Mechatronics: A New Very Promising Engineering and Science Discipline

II. Part: Mechatronics at the Budapest Tech

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- **PROFESSIONAL KNOWLEDGE IN THE SPIRIT OF TRADITION AND RENEWAL**
- **THE POSSIBILITY OF SPECIALIZATION WITHIN THE PROFESSIONAL KNOWLEDGE**
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- **THE PROFESSIONAL MODULES OF THE MSc COURSE.**
- **MECHATRONICAL TEACHING AND EVENTS AT THE BUDAPEST TECH**

INTRODUCTION - PRELIMINARIES

- **The progressive industry growing between 1995 – 2002 in Hungary made necessity to educate highly educated technicians.**

Industrial productivity in Hungary:

- **1990: industrial set-back**
- **1995: begin of dynamic growing (multinational firms - export)**

- **The history and future of the Mechatronic Course at the Budapest Tech**
  - **1987** – has been introduced the new *Teaching Plan – see next slide*
  - 1995 - Integrated (Mechanical and Electrical) Engineering BEng education
  - **1997** – starting date of the project: **Mechatronic Course** at the Budapest Tech.
  - **2005/06** – The first entrance interviews to the **BSc** Mechatronic Course at the Budapest Tech
  - **2008/09** - The first entrance interviews to the **MSc** Mechatronic Course at the Budapest Tech

- The **project leader** of the Mechatronic Course at the *BGK*: → Dr. Attlia L. Bencsik

CHARACTERIZATION OF THE COURSE OF MECHATRONICS - 1:

1987 – *New Curiculum*: *Basics of Mechatronics* – integration of: Electrical-, Mechanical-, IT-, and Control Engineering.

1995 - Integrated (Mechanical and Electrical) Engineering BEng education

1997 - Project: Mechatronic Course at the Budapest Tech.

2005/06 - BSc Mechatronic Course at the Budapest Tech

2008/09 - MSc Mechatronic Course at the Budapest Tech

The **4 mai**n areas, and the credit points assigned to the individual areas:

1- Knowledge in Natural Sciences

(23 credits) - see next

2- Financial & Human Knowledge

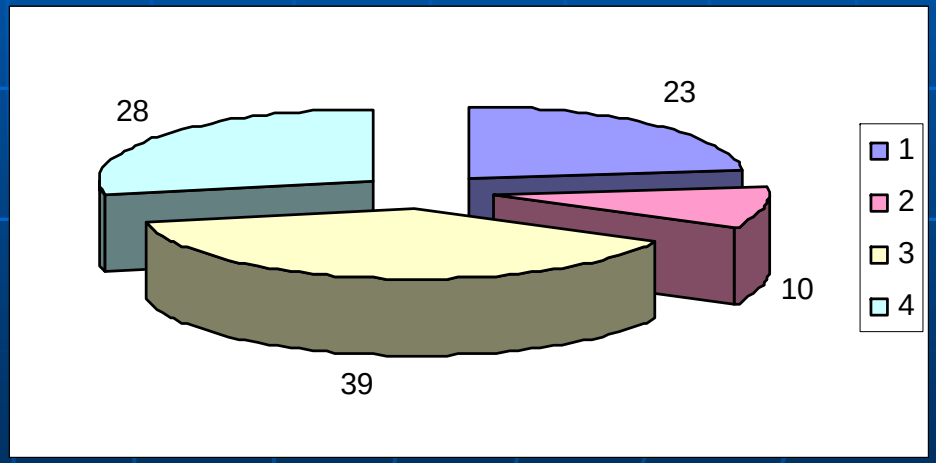
(10 credits) – see later

3- Professional basic material

(39 credits) – see next

4- Specialized professional knowledge

(28 credits) – see later



CHARACTERIZATION OF THE COURSE OF MECHATRONICS - 2:

Natural Sciences:

- Mathematics
- Introduction into Mechatronics
- Electrotechnics
- Physics for Engineering

Professional Basics:

