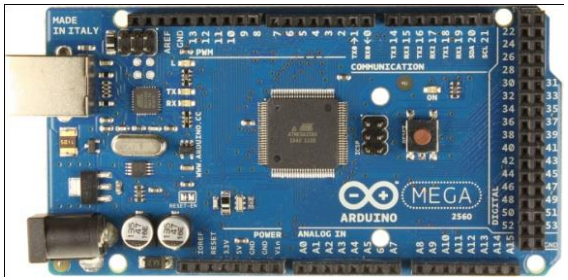








Modern hardware and software platforms

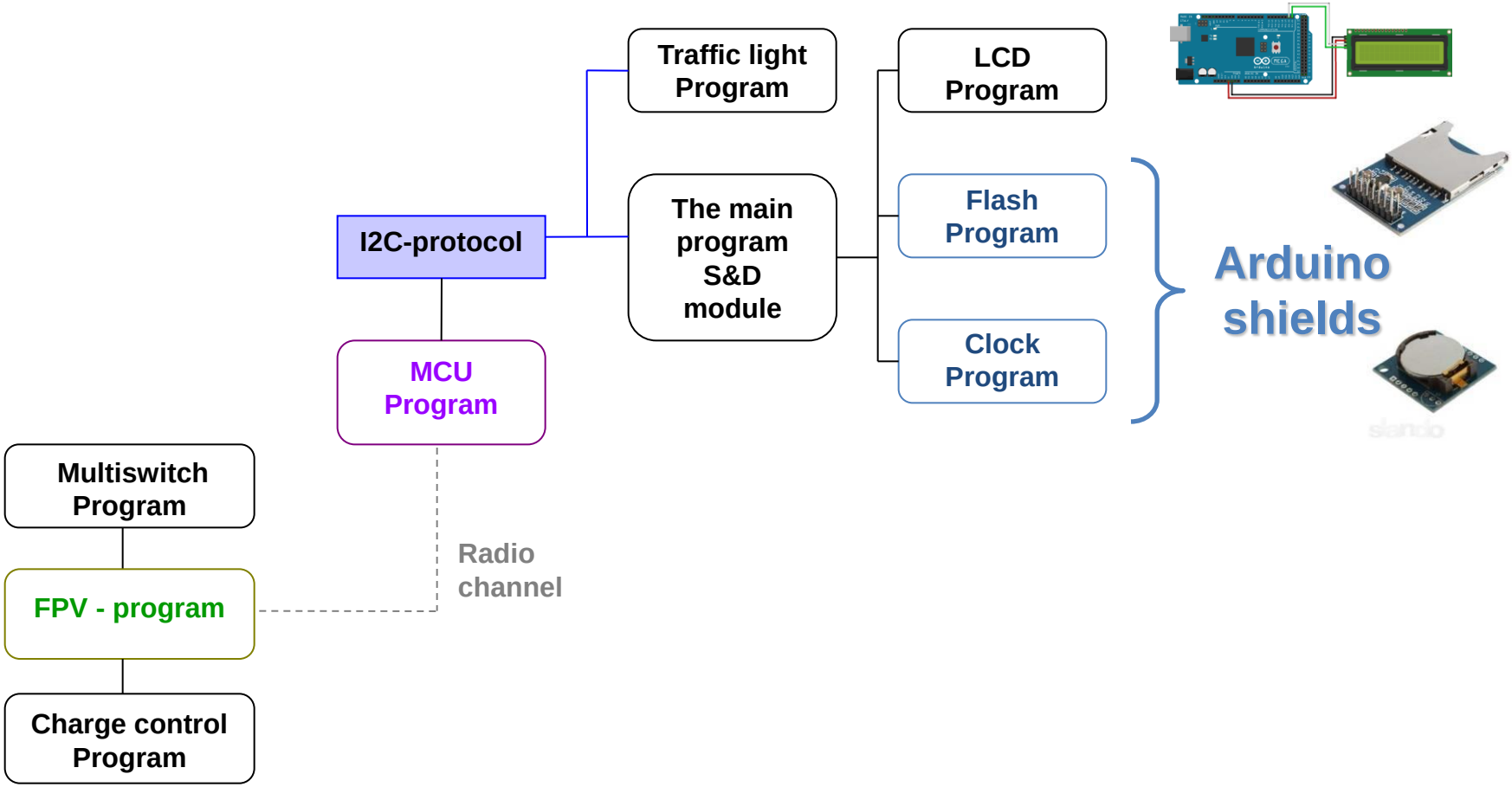


Arduino

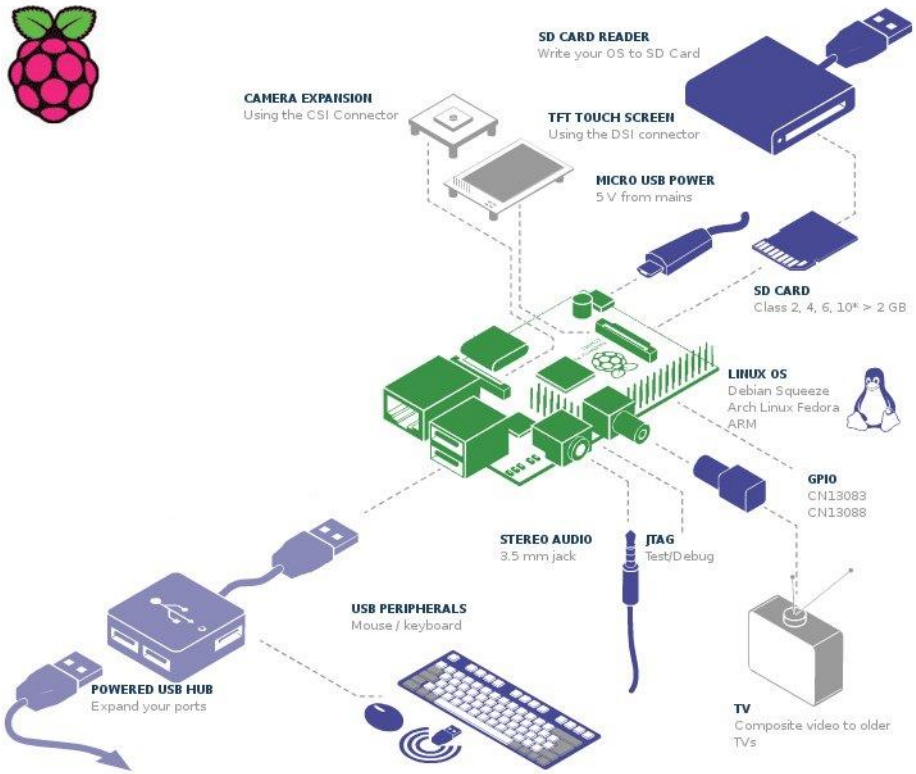
Raspberry Pi

Altera Cyclone

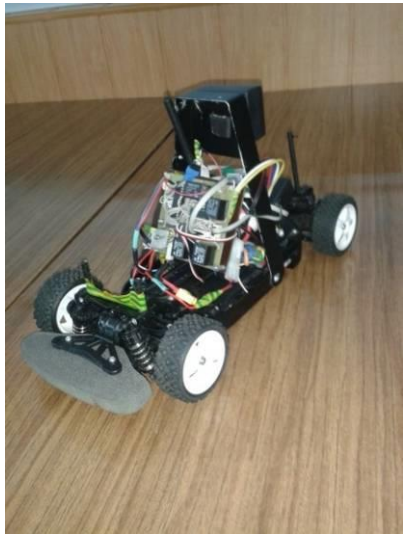
Bachelor work in progress based on Arduino

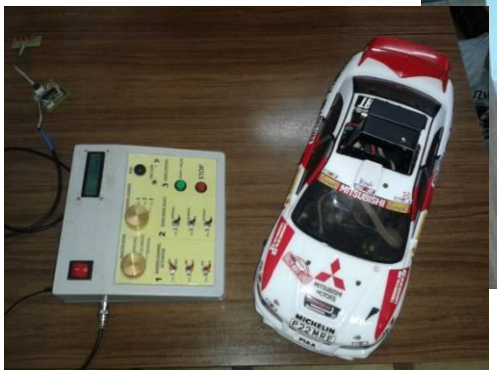


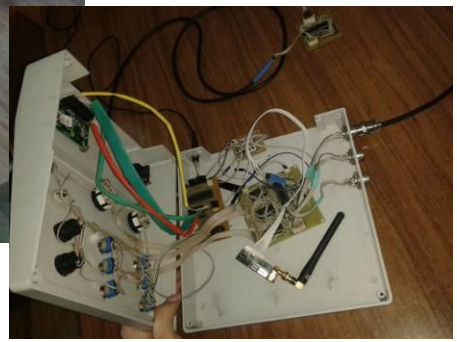
Bachelor work in progress based on Raspberry Pi



Real prototype

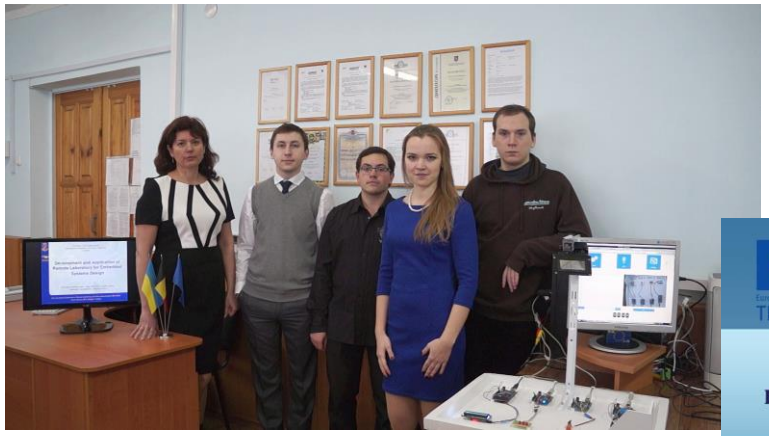




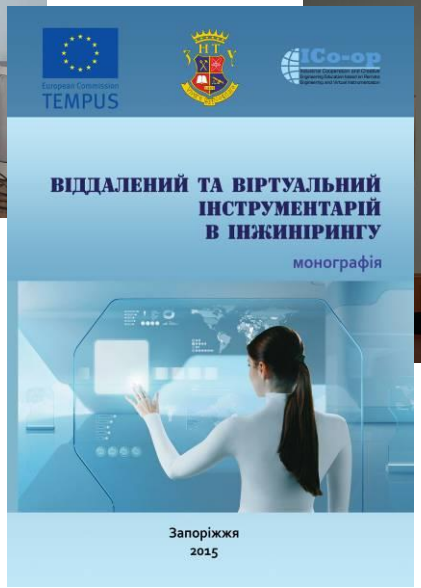


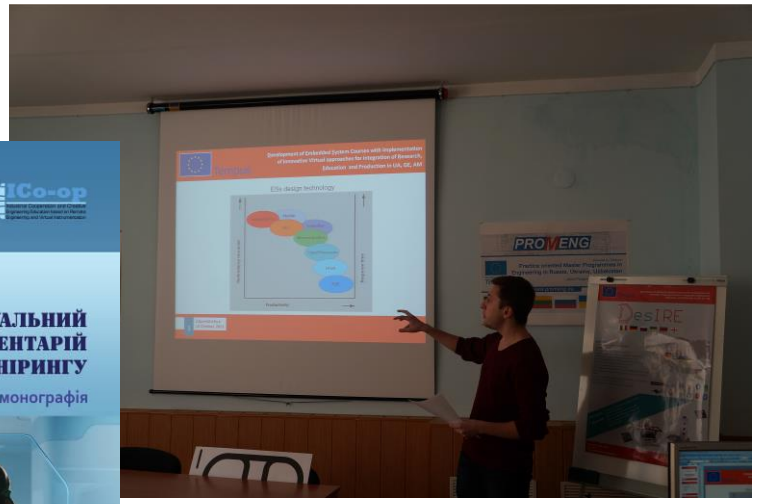
Video demonstration

Development and Application of Remote Laboratory for Design of Embedded Systems (RELDES)



