

DEPARTMENT OF AUTOMATION FROM THE TECHNICAL UNIVERSITY OF CLUJ-NAPOCA

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1. CHRONOLOGY (1960-UNTIL NOW)

1960 As a result of the intense activity made by Prof. Eng. Liviu Manduc, not only in educational and administrative domain, but also in the traditional spirit of the school for Electrotehnics from Cluj, in the frame of the Faculty for Mechanical Engineering (Polytechnic Institute from Cluj) it was founded a new line of study called "Electromechanics". The name of this new specialization was soon changed.

1964 Prof. Eng. Liviu Manduc founded the "Faculty for Electrotehnics" and he became the first dean (1964-1974) of this new faculty. This year, in the Polytechnic Institute of Cluj (with three faculties: Mechanical Engineering, Civil Engineering and Electrical Engineering) from a total enrollment of 2293 students, 528 have already studied in Electrical Engineering.

1965 In the frame of the Faculty of Electrotehnics, Assoc. Prof. M. Hanganut was appointed by the dean as a professor in ordinary for "Automation", a new subject in the syllabus for Electrical Engineering. This selection had

very important reasons: Eng. M. Hanganut was initially with the "Research Institute for Nuclear Physics" in Cluj, a subsidiary of the most important Romanian research and development institute, with the same name, in Bucharest. The safety and the high level of performance of the research and production equipment (nuclear research, molecular and isotope research, etc.) asked for a modern theory and proper applications of the Control science. Under the management and the supervision of Dr. Eng. Marius Hanganut, a nucleus of specialists in Automation, Electronics and Computers was built.

1966 Prof. Dr. Eng. M. Hanganut founded the Department of Automation as a new department of the Faculty for Electrotehnics.

1967-1971 The Department of Automation became an active element in the research and educational process for the Faculty of Electrotehnics. The Department:

- created and developed the "Central Computing Laboratory", as a special research nucleus;

- gave many valuable contributions in the “Scientific Bulletin of the Polytechnic Institute”, series “Electrotechnics”;
- assumed a great number of grants in order to solve scientific problems in industry, high school and administration;
- designed and supervised the student’s activity in the: “Micro-production workshop” of the Faculty of Electrotechnics.

1972-1974 Due to the administrative reshape of the Polytechnic Institute, the “Department of Automation and Physics” was built, Prof. Dr. Eng. M. Hanganut being appointed chef of the department.

1974-1978 The new Dean of the Faculty of Electrotechnics, Prof. Dr. Eng. M. Hanganut enlarged the teaching staff of the Department of Automation with new young engineers and created a dedicated “Research Center”, which solved many problems in the field of Control Engineering for industry in Cluj and in the county. In the same period, Prof. M. Hanganut set up a local subsidiary of the central “Research Institute in Automatics (IPA)” from Bucharest and he was the manager of this research team for many years.

As dean of the Faculty of Electrotechnics, Prof. M. Hanganut militated for the development of the technical high-school from Cluj, in order to create new specializations.

1974-1990 A new administrative reshape joins two departments under the name “Department for Utilizations and Automations”. The cooperation between the Department of Automation and the local subsidiary of the “Institute for Research in Automatics (IPA)” was an important factor for the development and the implementation of the theoretical notions and the practical applications in control. In 1977 the first Symposium on “Automatic, Testing Technologies and Equipment (THETA)” was held, an event with further sessions.

1990-1995 After the events of December 1989, the Department of Automation was recreated as independent unit and managed by Prof. Dr. Eng. M. Hanganut until his premature death in August 1995. The department was appointed for doctoral studies in the field of Control Systems (Prof. Dr. Eng. M. Hanganut, Prof. Dr. Eng. T.

Colosi). Based on the nucleus of the staff from the Faculty of Electrical Engineering two new faculties are created: Faculty of Automation-Computers and Faculty of Electronics-Telecommunications.

1996 -until now-The Department of Automation has been managed by Prof. Dr. Eng. T. Colosi till 2003 and by Prof. Dr. Eng. L. Miclea from 2003 until now. The doctoral studies in the Department were developed with three new supervisors: Prof. Dr. Eng. G. Lazea, Prof. Dr. Eng. Cl. Festila and Prof. Dr. Eng. M. Abrudean.

From the foundation of the Romanian Society for Automation and Technical Informatics (SRAIT) by Prof. Dr. Eng. I. Dumitrache (from the “Polytechnica” Institute of Bucharest), the teaching staff of the Department of Automation from Cluj-Napoca has been an active presence.