- Basic of Informatics (BGK)
- Analog & Digital Circuits (BGK,KVK)
- Control Engineering (BGK)
- Pneumatics & Hydraulics (BGK)
- Thermo and Fluid-dynamical Engines (BGK)
- Electronics (KVK)
- Precision-engineering (KVK)
- Interfaces (KVK)

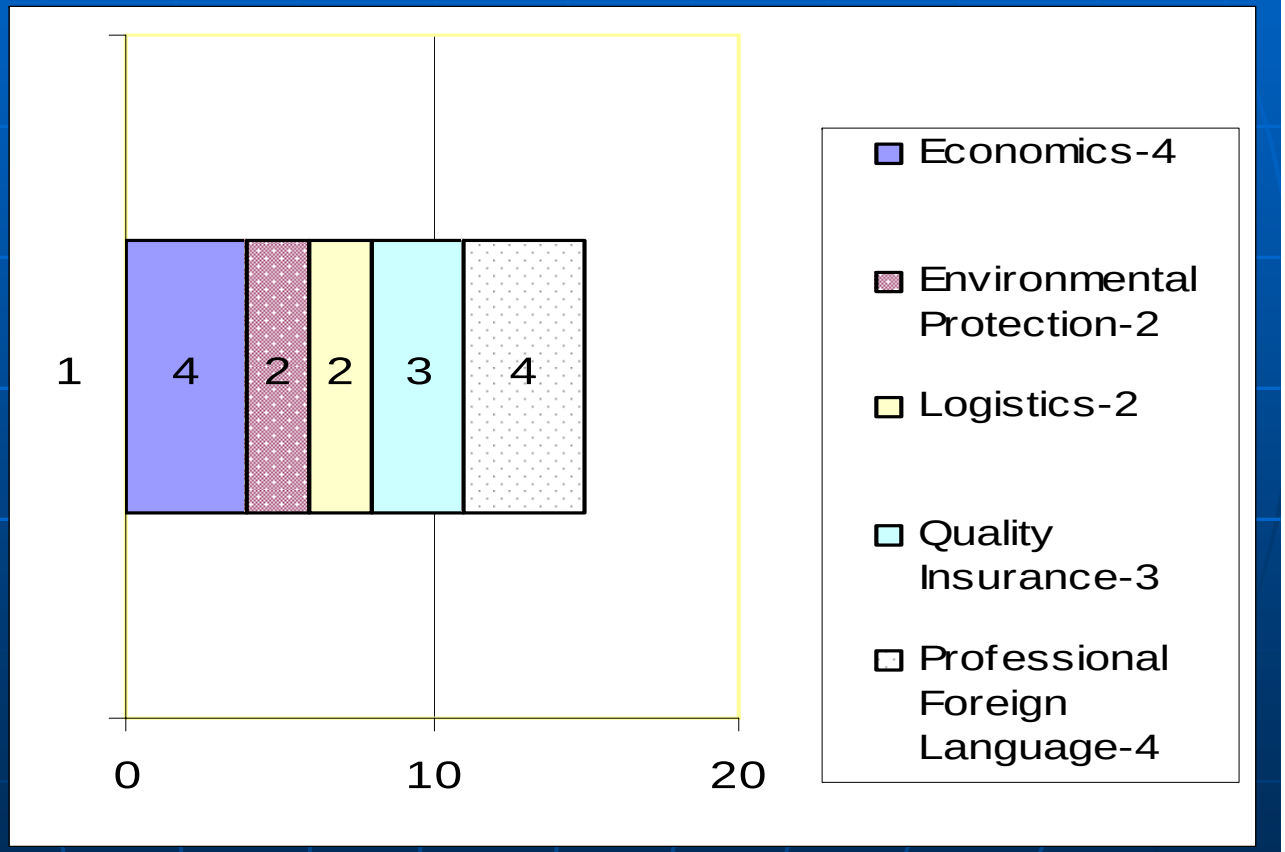
CHARACTERIZATION OF THE COURSE OF MECHATRONICS - 3:

Economics and Social Sciences

Focus on foreign languages

Mechanical Eng. and CAD, CAM Systems (partially) **German** training

Mechatronical Eng. **English** training



CHARACTERIZATION OF THE COURSE OF MECHATRONICS - 4:

The ***Mechatronic Curriculum*** at Budapest Tech is operated by ***3*** faculties:

- **Bánki Donát** Faculty of Mechanical and Safety-Technology Engineering
- **Kandó Kálmán** Faculty of Electrical Engineering
- **J. von Neumann** Faculty of Informatics

Full Time Course or ***Correspondent Course***

Training ✓

Credits ✓

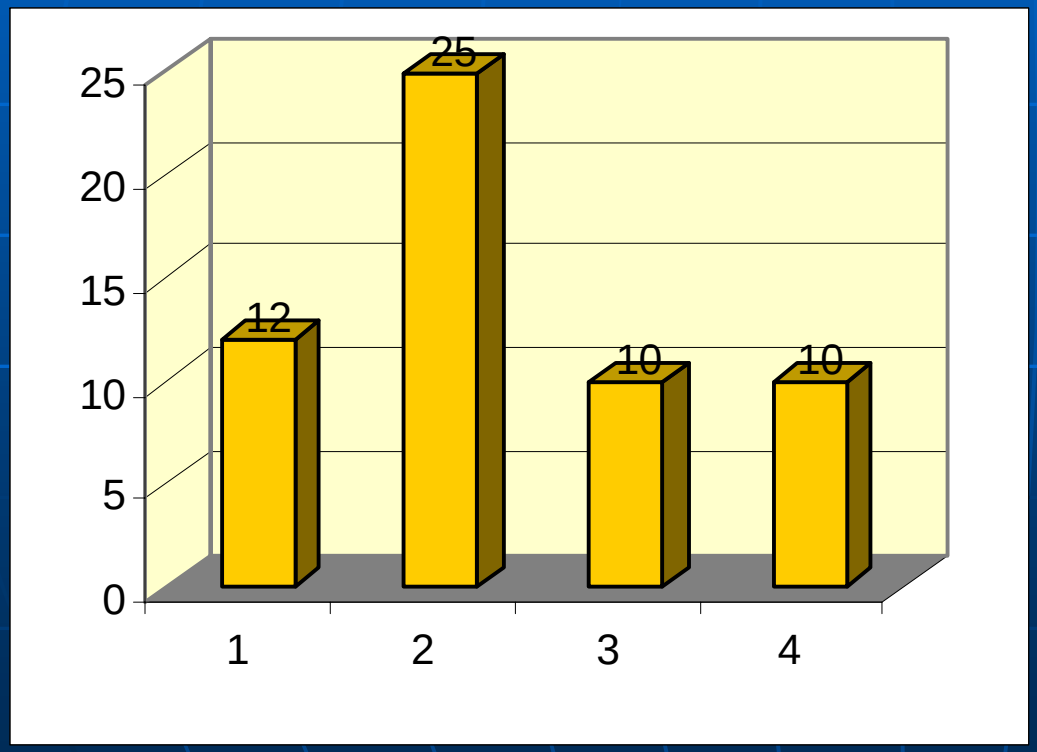
Contact hours ✓

	Semesters	*Credits*	*Total number of contact hours*
Full Time Training	7	210	2730
Correspondent courses	8	210	600

PROFESSIONAL KNOWLEDGE IN THE SPIRIT OF TRADITION AND RENEWAL

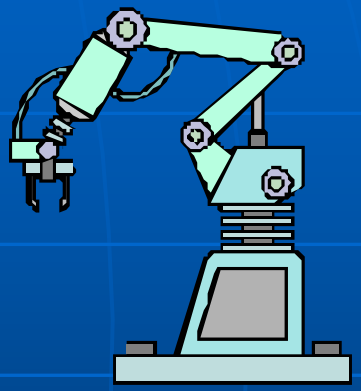
For 125 years the Faculty (*BGK*) has focused on ***mechanical engineering*** with national and international reputation among European technical institutions of higher education.