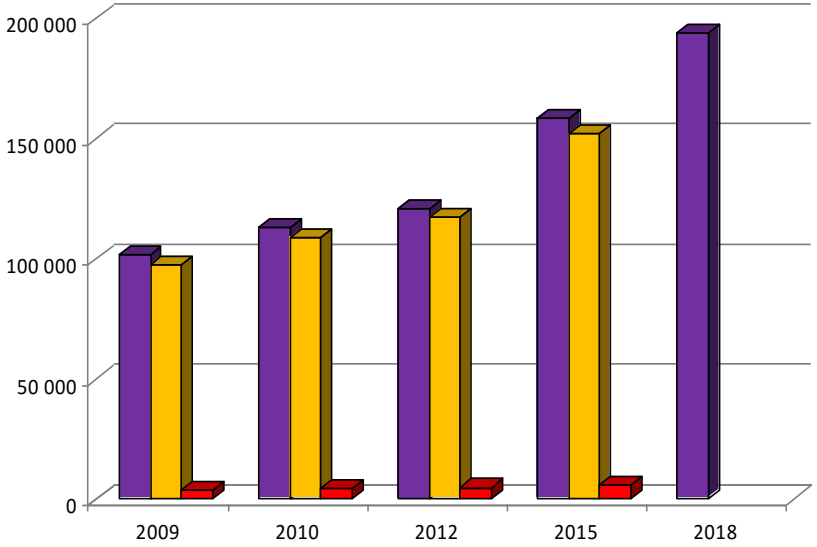
RELDES team





Presentation of RL Zaporizhzhya, October 15, 2015

ES today


200 000
150 000
100 000
50 000
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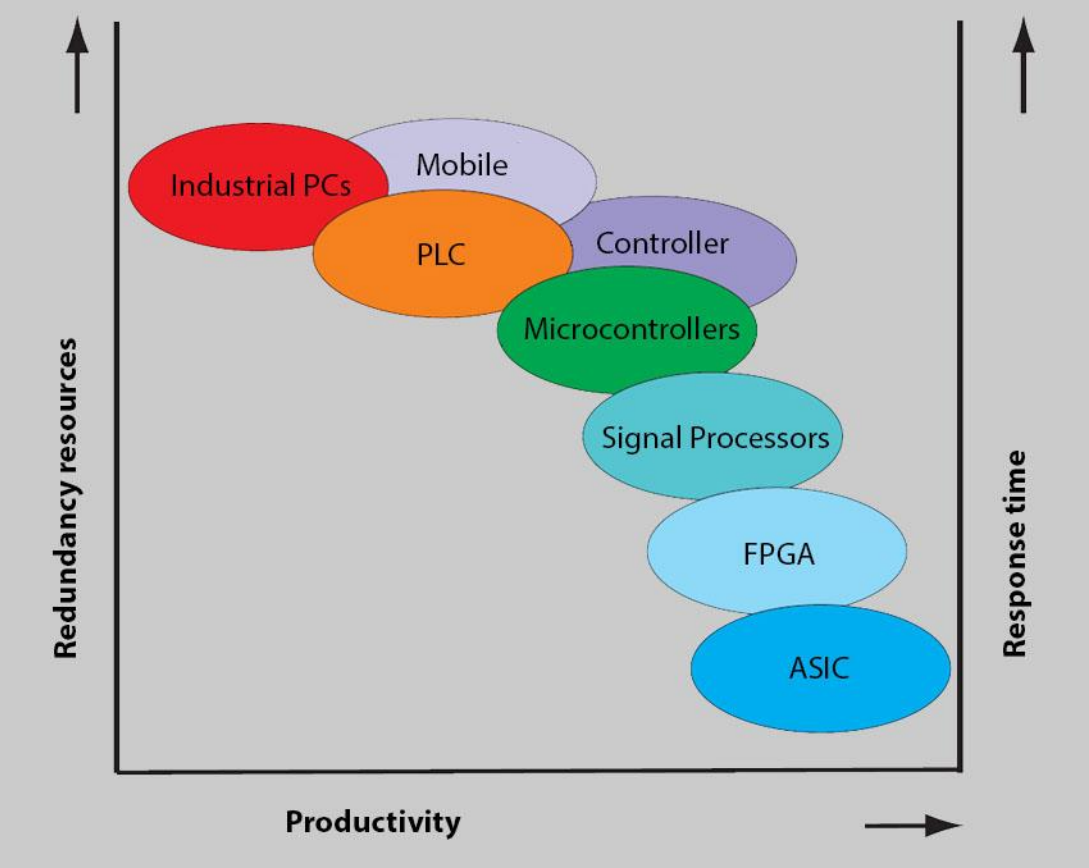
2009
2010
2012
2015
2018
Embedded System
Embedded hardware
Embedded software

ESs design technologies



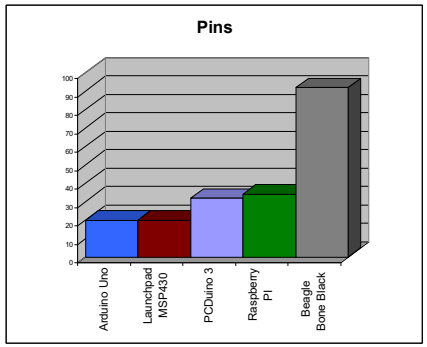
Platunov A.E, 2012

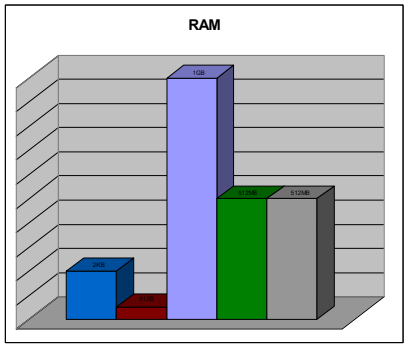
Hardware/software platforms for ES design

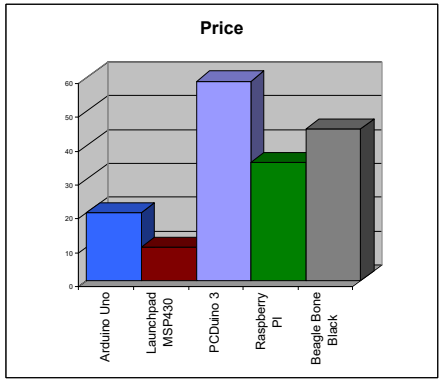
Launchpad MSP430

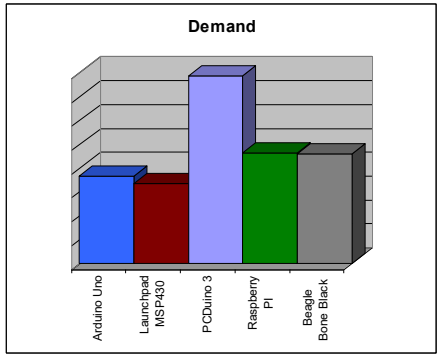
Freeduino

Raspberry Pi







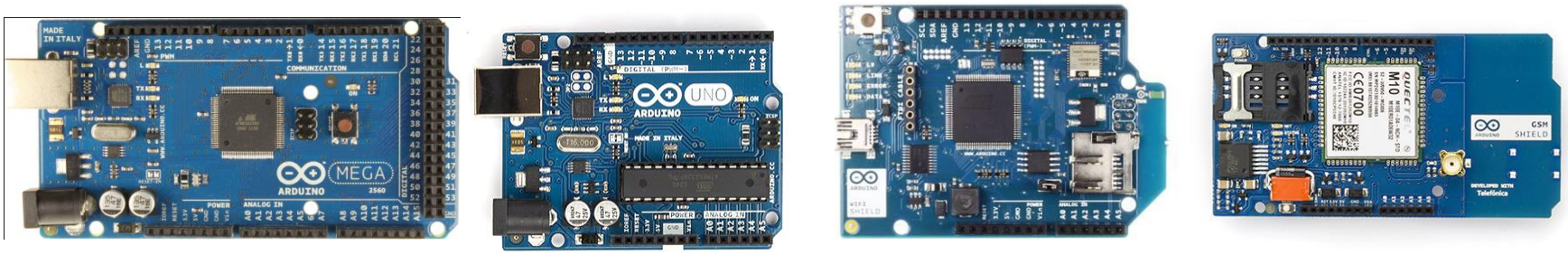


Beagle Bone Black

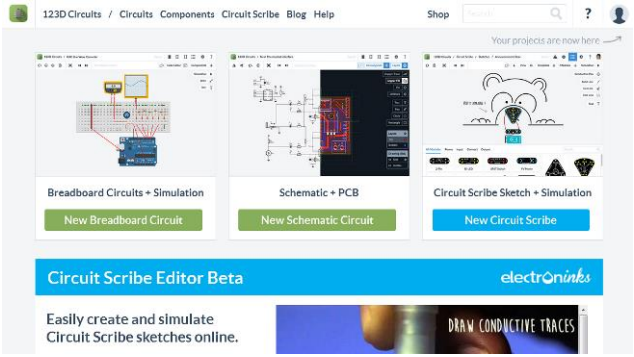
Arduino

Altera Cyclone

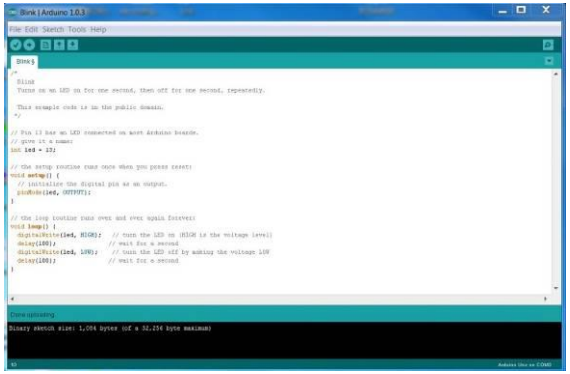
Hardware/software platform Arduino



Arduino boards and shilds



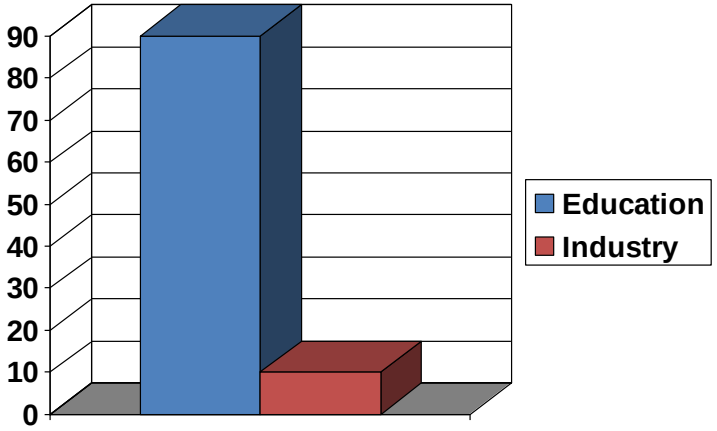
Arduino simulator

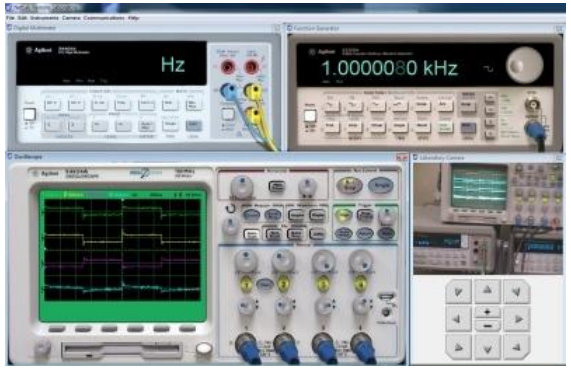


Arduino IDE

Applications of remote laboratories

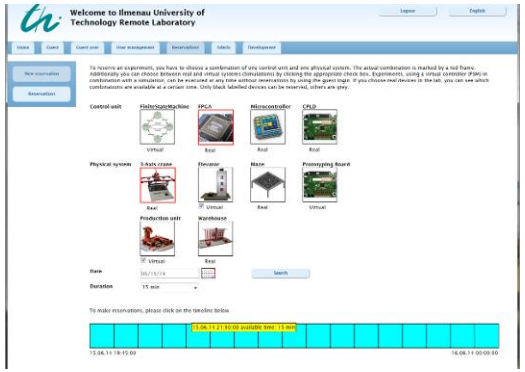
- Electronics
- Robotics
- Physics
- Chemistry
- Biology
- Earth Science
- etc..

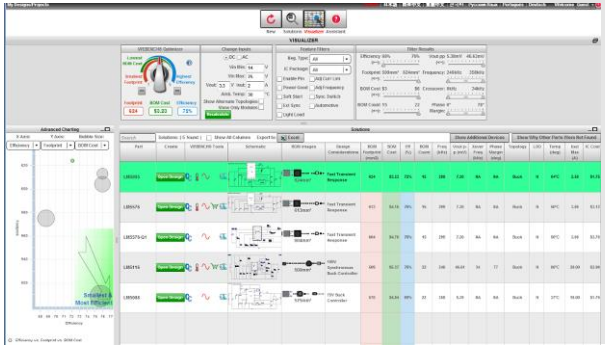


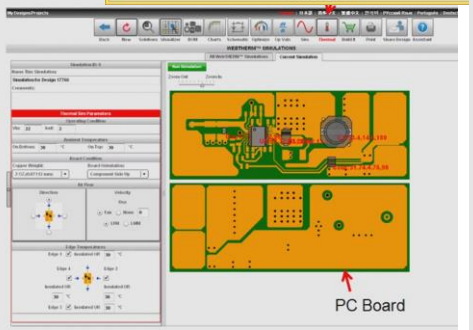


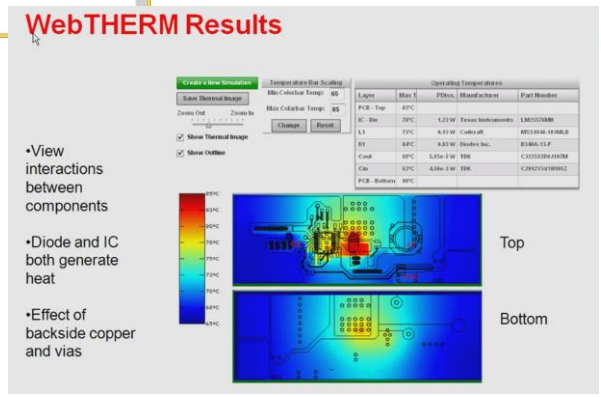
Remote laboratories in the fields of electronics