In 1996 the first edition of the “National Conference of Automation, Quality, Testing and Robotics (AQTR)” was held. Further on, in 1998, 2000, 2002, 2004 and 2006, these events were developed as “International Conferences AQTR” under the aegis of the IEEE and Romanian Society for Automation and Technical Informatics (SRAIT). The severe selection of the received papers, the higher and higher level of the subjects and the great number of participants define the acknowledgement and the value of the school for Control from Cluj-Napoca.

In the frame of the Department of Automation, the research activity is managed and directed by the “Research Excellence Center” for “Advanced Process Control”.

The teaching staff of the Department sustains a great number of scientific projects, some in the frame of the National Board for High School Research (CNCSIS), and others as partners in “Excellence Research Projects”.

In order to demonstrate the development of the Automatic Control School from Technical University of Cluj-Napoca, it is to mention the setting up of a new branch of the Department in Satu-Mare and new prospective appeared in other important cities from the coterminous counties. The transition to the new undergraduate system in conformity to the declaration from Bologna needs the

development of new curricula in the field of Automation and Applied Informatics (2005). This new curricula is in concordance with the competencies and knowledge agreed at national level by the Romanian Society of Automation and Technical Informatics (SRAIT).

2. EDUCATION. TEACHING STAFF

1965-1974 The number of the members of the Department of Automation increased continuously, so that at the end of this period, the teaching staff included 16 members: Assoc. Professors, Lecturers, Assistants and Researchers. The subjects taught were: Automation and Remote Control, Electronics, Electrical Drives, Analogous and Digital Computers, Electrical Machines. The number of laboratories has also continuously increased up to five: Automation, Systems Theory, Computers, Electronics and Control and Industrial Electronics. The activity of the teaching staff was dedicated to develop new textbooks and laboratory-guides or project-guides, being to mention about 30 books in this period.

It was set up an own library of the Department of Automation.

Because the syllabuses of the students in Mechanical Engineering and Electrical Engineering include notions from Automation, Electronics and Computers, the teaching staff of the Department of Automation taught these subjects too.

1974-1990 The new “hybrid” Department for Utilizations and Automations, included about 40 members and a large number of disciplines in “teaching collectives”: Electronics, System Theory, Control Engineering and Control Equipments, Computers (software and hardware), Electrical Machines, Traction and Electrical Drives, Industrial Electrotechnics and Plants, Power Stations, Power System and Apparatus and High Voltage Techniques.

1990 -until now- After the founding of the Faculty of Automation and Computers, the diversity of disciplines and the number of teaching personnel considerably increased. The two specializations are: Automation- Industrial Informatics and Computer Science, with Romanian and English courses. The total

number of students in the Faculty of Automation and Computers is between 300 and 450, of which about 40% belong to the Automation and Industrial Informatics specialization.

Today, the academic staff of the Automation Department consists of:

Professors: Tiberiu Colosi(consultant), Clement Festila, Gheorghe Lazea, Mihail Abrudean, Dorin Isoc, Tiberiu Letia, Petru Dobra, Ioan Nascu, Liviu Miclea, Adina Astilean, Honoriu Valean

Associate Professor: Daniel Moga

Lecturers: Mihaela Cistelecan, Paula Raica, Silviu Folea, Eva Dulf, Radu Robotin, Sorin Herle.

Teaching Assistants: Szilard Enyedi, Mirela Dobra.

Junior Assistans: Camelia Avram, Mihai Hulea, Aurelian Ignat, Tudor Buzdugan, Zsofia Lendek.

PhD Students: Vasile Marcu, Marius Borodi, Mircea Chintoan, Ioana Vatajelu, Adrian Gut.

All the years round, the Automation Department had profit from a big number of external partners, engineers, with responsibilities in research or industry, with valuable activity in teaching and education. Also the number of PhD students substantially increased: 8 PhD students of Prof. Tiberiu Colosi, 11 PhD students of Prof. Clement Festila, 12 PhD students of Prof. Gheorghe Lazea and 10 PhD students of Prof. Mihail Abrudean. In the framework of the Department of Automation, there have been held and certified 16 PhD theses.

The syllabus of the specialization: Automation and Industrial Informatics consist of various courses. System theory, Power electronics in automation control, Systems identification, Control engineering, Electronic Automation Equipment, Real time algorithms, Peripheral devices and process interfaces, Nonlinear and stochastic systems, Data transmission, Hydraulic and Pneumatic control equipment, Reliability and diagnosis, Thermal and chemical plants control, Industrial Informatics, Robot control systems, Optimization techniques, Knowledge-based systems, Power systems and plants

control, Application-oriented software environments, CAD in automation, Computer integrated manufacture, and others.

