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BRIEF HISTORY OF THE AUTOMATIC CONTROL DEGREE COURSE AT TECHNICAL UNIVERSITY “GHEORGHE ASACHI” OF IASI

Mihail Voicu, Corneliu Lazar, Octavian Pastravanu, Teohari Ganciu, Eugen Balaban, Ioan Bejan, Doru Panescu

Technical University “Gheorghe Asachi” of Iasi

Department of Automatic Control and Applied Informatics

URLs: www.ac.tuiasi.ro; www.ace.tuiasi.ro/ro/personal/automatica.htm

Abstract: The Faculty of Automatic Control and Computer Science within Technical University “Gheorghe Asachi” of Iasi, one of the leading training and research centre in the field of automatic control and computer science from Romania, has celebrated in the University year 2002 – 2003 40 years from the appearance of the first courses in the above mentioned field and 25 years from the emergence of the Automatic Control and Computer Science degree course. On that occasion and afterwards, some of the most significant scientific achievements have been put together in this article, as a brief history of the development of education and research in automatic control at the Technical University “Gheorghe Asachi” of Iasi.

1. Origin (the end of 1950s until 1977)

Control engineering saw rapid development in many countries in the period immediately following the Second World War. Engineers and scientists concerned with control problems have formed new professional groupings and university courses dedicated to this subject have arisen. At the same time, research groups have been set up both in the industrial and in the academic communities.

In the above context, control engineering has started at the Technical University “Gheorghe Asachi” of Iasi in the 50s. The Department of Electrical Drives from the Electrical Engineering Faculty was approaching issues in control engineering, which were introduced as chapters in the courses

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“Electrical Drives” and “Electromechanical Equipment”. The first course actually entitled “Automation” was an optional course and it was initiated in the same period by professor Nicolae Botan. As a result of their didactic and research activities, Nicolae Botan, Ioan Bejan and Eugen Balaban published the first book, named “Electromechanical Drives and Automation”, in the field of automatic control at “Editura didactica si pedagogica”, Bucharest, in 1962.

Other compulsory courses have been established prior to 1962, which were mainly focused on the requirements of electrical and power engineering programmes. This was the case with the course of “Automation and Remote Control” (within the two degree courses) and the course on “Relays protection” (for the electrical power engineering programme) taught by professors Leopold Sebastian and Ioan Bejan. In 1967, Ioan Bejan and Gherghina Balaban published the first course in control, entitled “Automation and Remote Control” at the publishing house of the University of Medicine and Pharmacy “Gr. T. Popa” of Iasi.

In the 60s and the beginning of the 70s, the course of “Automation and Remote Control” has known a rapid development, e.g. the course “Automatic Control” (Leopold Sebastian) started at the electrical engineering programme and the course “Automation of Electrical Power Systems” (Ioan Bejan) was introduced for the electrical power engineering programme. New optional courses have also simultaneously appeared for electrical engineering, such as: “Logical Circuits and Sequential Control Systems” (Corneliu Hutanu), “Servomechanisms” (Iosif Olah), “Computer Controlled Processes” (Simona Caba) and “Advanced Automation” (Gherghina Balaban, Iosif Olah and Mihail Voicu).

Under the supervision of professors Ioan Bejan and Leopold Sebastian extensive research have been carried out at the Department of Electrical Drives ranging from control theory problems (nonlinear systems, identification, adaptive and optimal control, controller tuning) to the application of control methods in the areas of thermal processes, electrical drives, electrical power systems, relays protection systems, servomechanisms or machines tools control. The above mentioned professors have initiated PhD positions in Industrial Automation (Leopold Sebastian – 1966) and in Electrical Power System Automation (Ioan Bejan – 1972). Then, two research groups have emerged, headed by Leopold Sebastian for the electrical engineering programme (Eugen Balaban, Corneliu Hutanu, Iosif Olah, Corneliu Botan, Teohari Ganciu and Simona Caba) and Ioan Bejan for the electrical power engineering programme, respectively (Gherghina Balaban, Ioan Titaru, Mihail Voicu, Cristea Pal and Dumitru Asandei).

Due to the fact that these groups were at that time the only ones offering courses in automatic control, one of the main tasks was from the very beginning to write manuals and monographs. In the 70s, several well-known books have been published in Romanian, e.g.:

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- L. Sebastian, “Automatic Control”, Editura didactica si pedagogica, Bucharest, 1975;
- I. Bejan, “Automation and remote control of electrical power systems”, Editura didactica si pedagogica, Bucharest, 1976;
- I. Bejan, “Magnetic amplifier for control systems”, Editura Tehnica, Bucharest, 1972;
- N. V. Botan, “Speed control of electrical drives”, Editura Tehnica, Bucharest, 1974;
- N. V. Botan, “Electrical drives control”, Editura Tehnica, Bucharest, 1977.

In the above mentioned period, PhD degrees in the field of automatic control have been obtained by Mihail Voicu, Corneliu Botan, Gherghina Balaban and Iosif Olah.

Also in the same period, the members of the automatic control group were awarded the following prizes:

- the Ministry of Education Prize – Ioan Bejan, Nicolae Botan, Leopold Sebastian, Eugen Balaban and Gherghina Balaban;
- Professor Emeritus awarded by the Ministry of Education – Ioan Bejan, Eugen Balaban and Iosif Olah.

The members of the automatic control group were involved in different types of collaborative activities with the industrial companies developed in the eastern region of the country, such as: Design and implementation of voltage controllers (research projects funded by the Electric Power Company – IRE Galati and the Electric Power Company – IRE Iasi); Design and implementation of digital circuits and modules for automation (research project funded by the Bearing Manufacturing Enterprise Barlad); Retraining courses of automation for engineers working in power plants and power distribution.