- GOLDI
- DEUSTO
- WEBENCH ® Design Center
- Intel Remote.Lab
- iLabs

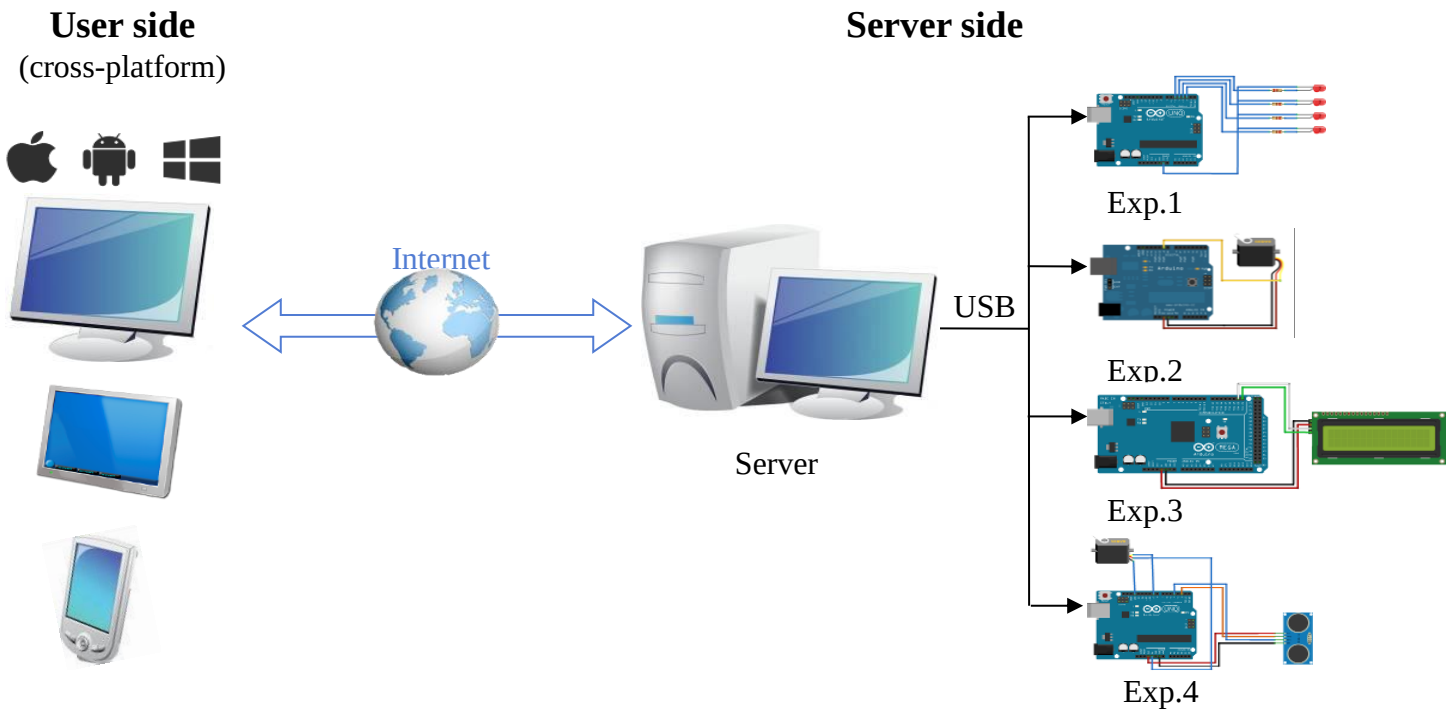




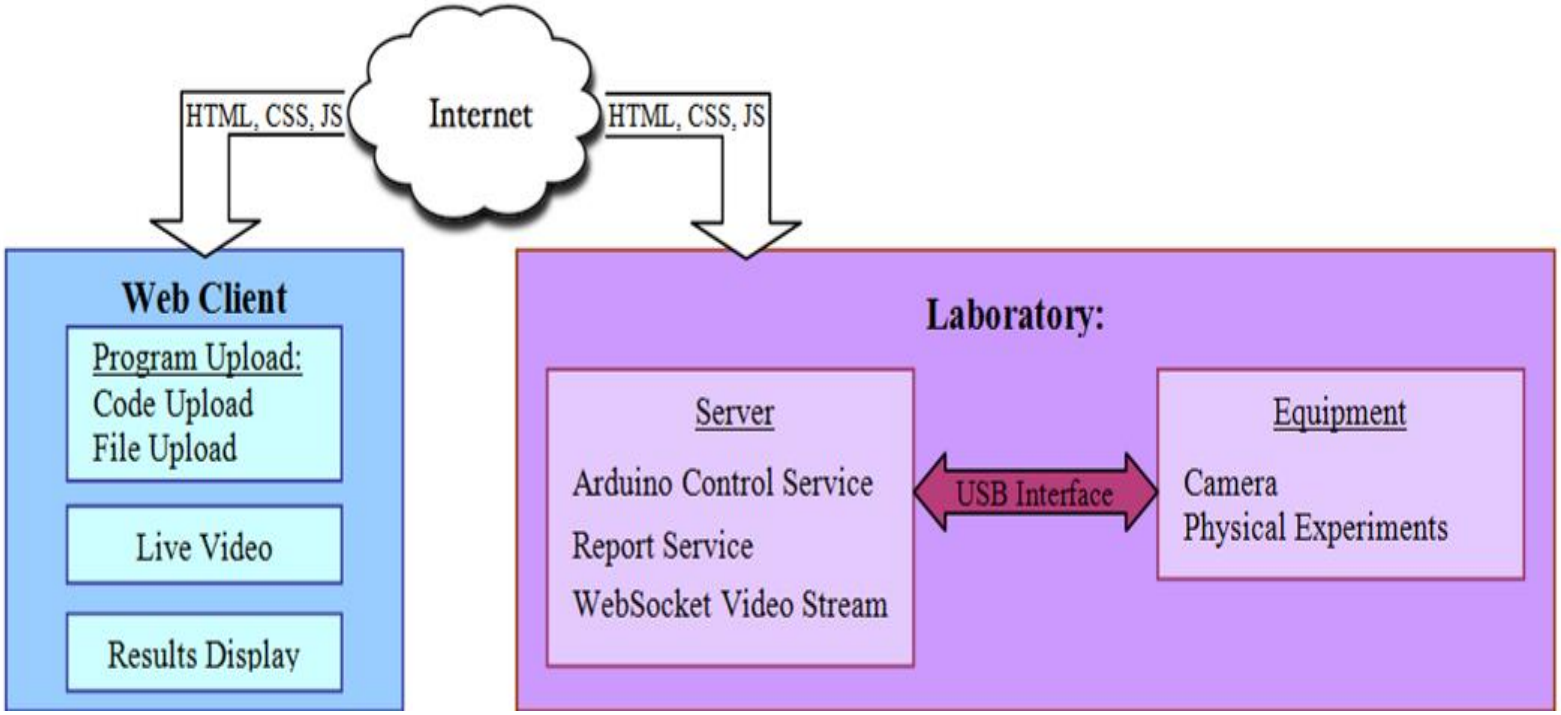




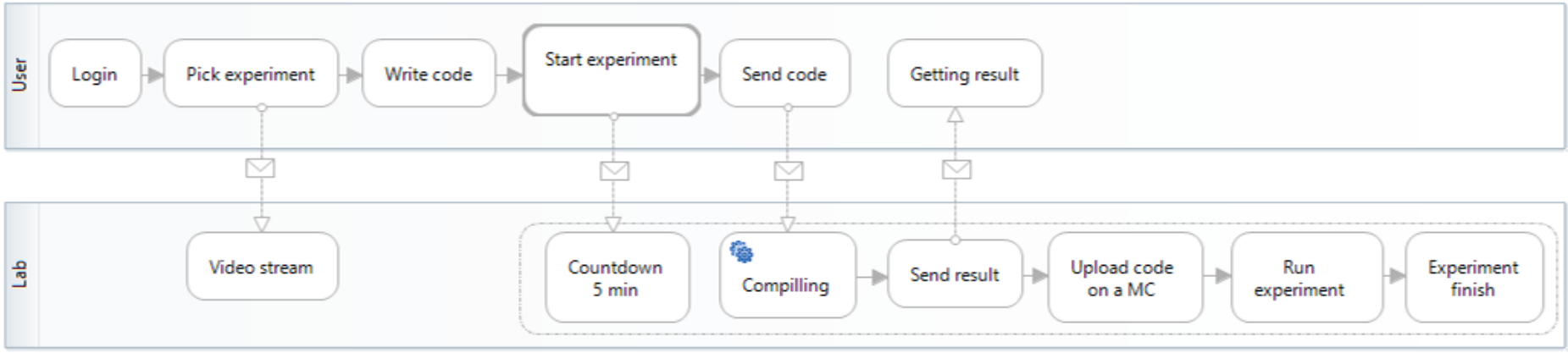
RELDES Hardware architecture



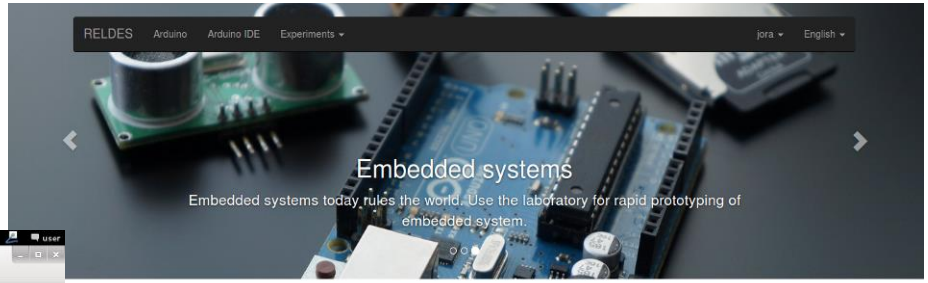
RELDES Software architecture

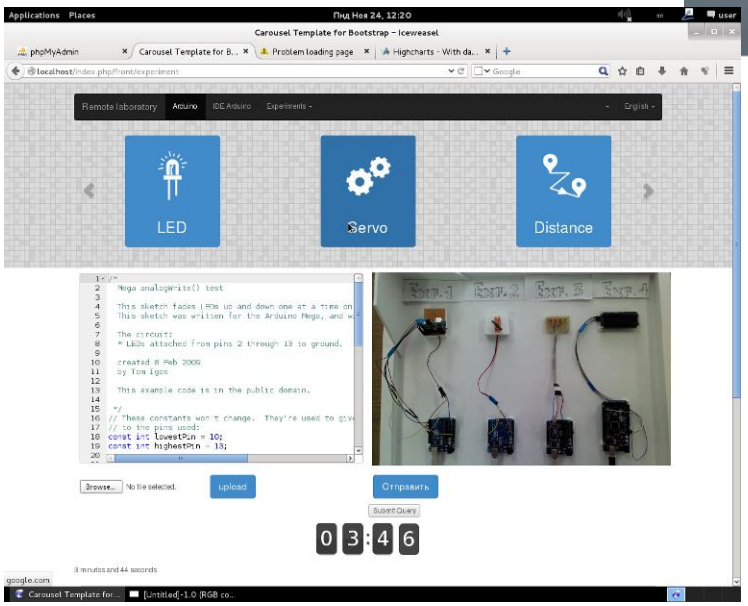


Laboratory process diagram



RELDES interface





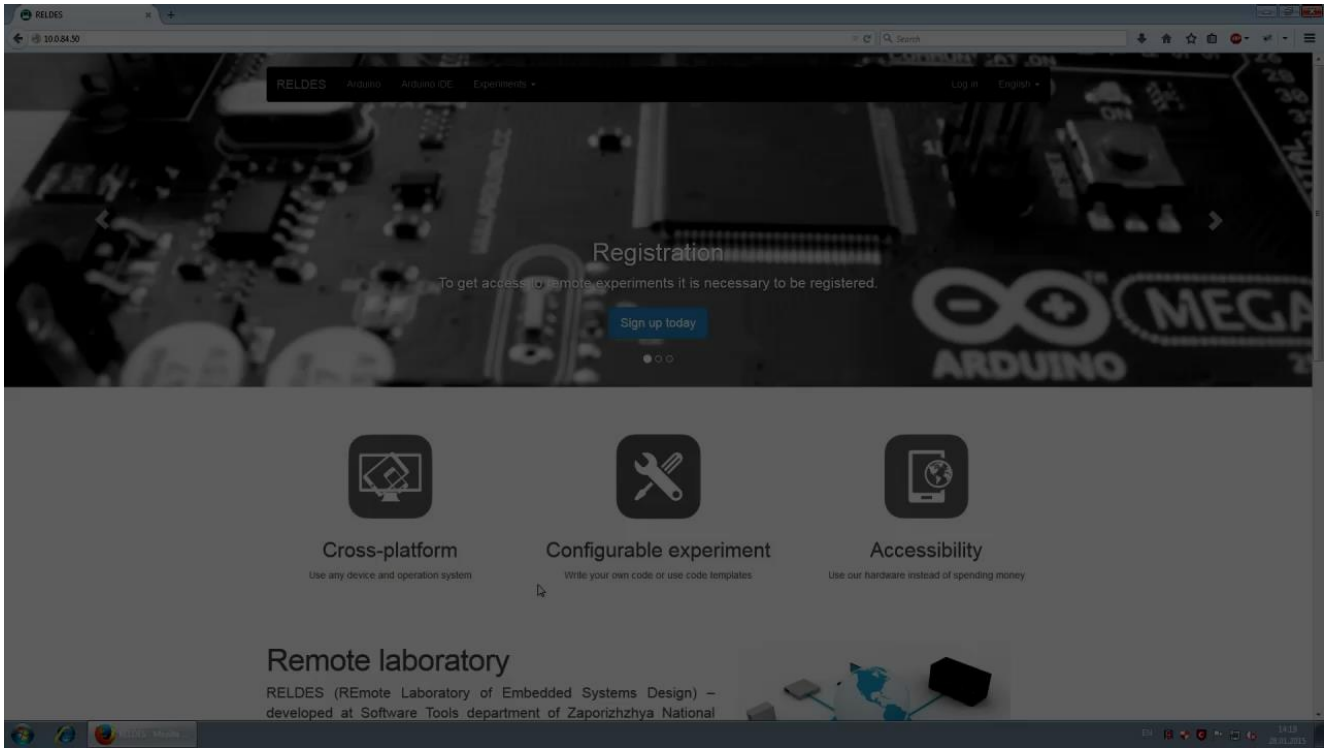
http://youtu.be/u2anq--UYFg

Work in progress

Future work will be focused on :

- expanding the range of provided hardware-software platforms;
- adding the set of experiments for solution of different tasks of embedded systems of mobile objects control design;
- development of special mechanism of lab reservation;
- creation of statistical data processing module for control of laboratory using.