The personnel of the Department participated at numerous Tempus programs and collaborated with other universities abroad in Socrates (Erasmus) programs.

The Department possesses 4 lecture rooms (480 total places and 880 square meters), 9 seminar rooms (370 places and 640 square meters), and also a number of 11 laboratories (about 700 square meters).

The equipments of these laboratories comprise: different types of industrial robots, experimental stalls, programmable logic controllers, physical models of various industrial processes and also computer networks, process interfaces and usual electronic equipments: oscilloscopes, signal generators, stabilized voltage supplies, data acquisition boards etc.

The deans of the Faculty of Automation and Computers:

1990-1994 Prof. Dr. Eng. Gheorghe Lazea

1994-2004 Prof. Dr. Eng. Kalman Pusztai

2004 until now Prof. Dr. Eng. Sergiu Nedevschi

3. RESEARCH AND DEVELOPMENT

1965-1968 Research domains and publications: Control of the electrical arc in alternating current, used to crack the hydrocarbon, PhD Thesis; Driving of asynchronous step by step motors, PhD thesis; Theoretical and experimental studies of some electrical machines; Digital and analog controllers; Sample signal-based systems.

Some papers were presented by conferences as "IMEKO" and other papers were published in magazines as "Electronics and Automation", or in the Scientific Bulletins of the Polytechnic Institute of Bucharest, Polytechnic Institute of Cluj, and University of Brasov. Are there also to mention some research grants offered by companies from Cluj and from other cities in the county: "Industria Sarmei Campia Turzii", "Metalu Rosu – Cluj" and ITTC – Cluj (Institute for Computing Techniques), IPA Bucharest and IPA Cluj, "Unirea Cluj" and others.

1968-1974 The conceiving and the implementation of some projects for the Micro-production Workshop, for example: stabilized continuous voltage supplies, analogous controllers, digital and analogous control devices and others.

The collaboration (with projects and technical assistance) with IPA-Cluj, under the control of Prof. Marius Hanganut had as result the setting up of a number of 9 national Symposia with international attendance, in the field of Automatic Testing (Theta 1,2,...,9).

Prof. Marius Hanganut had a study scholarship for one year (1967-1968), at CRN Seibersdorf-Austria, in the field of ionic trajectory analysis, in inhomogeneous magnetic fields.

Prof. Ioan Dancea had a study scholarship for one year (1967-1968) at Purdue University of Illinois –USA, in the field of numerical computers for process control.

Prof. Clement Festila had a study scholarship DAAD, for one year (1973-1974) at the Institut fur Regelungs und Steuerungs Systeme, from Karlsruhe-Germany, prof. PhD. eng. Otto Follinger, in the field of process control.

The staff of the Department of Automation guided itself to the implementation of computers in industrial processes, research for the design of testing for printer boards with integrated circuits, miscellaneous electrical devices, digital to analogous and analogous to digital converters, numerical integration techniques for linear and nonlinear processes.

The foundation aid of the laboratories was completed with the first generation of computers and automation equipments made in Romania and abroad (Oliveti, HP, 9020 A, Felix C 256, etc.).

1974-1990 The research activity of the Department of Automation is basically devoted to:

- Endowment of the department's laboratories
- Scientific grants with "Institute for Research in Automatics (IPA)" subsidiary Cluj and with factories and institutes which had research agreements

- Implementation of the department's projects in the "Micro-production workshop for Electrotechnics"

It was published more than 150 of scientific papers, from which appreciatively 25 abroad.

Exchange in other countries:

Prof. Tiberiu Colosi had a study scholarship of Alexander von Humboldt Foundation at the Institut für Allgemeine Theoretische Electrotechnik, der Universität Erlangen – Nuremberg – Prof. Dr. Eng. Rolf Unbehauen (1974-1975)

Prof. Iosif Ignat had a study scholarship at the Belgrad University, Prof. Dr. Eng. R. Tomovici, 1976

Prof. Liviu Miclea had a specialization grant at the Technical University of Wien 1993 and by Politehnica di Torina 1998.

In this period there had been developed the laboratories of computers, automation and electronics of the Department, from the Observator Campus, floors II, III, IV, V and from the Faculty for Mechanical Engineering.

1990-until now - The research areas of the Department of Automation are: Robust control of industrial processes, Modeling and simulation of lumped and distributed parameters processes, Distributed control systems, Fiability and diagnosis, Robot control systems, CAD-CAM systems, Intelligent control systems, Identification techniques, Adaptive control systems, Power system control, Thermal process control, Web technologies.