Contact hours with regard to educational profile



1. *IT knowledge*
2. *Mechanical knowledge*
3. *Control engineering*
4. *Electronics*

THE POSSIBILITY OF SPECIALIZATION WITHIN THE EDUCATIONAL PROFILE



MECHATRONICS:

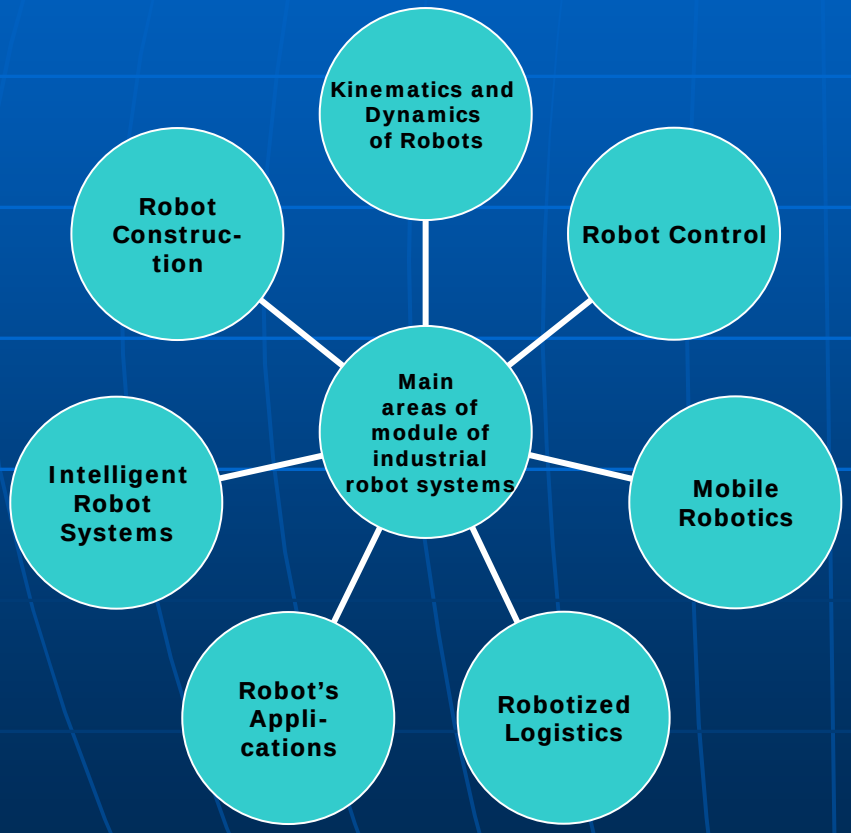
Module of Industrial Robot Systems

Faculties:

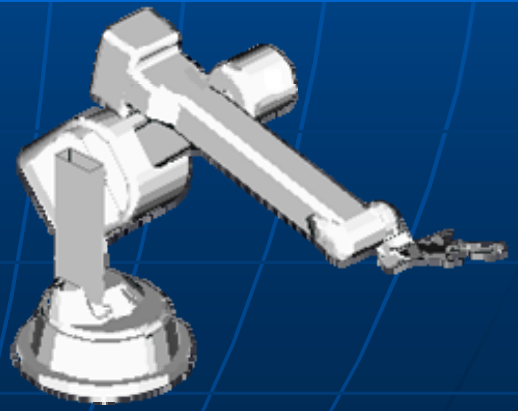
Bánki Donát + J. von Neumann + Kandó Kálmán

The module of industrial robot systems

Majors belonging to the module industrial robot systems:



Through applications the learners acquire the principles and phenomena of mechanical systems, mechanical micro-drivers, the ability of micro-manipulation, intelligent functions, the various strategies of regulation and control engineering, as well as movement control and navigation of mobile robots.



The MSc Course

Before the launching of the MSc Course the faculties had to prepare some „pre-studies" in different research areas.