Video demonstration

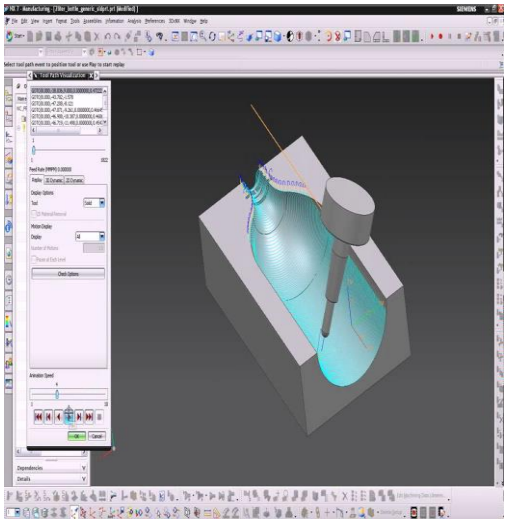


CNC machine

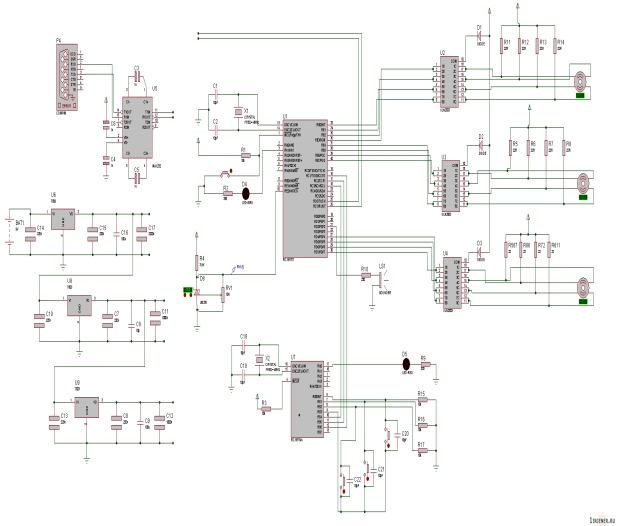
for training students

Presentation of project
Zaporizhzhya,
October 15, 2015

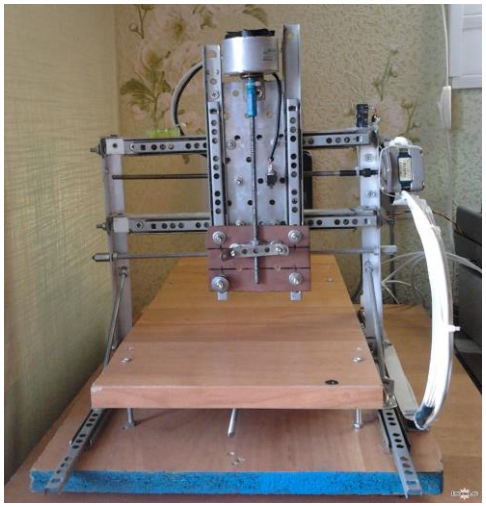
Project Overview



CREO 2.0

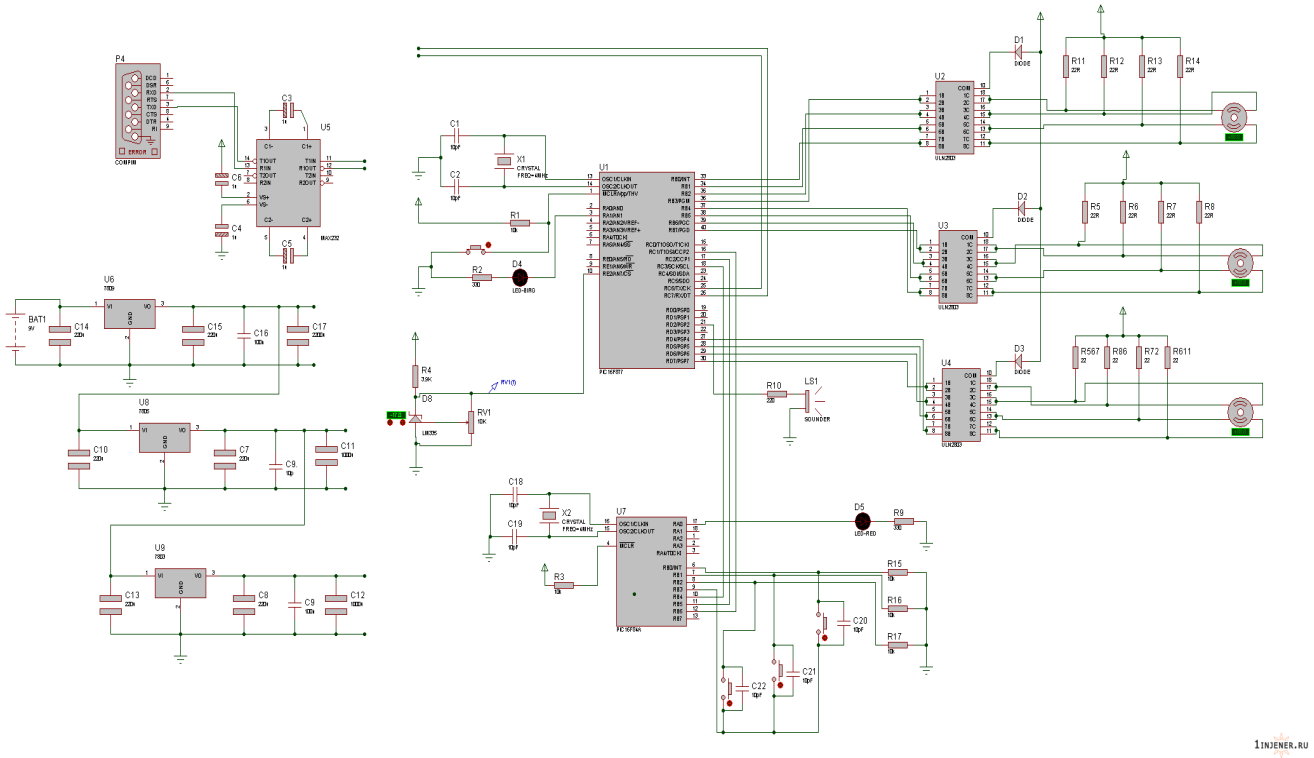


Embedded Control System



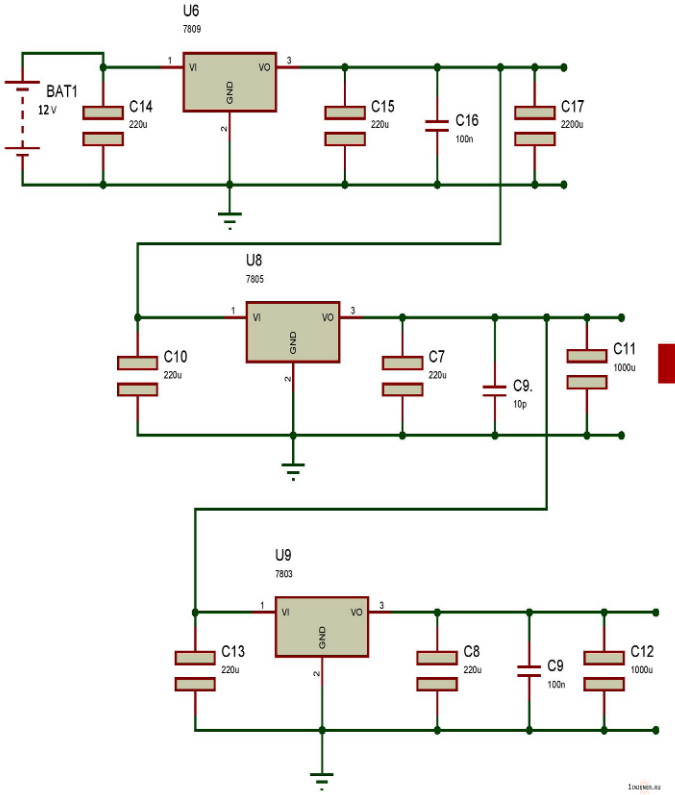
CNC Machine

CNC Machine Control Unit



1. Power supply module
2. Commands transformation module
3. Motor control driver
4. Sensor control module

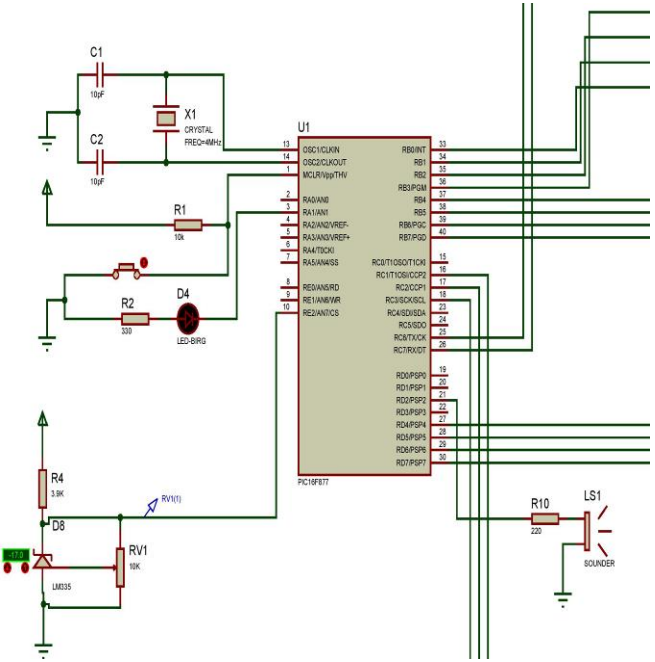
CNC Machine Control Unit

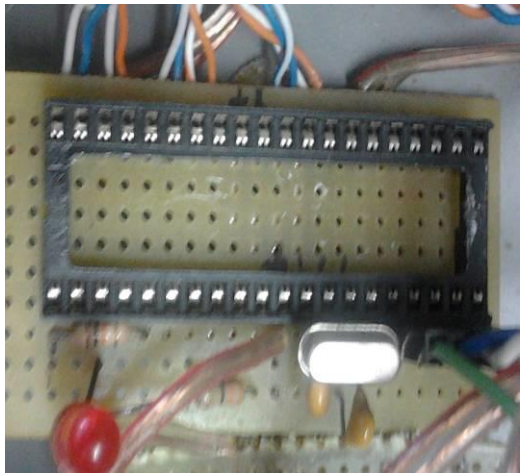


1. **Power supply module**
2. Commands transformation module
3. Motor control driver
4. Sensor control module

