



Installation of the Interfaculty Technology & Product Design Labs at GTU within ENGITEC and other ongoing TEMPUS Projects

For the purpose of enhancement of engineering education, that today has to contain different knowledge in various fields of engineering activities, it is essential to provide newly developed educational curricula and syllabuses with appropriate labs consisting modern educational devices and technique. Therefore established Interfaculty Technology and Product Design Labs are considered for different educational programs. Since such labs are extremely important for GTU educational and research activities they are established within various projects as well including Tempus projects ENGITEC, REGENLAW, MATHGEAR, EANET and equipped with the appropriate modern technology.

The SPA “Analizkhelsatsko” (“Analytical Instruments”), non-academic partner of the ENGITEC project from Georgia provides design and manufacturing of different analytical instruments and automated information-measurement systems, including various electrical equipment and tools thus contributing launching and effective performance of Interfaculty Technology and Product Design Labs at GTU as training platform to accomplish full circle of creative engineering from idea to prototype.

For example, tools produced by the “Analizkhelsatsko”:

- Conductivity meter CEL-1M2 for measuring the specific electrical conductivity of any solutions;
- Apparatus for local renal hypothermia. Would be used in surgical urology;
- Ion meter for measuring of different ions of oxidation-reduction potentials in various solutions;
- PH –meter for measurements of hydrogen ions and oxidation-reduction potentials in water solutions. Would be used in field conditions.

Herewith, in order to study Mechatronic systems the Transportation and mechanical engineering faculty together with faculty of Informatics and Control Systems elaborated and developed BCs, MSc and PhD the interdisciplinary educational curricula in Mechatronics. The interfaculty technology and production design lab is intending to be established within ENGITEC, which will be equipped with appropriate devices including controllable hydraulic, electrical and pneumatic actuators as well the production line with robot and others. The mentioned lab is intended to use not only for education BCs, MSc and PhD students but also for the vocational education.



The water purification device

Especially can be distinguished some labs at Power Engineering and Telecommunications, Civil Engineering, Informatics and Control Systems, Business Engineering, Mining and Geology faculties.

For example, at GTU Power Engineering and Telecommunications Faculty was established the “Energy and Environmental Law Consultancy Bureau”.
<http://www.eelcb.com/index.php/en/>

Bureau Activities include GTU Power Energy and Telecommunication Faculty academic staff cooperation with European universities:

- Shearing the experience in the field of European standards;
- Elaboration of market economy relevant educational agenda and programs;
- Create modern literature;
- Teaching skills training;
- Exchange of students;
- Improvement of faculty governance;
- Using and development of new technologies;
- Support staff training of the faculty.

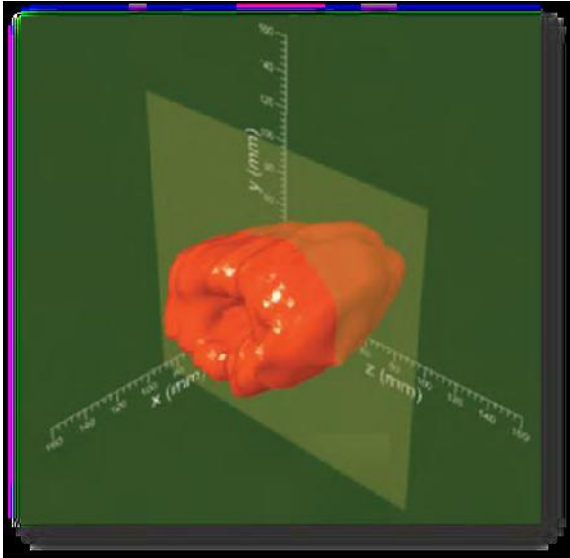
Implementation of joint projects and structural measures:

- Improve management of higher education institutions or academic programs;
- Increase the quality of the higher education system and their convergence with EU developments;
- Exchange of economic information and data with European universities in the scientific, educational and technical fields.

At the faculty of Informatics and Control Systems was established **Earth’s Field NMR Laboratory** equipped with Teranova earth’s field NMR apparatus designed for teaching and

research. System comprises the spectrometer, coil probe, phantom samples, Prospa NMR software:

- FID, spin echo, T1,T2 and PGSE experiments.
- 1D, 2D, 3D imaging experiments
- Three imaging gradient coils for 3D MR imaging
- A fourth gradient coil for diffusion measurement
- Pulsed NMR and MRI spectrometer



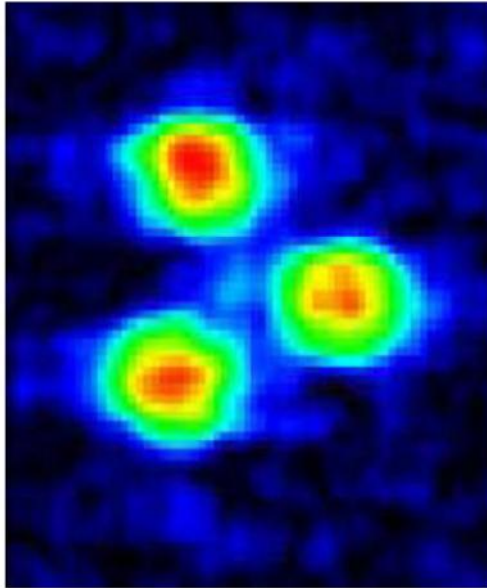
3D spin-echo MRI of a red pepper acquired using Terranova-MRI

Another laboratory to be established at this faculty is so-called **SMART MRI Laboratory** enabling Georgian scientists and students to be involved in design of novel sequences (imaging methods) for quantitative magnetic imaging.

These will include mapping the relaxation parameters T1, T2, and T2* as well as the proton density, M0. Moreover, developments will be undertaken in the area of diffusion imaging both from the point of view of analysis of data and well as novel methodology. At 9.4T the design of new radiofrequency coils is also an important task; Georgian scientists and students will also gain knowledge in this area. This is particularly beneficial since only five such machines exist worldwide.

The experience gained in this project by the Georgian group in sequence design, radiofrequency hardware design and programming of novel techniques for quantitative MRI will enable them to apply their knowledge in the Georgian healthcare sector as well as in Georgian industry.

These labs are provided by the Research Centre JÜLICH (Germany) within Georgia-German Science Bridge. <http://www.fz-juelich.gtu.ge/>



3tube YZ image (32 by 32 pixels, 4 accumulation, 90 by 90 mm FOV, total imaging time 5 minutes)