The different research areas of the faculties:

Bánki Donát Faculty of *Mechanical* Eng.	**Kandó Kálmán Faculty of *Electrical* Eng.**	**J. Von Neumann Faculty of *Informatics***
– Material engineering – Manufacturing technology and quality insurance – Mechanical and system engineering – Automatization & **Mechatronics** – Applied mechanics and machine design	– **Embedded** informatics – Electronic systems – Energetics systems – Information and communication techniques – Integrated control engineering – Measuring systems	– **Intelligent** mechatronical systems – Intelligent systems – Operation researches and Stochastic models – Micro-architectures of superscalar processors.

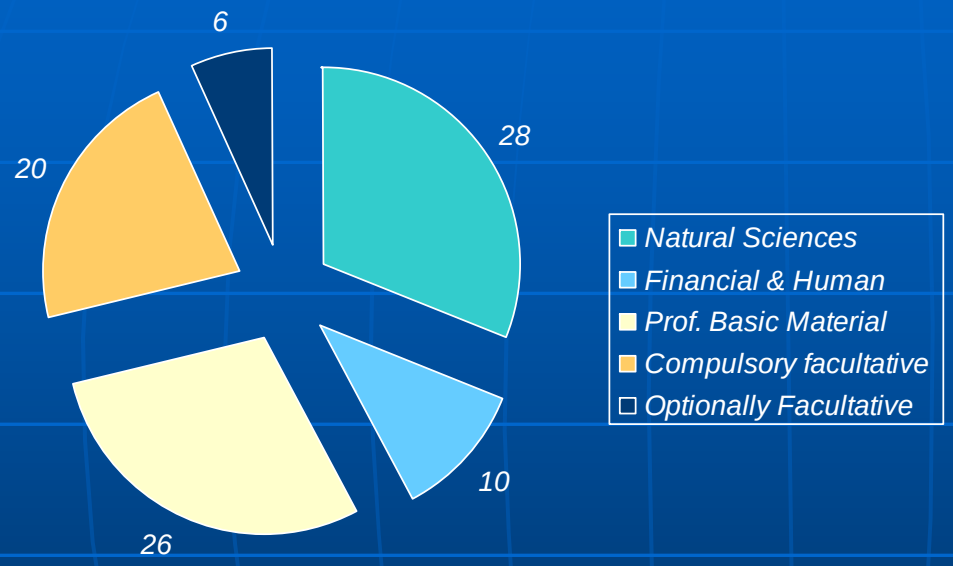
The main characteristics of the MSc Course

Full Time and ***Correspondent***, each of them is taking 4 semesters/terms

	Semesters/Terms	*Credits*	*Total number of contact hours*
Full Time	4	120	1380
Correspondent	4	120	550

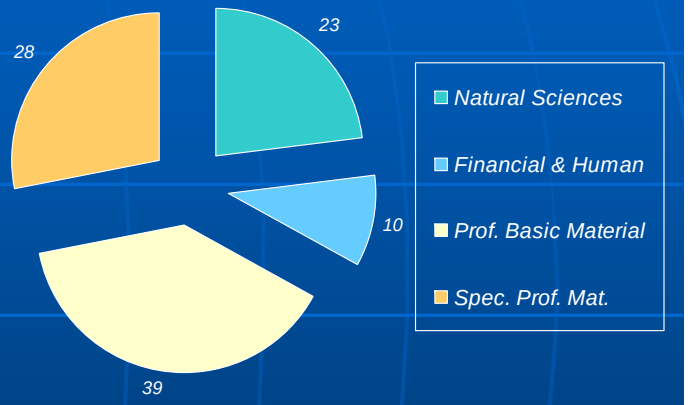
Launching of the first **MSc** Course (academic year 2008/09) is adjusted to the graduation date of the first **BSc** course.