The main components: LM7805, LM7809, LM78033

CNC Machine Control Unit

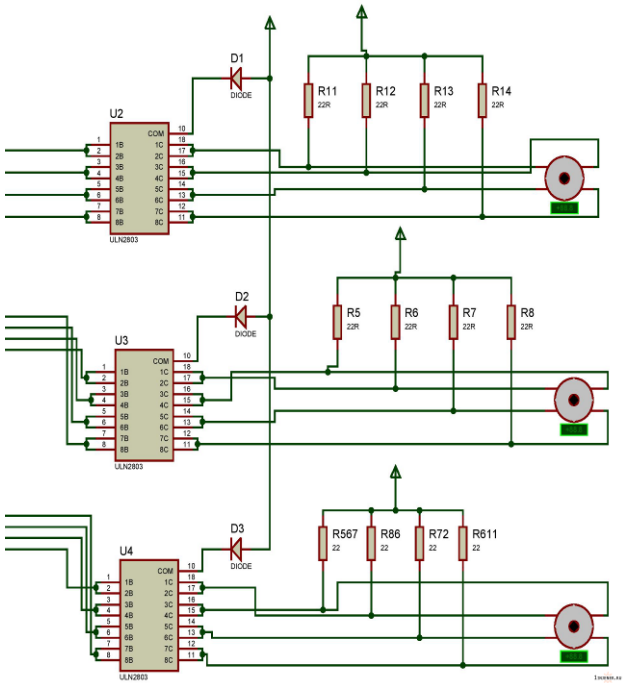


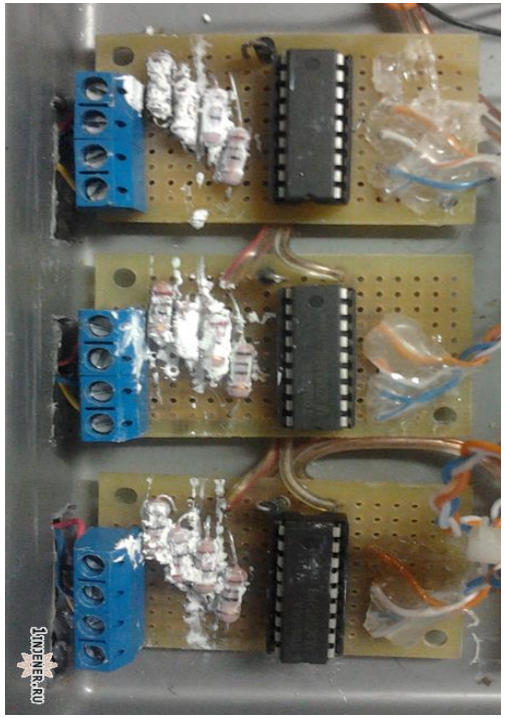


1. Power supply module
2. Commands transformation module
3. Motor control driver
4. Sensor control module

The main components : PIC16f877a

CNC Machine Control Unit

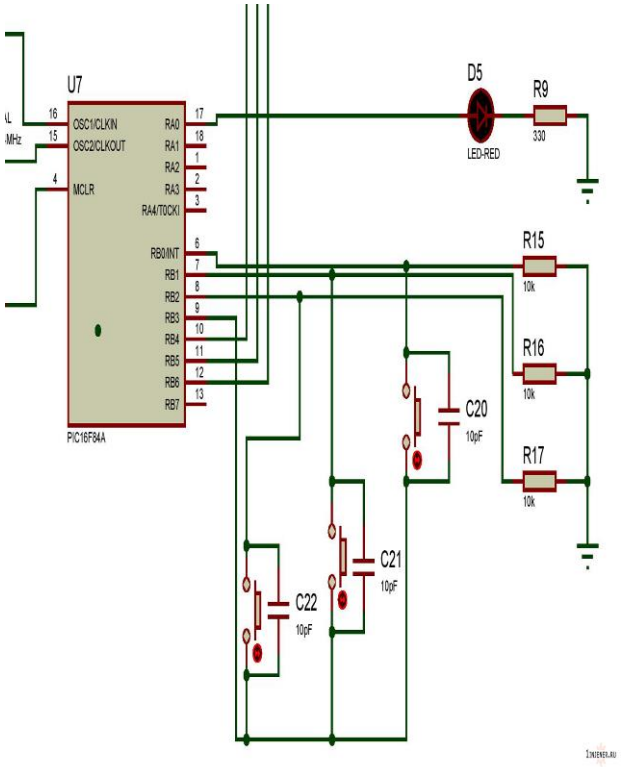


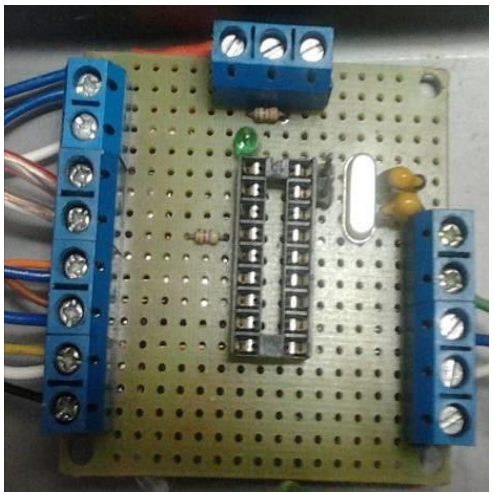


1. Power supply module
2. Commands transformation module
3. Motor control driver
4. Sensor control module

The main components : ULN2804a

CNC Machine Control Unit

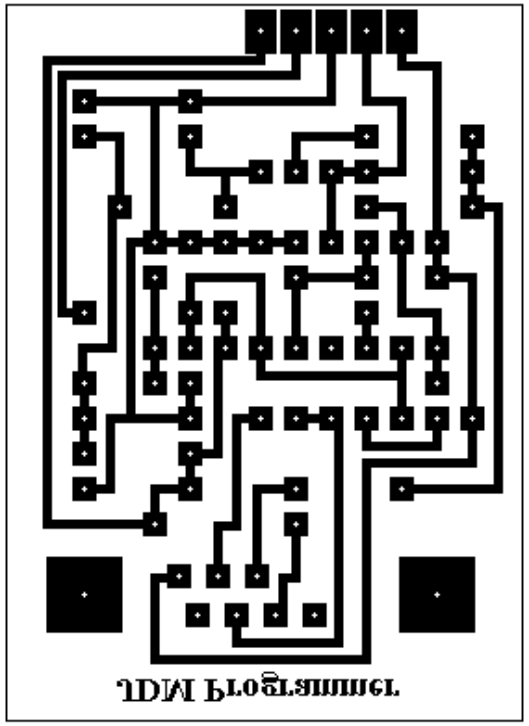


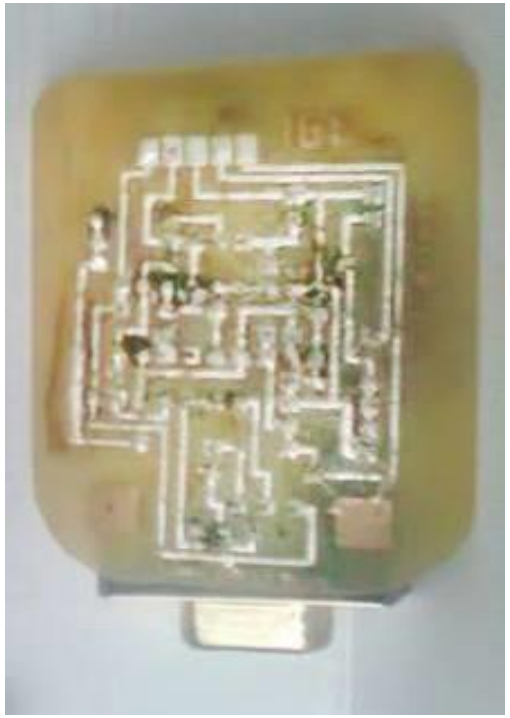


1. Power supply module
2. Commands transformation module
3. Motor control driver
4. Sensor control module

The main components : PIC16F84a

CNC Machine Control Unit

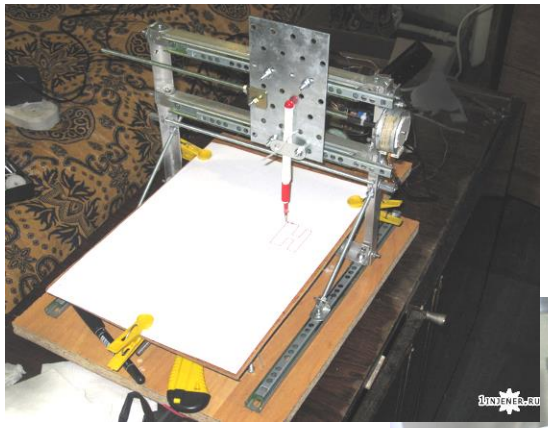


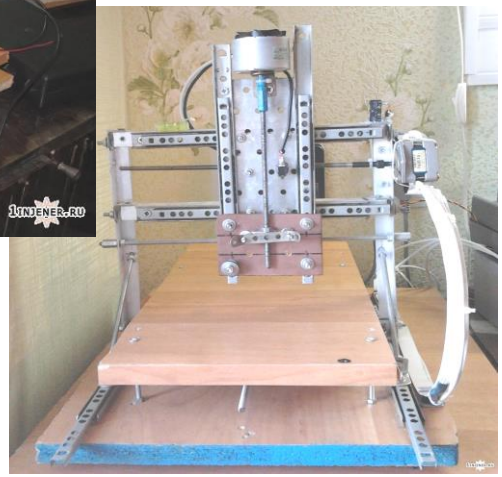


Programing of

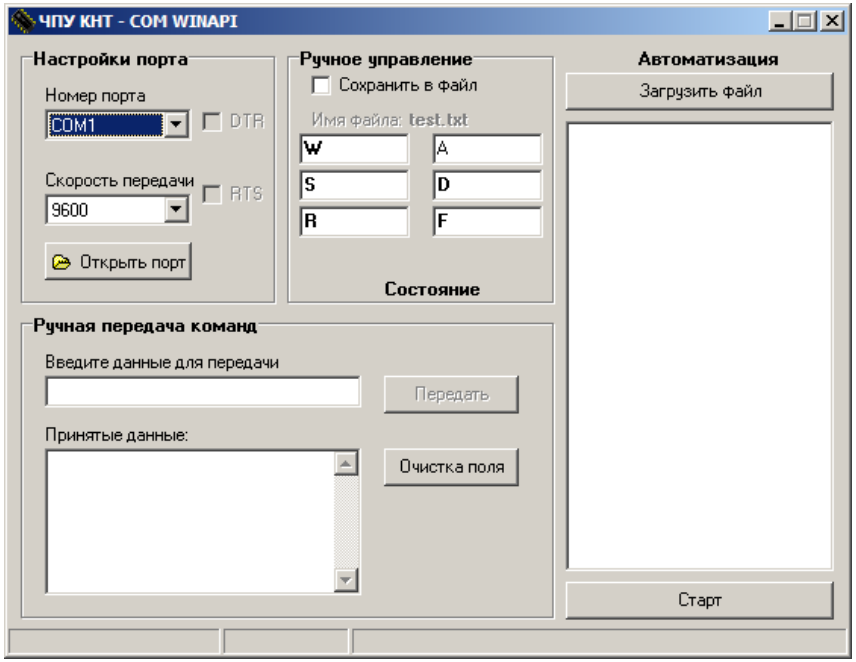
PIC12C509A,
PIC16F84,
PIC16F84A,
PIC16F628A
PIC16F877A

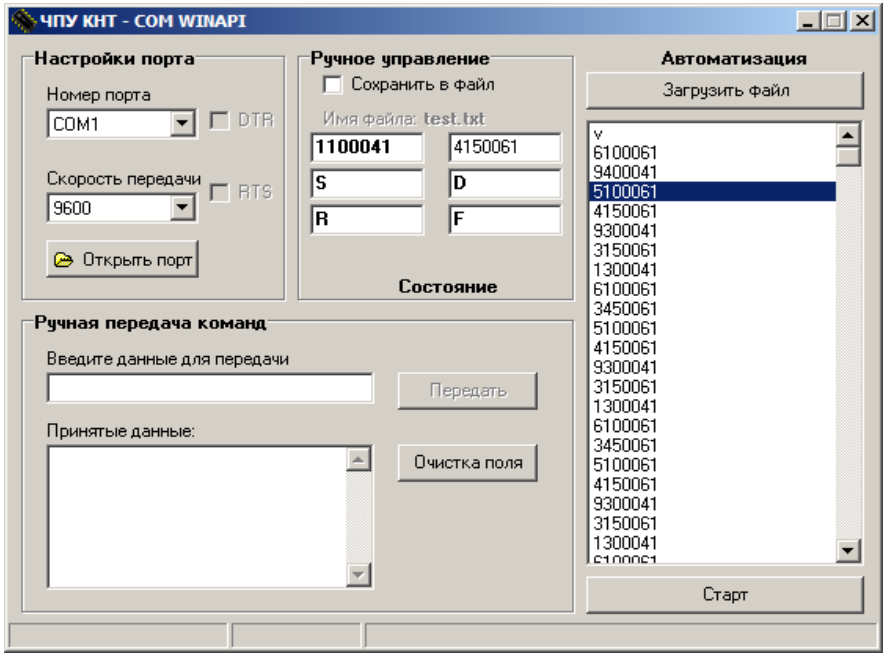
CNC Machine hardware design



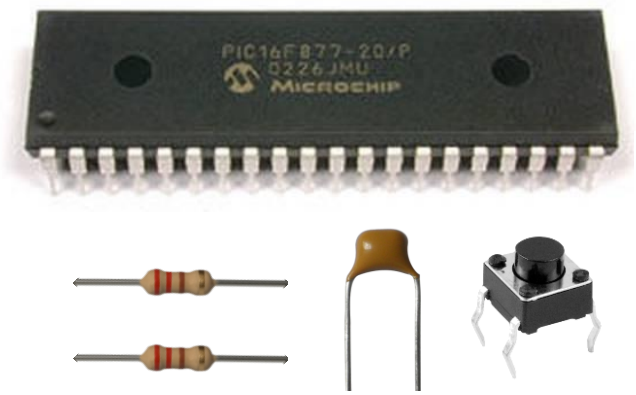


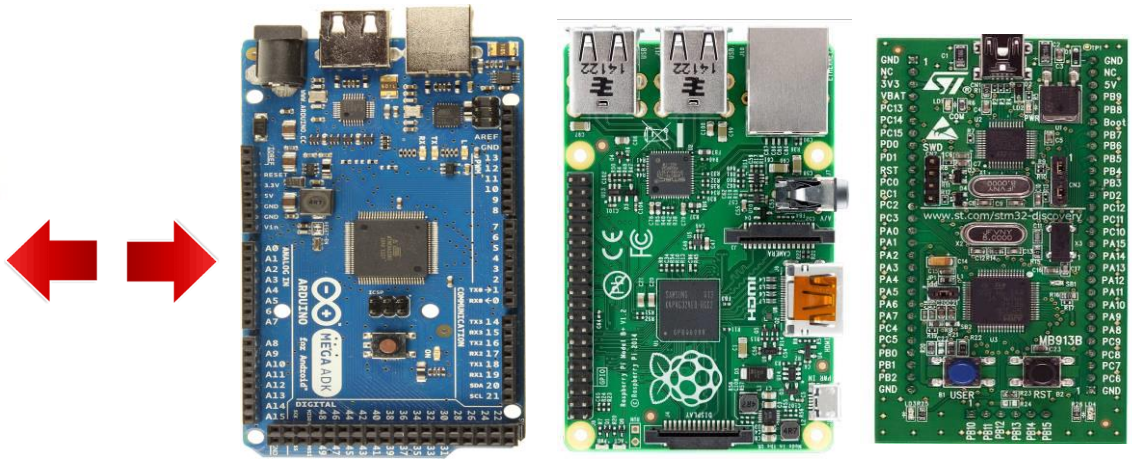
The Test Program





Work in progress





PIC16FXXX

Arduino

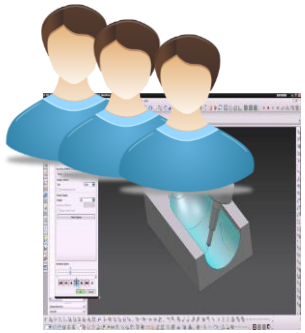
Raspbery Pi

STM32

Cheaper, but less quality and functionality

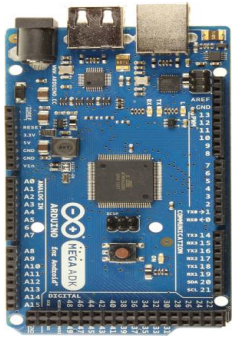
Expensive, but high quality, more functionality