The kind of agreements in which the department is involved can be grouped as follows: CNCSIS grants, grants which are included in National Research, Development, Innovation Plan (PNCDI), European program FP5 an FP6, bilateral agreements with different countries (Italy, Greece, Spain, Belgium).

The department has 7 research laboratories with a 230 m² total available surface.

There have been elaborated, presented and attested by the Ministry for Education and Instruction (MEI) level 16 PhD Theses in our department.

All the members of Automation Department are registered in Romanian Society for Automation and Technical Informatics (SRAIT) and a part of theme are members of different national or international scientific organizations (AGIR, IFAC, IEEE, IEEE-TTTC).

The collective of the Automation Department, in collaboration with IPA Cluj subsidiary, with the direction of Prof. Marius Hanganut, participate to the organization of 9 national symposiums with international participation, in the domain of Automat Testing Equipments, in Cluj-Napoca.

An important activity of the teaching staff of the Department of Automation, in cooperation with the subsidiary of Research Institute for Automation (IPA) Cluj, is related to the national and lather international Symposia:

1. The National Symposium of Automation and Testing "A-96; THETA 10" in May 1996. Were presented 190 papers in 11 sections. The papers of symposium were published in "Automatic Control and Testing Conference", 3 volumes, 1280 pages
2. International Conference on Automation and Quality Control "AQ-98", May 1998. There were presented 218 papers in 9 sections and a poster session. The papers of symposium were published in "International Conference on Automatic and Quality Control", 2 volumes, 1200 pages
3. International Conference on Automation, Robotics and Quality Control "AQ-R-2000", May 2000. There were presented 137 papers in 5. The papers were published in "Automation, Quality and Robotics", 2 volumes, 510 pages
4. International Conference on Automation, Quality, Testing and Robotics "AQTR-Theta 13", May 2002. There were presented 162 papers in 5 sections and a junior poster session. The papers were published in "Proceedings of 2002 IEEE-TTTC International Conference on Automatic, Quality and Testing, Robotics", 2 volumes, 1060 pages.
5. International Conference on Automation, Quality, Testing and Robotics "AQTR-2004-Theta 14", May 2004. There were presented 175 papers in 7 sections and 2 poster sessions. The papers were published in "Proceedings of 2004 IEEE-TTTC International Conference on

Automatic, Quality and Testing, Robotics”, 2 volumes, 1010 pages.

6. International Conference on Automation, Quality, Testing and Robotics “AQTR-2006-Theta 15”, May 2006.

The above mentioned scientific meetings were honored by recognized scientific personalities from Romania and from foreign countries. Some of these conferences were organized under the aegis of: National Committee IFAC, Romanian Academy, Romanian Society of Automation and Technical Informatics (SRAIT) and under the aegis of IEEE Computer Society – Test Technology Technical Council (IEEE-TTTC).

The Department of Automation also organized the scientific meeting “Automatica Academica 2001”, at national level and had a great contribution to establish scientific relationships – at national and international level.

From the great number of grants assignee to the Department of Automation may be mentioned the most significant:

“Technology for the separation of the ^{13}C isotope by cryogenic distillation”, grant CEEEX nr. 45/2005, 2005-2008, Scientific manager Mihail Abrudean.

“Portal for resources and agro-tourism services”, grant CEEEX nr.17/2005, 2005-2008, Scientific manager Liviu Miclea

“Intelligent system for food quality detection, using chemical sensors- SISAL”, grant CEEEX nr.9/2005, 2005-2008, Scientific manager Honoriu Valean

“Multi-agent and intelligent agents techniques for supervising and control of hydropower systems-AGENTEL”, grant INFOSOC nr. 143/2004, 2004-2006, Scientific manager Honoriu Valean

“Autonomous multi-robot cooperative systems”, grant CNCISIS nr.1028, 2004-2006, Scientific manager Gheorghe Lazea

“Optimization system for the biologic waste water treatment”, grant PNCDI-MENER 23831/2004, 2004-2006, Scientific manager Ioan Nascu

“Research on Test Compression and LBIST”, grant UTCN-Philips Semiconductors, 2005-2006, Scientific manager Daniel Moga

“Structural Complex Modeling for Optimal Control of Isotope Separation Column”, grant CNCISIS 1287/2006, 2006-2008, Scientific manager Clement Festila

The teaching staff of the Department of Automation hopes that their hard work – briefly presented in this retrospective – represent a contribution to the development of the education and research process, especially in the Control area, at local, national or even international level.