Credits in the MSc Course



The ***Compulsory facultative*** and the ***Optionally Facultative*** subjects *creates together* the *Spec. Prof. Materials.*

Compared to BSc Course



At the BSC level, we had only 1 specialized module (industrial robot systems)

The Compulsory Facultative Professional-Modules

Module of Intelligent Equipments:

Machine Intelligence
Intelligent equipments 1-2
Mechatronics of the Mobile Machines
Intelligent Engineering Systems
Modern Manufacturer Technologies

Compulsory Facultative Subjects: Intelligent Building Technology, Supervision systems, C++ programming

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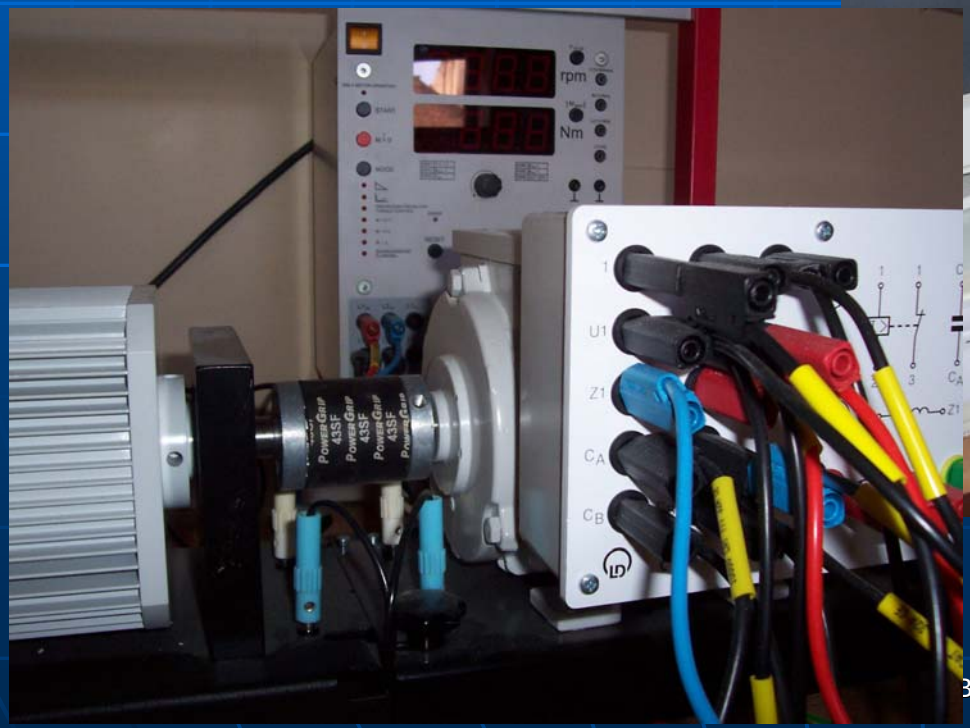
Module of Vehicle Informatics:

Machine Intelligence
Vehicle Dynamics
Vehicle Electronics
Traffic Informatics 1-2
Modern Manufacturer Technologies
Intelligent Engineering Systems

Compulsory Facultative Subjects: Vehicle Operation, Vehicle Security and Supervising Systems, Alternative Vehicle Drives,