Work in progress

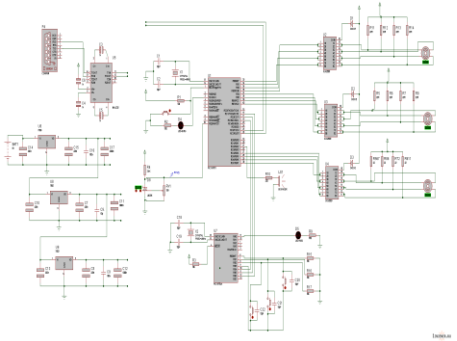


CAD

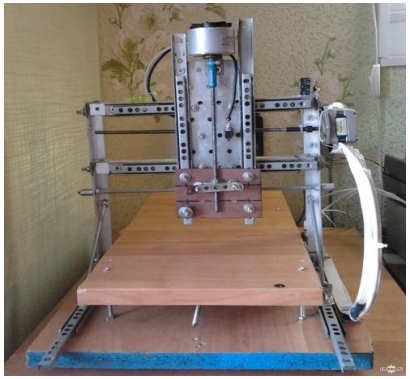
Limiting commands of control



Arduino

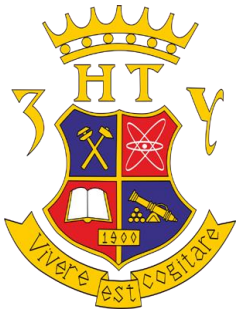


Control Unit



Hardware

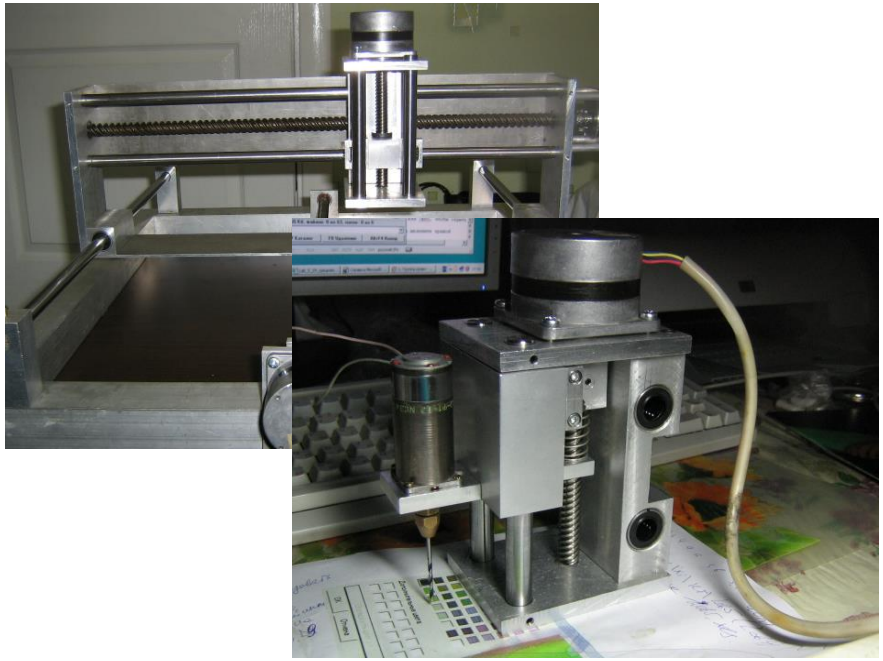
Video demonstration

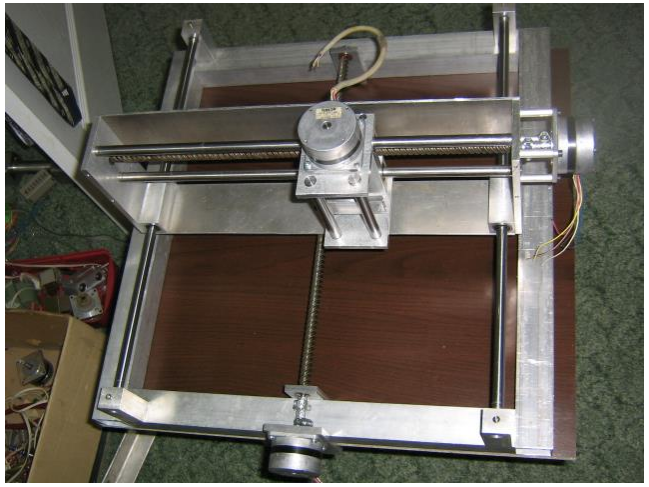


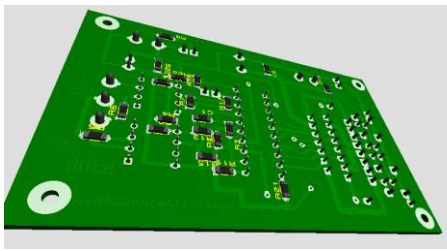
https://youtu.be/aDHGX-FLe_o

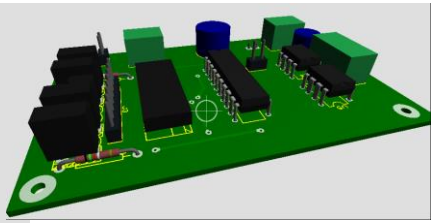
CNC machine

Donbass State Engineering Academy (DSEA)
Kramatorsk, Ukraine

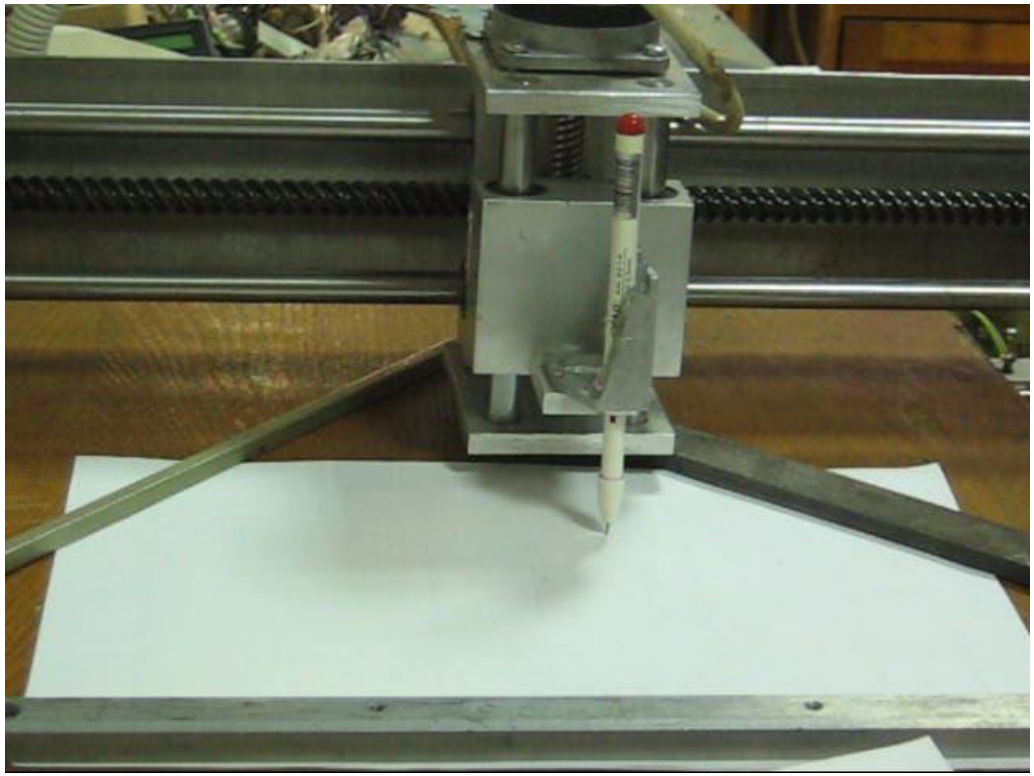




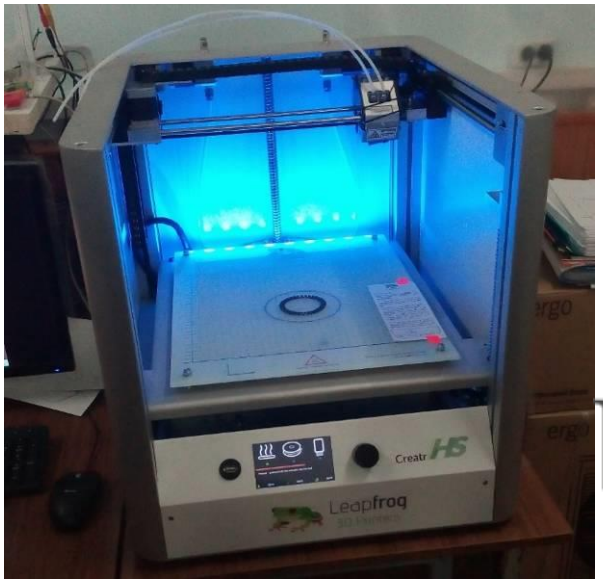




Video demonstration



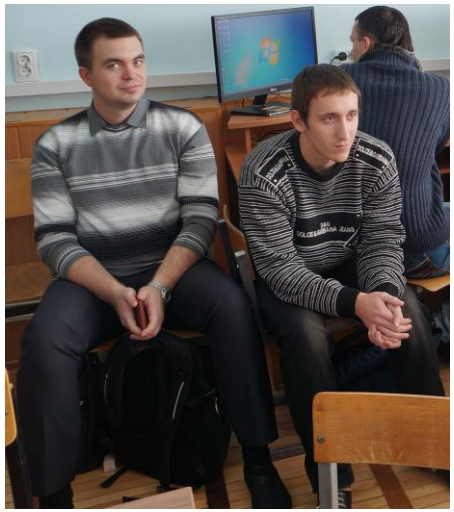
Modern tools for design and prototyping



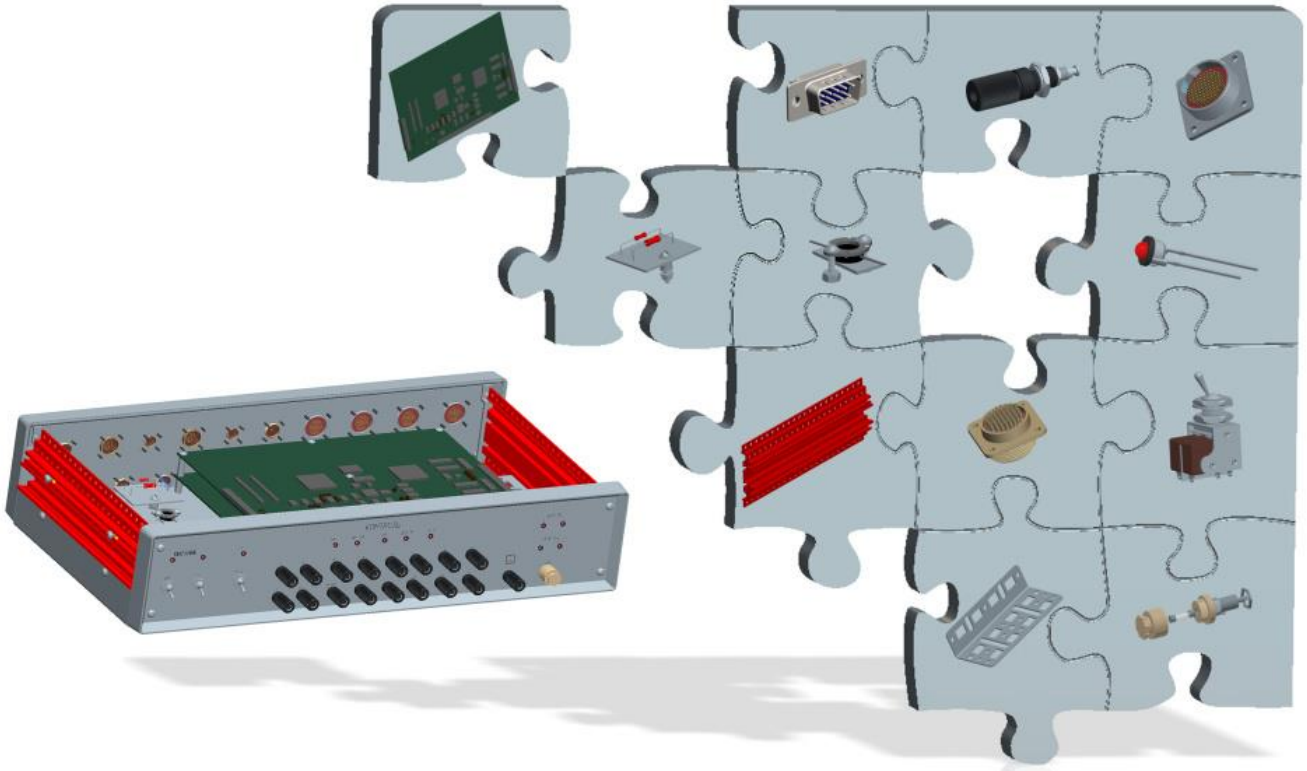
3D printer Leapfrog Creatr HS

PTC® PRODUCT & SERVICE ADVANTAGE®

3D scanner Gotcha

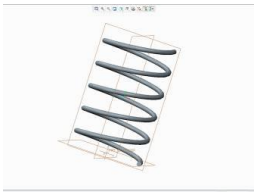


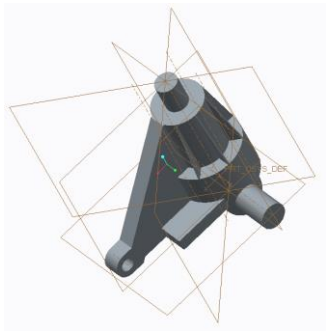
Student integrated project in Creo Elements/Pro 5.0

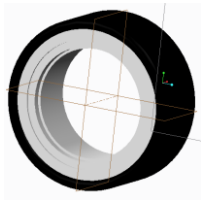
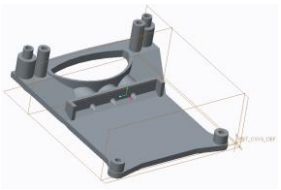
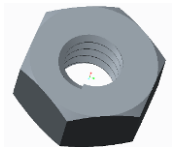
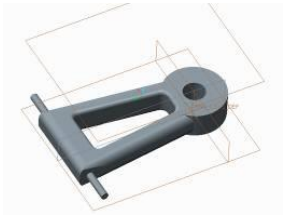


CREO virtual model of car body

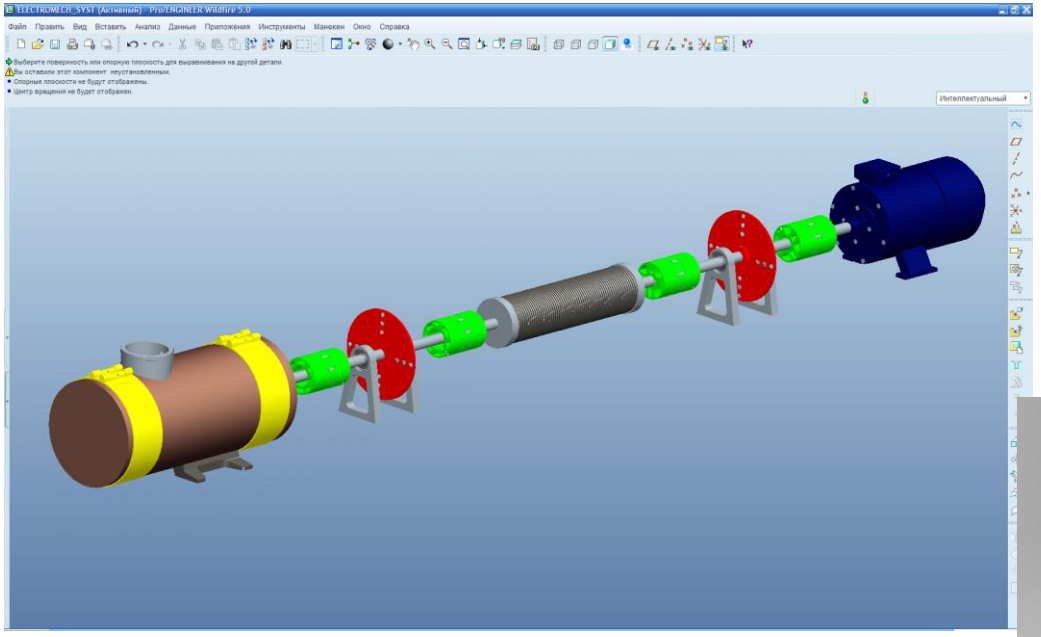


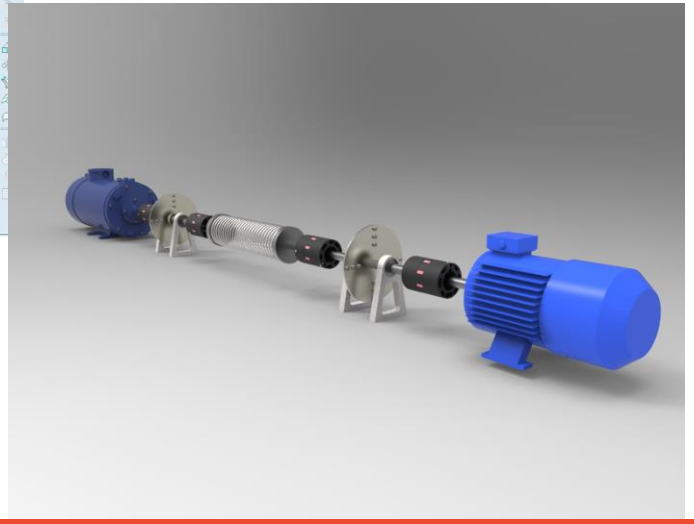




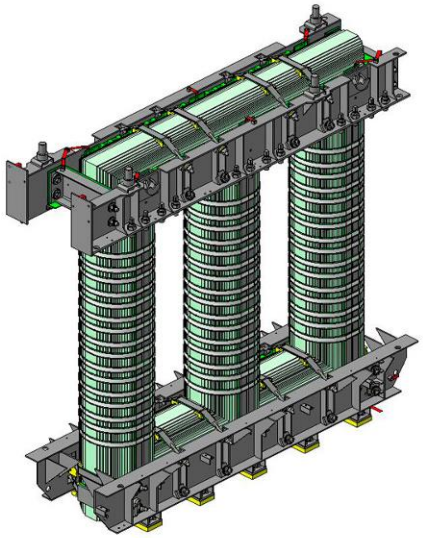





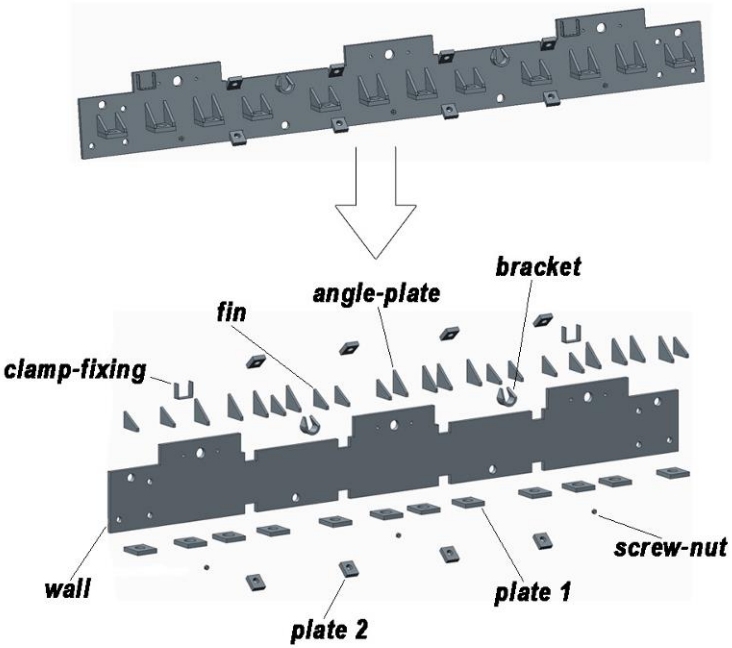

CREO virtual model of electromechanical system



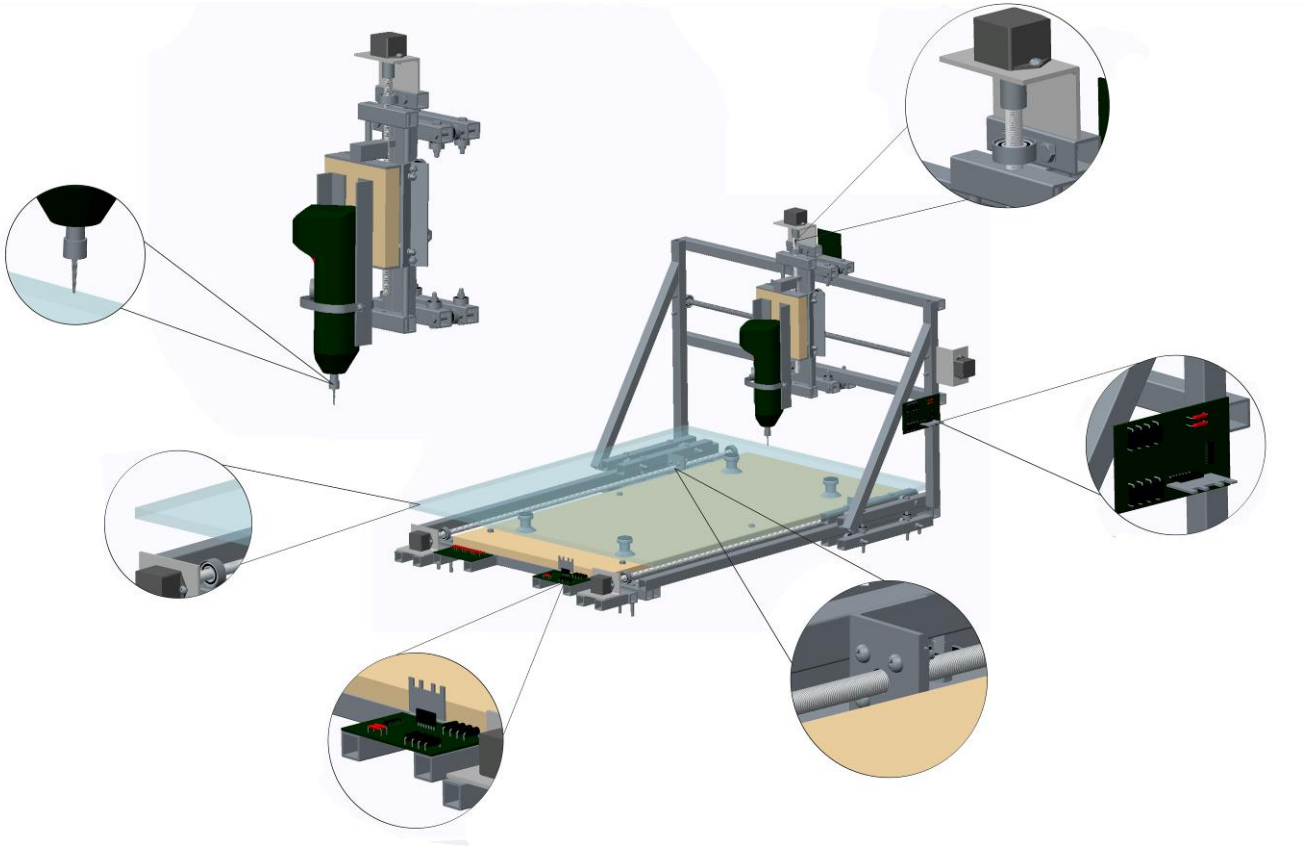


Design of 3D model of transformer beam in Creo 2.0

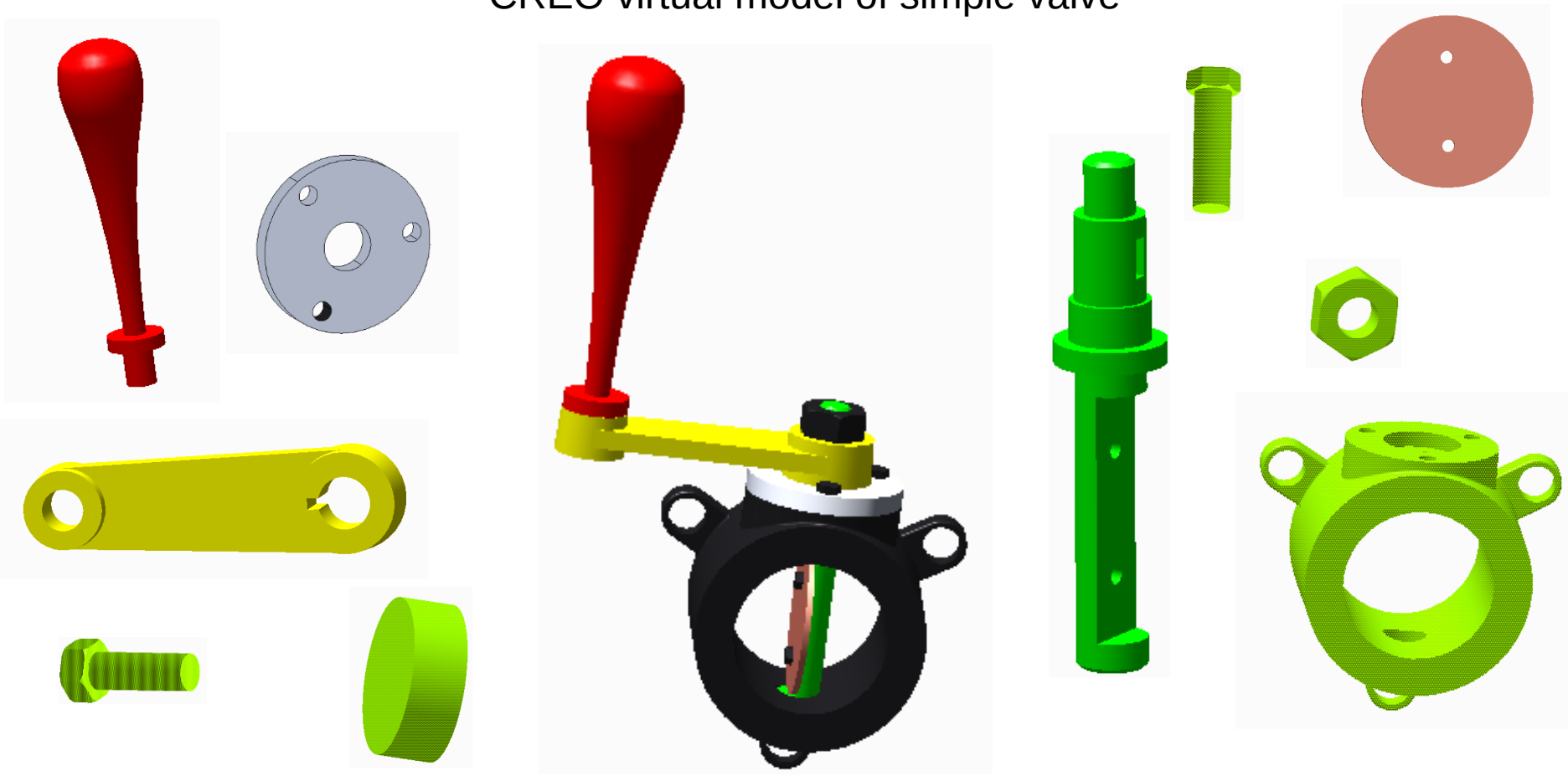




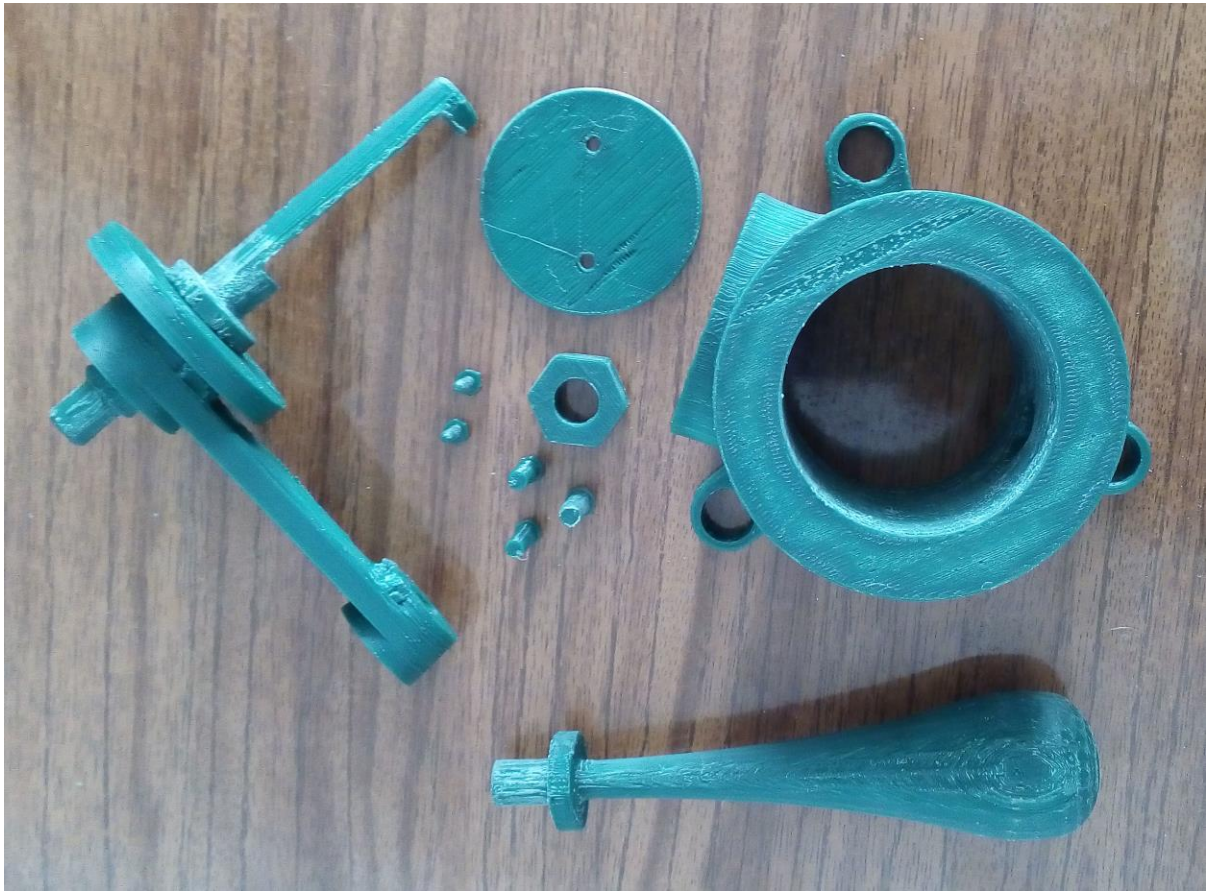
CREO virtual model of CNC machine