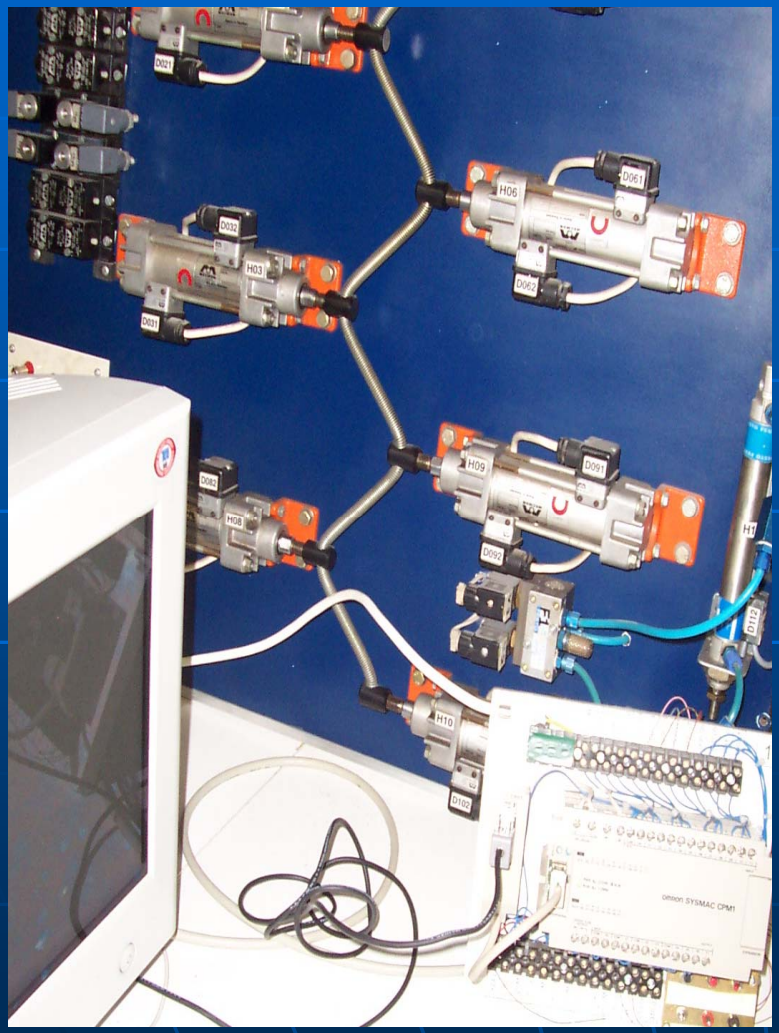
Mechatronical *Teaching* and Events at Budapest Tech

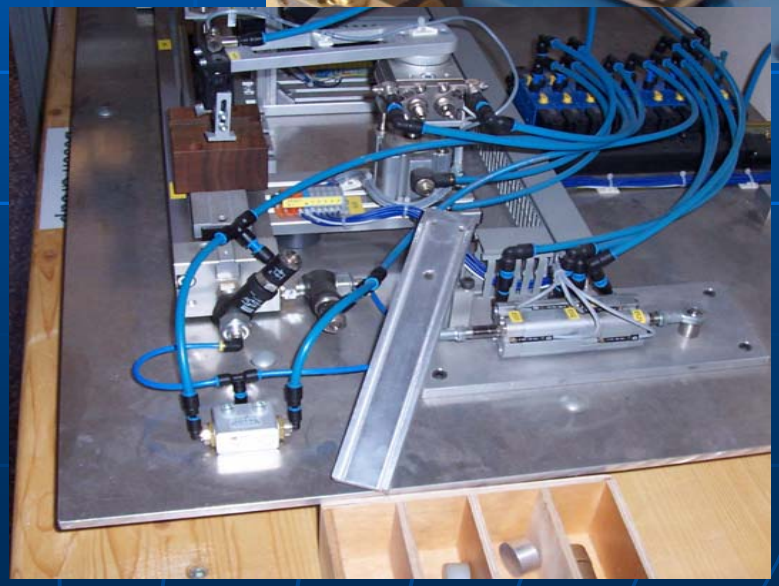
Examination of the mechatronical unit - BGK:



Mechatronical *Teaching* and Events at Budapest Tech

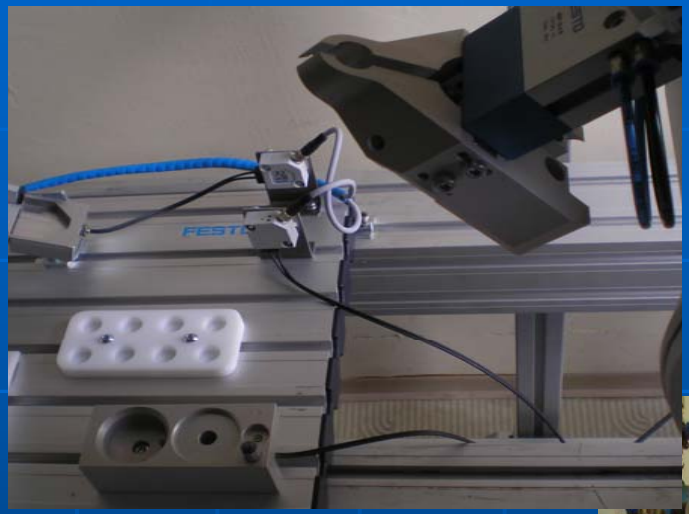
Pneumatic valve control by PLC - BGK:

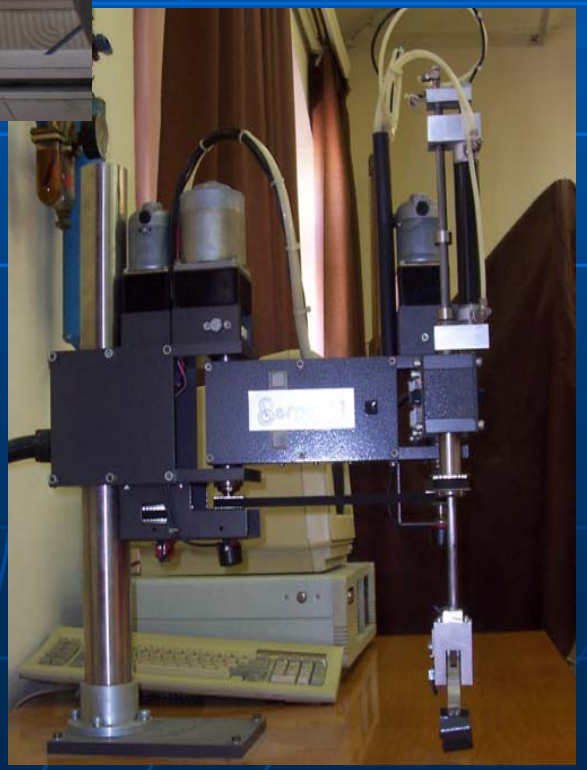




Mechatronical *Teaching* and Events at Budapest Tech

Teaching robots in the Mechatronics laboratory - BGK:





Mechatronical Teaching and *Events* at Budapest Tech

PLC programming - National Competition at the BGK Faculty

Organized by FIOM

F • I • O • M

Főiskolai Irányítástechnikai Oktatás Módszertani Egyesület
Association of Control Engineering and Teaching Methodology in Higher Education

THANK YOU FOR YOUR ATTENTION!

Responsible person:	**Prof. Dr. János Fodor, DSc.**
Contact:	fodor@bmf.hu
Short Description:	**The Zadeh-like approach in Machine Intelligence**

Responsible person:	**Dr. habil Tibor Kovács, CSc**
Contact:	kovacs.tibor@bgk.bmf.hu
Short Description:	**Identification and adaptation.**

Responsible person:	**Dr. Endre Ruszinkó, CSc.**
Contact:	ruszinko.endre@bgk.bmf.hu
Short Description:	**Hardware and software structure of Mobile Machines. Path planning and localization methods.**

Responsible person:	**Prof. Dr. Imre Rudas, DSc.**
Contact:	rudas@bmf.hu
Short Description:	**The general architecture and classification of Fuzzy models**

Responsible person:	**Dr. Balázs Mikó, PhD.**
Contact	miko.balazs@bgk.bmf.hu
Short Description:	**Designing and automatization of mounting processes.**

Responsible person:	**Dr. Péter Gáspár, DSc.**
Contact:	gaspar.peter@nik.bmf.hu
Short Description:	**New methods of analyzing vehicle dynamics. Examination of the *ABS* and *EBS* equipments.**

Responsible person:	**Dr. Péter Turmezei, PhD.**
Contact:	turmezei@bmf.hu
Short Description:	**Electronic ignition and injection systems in vehicles.**

Responsible person:	**Dr. László Nádai, PhD.**
Contact:	nadai@bmf.hu
Short Description:	**Design and analyzing of traffic control systems.**