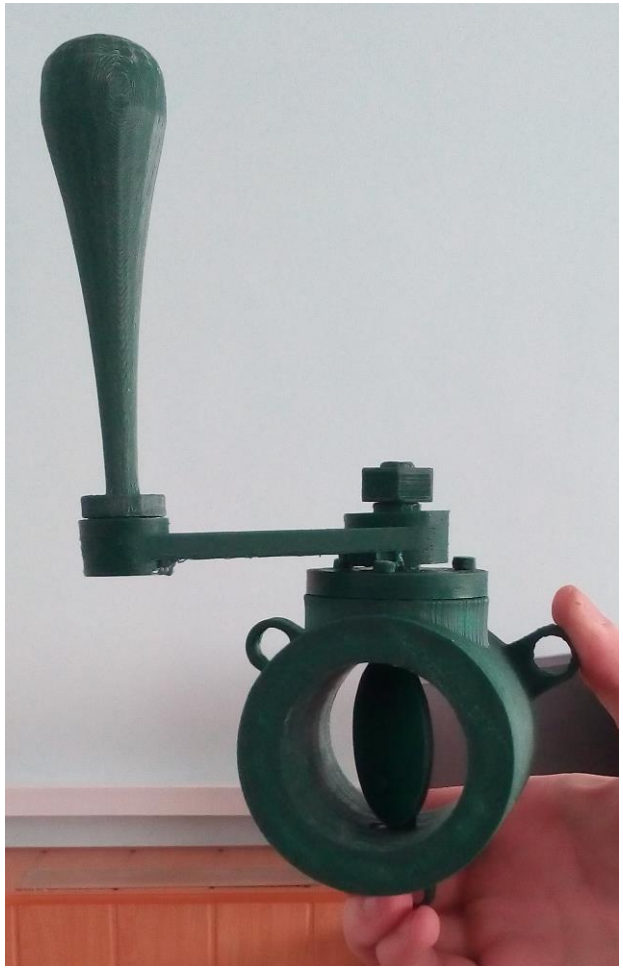


CREO virtual model of simple valve

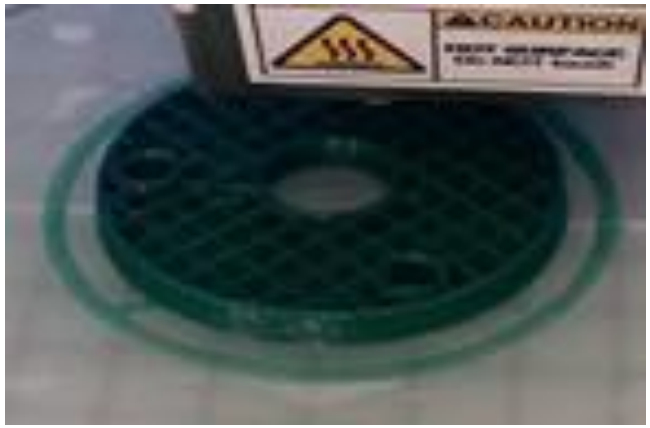


Printed real valve prototype

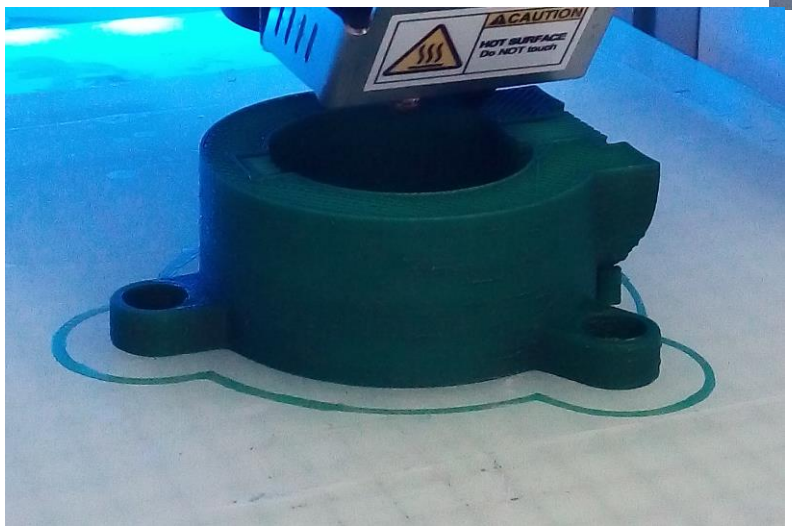


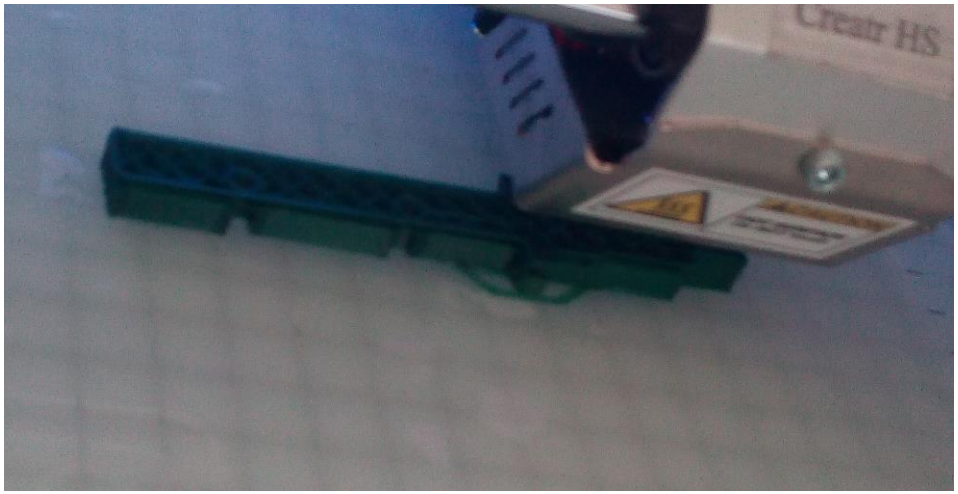


3D printing


CAUTION

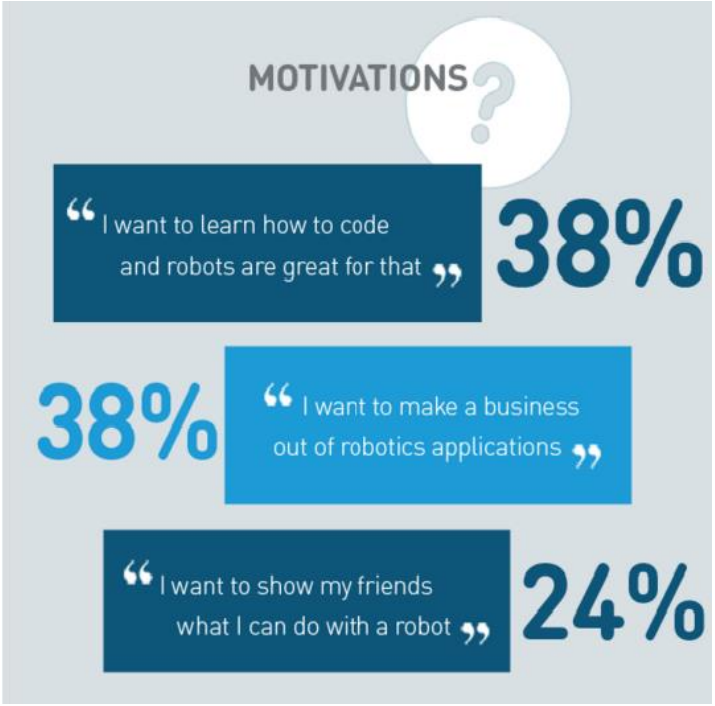

CAUTION
NOT SURFACE
Do NOT touch

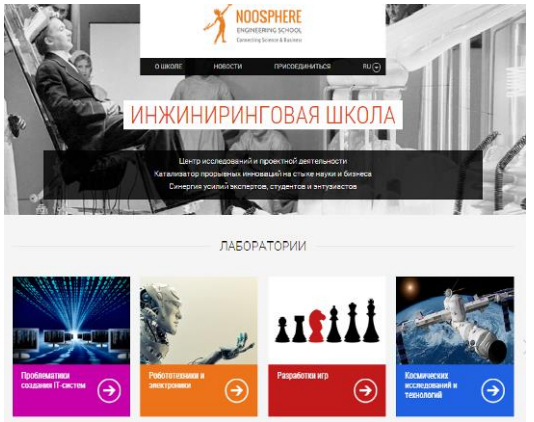

CAUTION
NOT SURFACE
Do NOT touch



Video demonstration

We are open for new projects





https://community.aldebaran.com/en/developerprogram

THANK YOU FOR YOUR ATTENTION!

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(Anzhelika Parkhomenko)

URL:
http://zntu.edu.ua/