2. First automatic control programme (1977 – 1990)

In 1977, a five years programme entitled “Automatic Control and Computers” has been developed within the Faculty of Electrical Engineering. This came as a response to the demands from industry, which began to require well prepared engineers in the fields of control and computer science.

This study programme began in 1977. There were two groups of first-year students which took entrance examination at the new degree course and other two of second-year students transferred from the electrical and electronics programmes. Each group of students, in the first and second year respectively, had separate curricula, one for Automatic Control within the Electrical Drives Department and the other for Computers functioning at the Electronics Department.

As it has been mentioned in the previous section, at the Electrical Drives

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Department there were already teaching staff and research laboratories in the field of control engineering. The control team elaborated the first Automatic Control curriculum that comprised courses of System theory, Digital control systems, Analogue control systems, System identification, Hydraulic and pneumatic control equipment, Control system design, Systems and equipment for process control and Optimal control. The scientific research of the automatic control staff has known a significant progress characterized by several research projects, the publishing of monographs and participation at international conferences.

In the 80s, the following new areas of research have appeared: flow-invariance in control theory, computer controlled processes, machine vision, pattern recognition, computer aided control engineering and robotics. In 1983 professor Hutanu's book "Digital circuits and sequential control systems" was published at "Junimea" publishing house from Iasi and professor Voicu published an important monograph at "Editura Tehnica", Bucharest, in 1986, entitled "Stability analysis techniques for control systems".

The deep crisis experienced by Romania in the 80s particularly affected higher education and inevitably, also the automatic control teaching staff, which faced serious problems. For example only three teaching assistants were admitted as PhD students in that period in the field of automatic control. It was extremely difficult, from an administrative point of view, to publish abroad or to participate at international conferences. However, under these severe conditions, 10 papers have still been published in important foreign journals by Voicu, Sebastian, Pastravanu and Ganciu and 9 papers appeared in the proceedings of international conferences. In this respect, the papers published by professor Voicu at the 9th IFAC World Congress in Budapest (1984) and at the 10th IFAC World Congress in Munich (1987) can be considered as remarkable achievements. Also, Pastravanu presented papers at the international conferences "Symposium on Systems Science IX" organized by University of Wroclaw (1986), "European Congress of Simulation" organized by Czechoslovak Academy of Science in cooperation with IMACS at Prague (1987) and the 4th International Symposium on Systems Analysis and Simulation organized by DDR Academy of Science in cooperation with IMACS at Berlin (1988), and Lazar presented a paper at "The 3rd International Conference on Automatic Image Processing" organized by Scientific Technological Society for Measurement and Automatic Control and DDR Academy of Science at Leipzig (1989).

The main difficulties in teaching and research activities were caused by the lack of computer facilities. Notable efforts were done by the teaching assistants Octavian Pastravanu and Corneliu Lazar in the mid 80s, which were supported by the dean of the Faculty, professor Ioan Bejan and by professor Mihail Voicu, in order to achieve proper computer equipment and software and to develop laboratories for computer aided control engineering.

Beginning with 1987, the control group formed within the teaching staff of

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the Electrical Drives Department organized every two years the national scientific symposium “Structures, Algorithms and Equipment for Process Control”.

During the period discussed in the current section, the control engineering group supported the technology research and development in the field of automation and robotics by fruitful cooperation with research institutes and industrial companies. The most important projects approached within this framework are listed below: Computer-assisted optimization in power distribution (funded by the Electric Power Company – IRE Bacau); Design and implementation of voltage controllers (funded by the Electric Power Company – IRE Galati); Performance improvement of several types of controlled plants (funded by the Electric Power Company – IRE Iasi and the Electric Power Company – IRE Suceava); PLC-based control of robotized cells (funded by the Metal Processing Company – IAM Tecuci); Design, implementation and testing of control equipment (funded by the Transducers and Controllers Company – ITRD Pascani, and the Pneumatic equipment – FEPA Barlad); Computer vision applications in textile industry (funded by the Computing Centre – CTCE Suceava); Parameter estimation in biosynthesis processes (funded by the Computing Centre – CTCE Iasi); Software development for the identification of unknown information sources (funded by the Computing Research Institute – ITC Bucharest); Computer-graphics tools for CNC machines (funded by the Automation Research Institute – IPA Bucharest).

In the mid 80s, professor Teohari Ganciu concentrated his efforts on the foundation of the Iasi branch of the “Automation Research Institute” – IPA Bucharest.

3. The Faculty of Automatic Control and Computer Engineering

As a direct consequence of the profound changes experienced by the Romanian nation in 1989, the Romanian higher educational system has known a lively development. The Faculty of Electrical Engineering has split in 1990 in three faculties. One of these, the Faculty of Automatic Control and Computer Engineering has been founded at the initiative and due to the efforts of the teaching staff from the degree course “Automatic Control and Computers” of the former Electrical Engineering Faculty. Professor Corneliu Hutanu was the first dean of the Faculty from 1990 to 1992. From the beginning, the Faculty had two departments, Automatic Control and Industrial Informatics and Computer Science, each of them offering the following degree courses: Automatic Control and Industrial Informatics and Computer Science, respectively.

The first head of the Automatic Control and Industrial Informatics

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department, professor Mihail Voicu, together with the department staff began in 1990 to develop a new curriculum in Automatic Control and Industrial Informatics. It must be noted that this curriculum was also influenced by a consultative council of the Automatic Control professors from Romania in order to maintain certain compatibilities between similar curricula introduced in other university centres of the country. Starting with the beginning of the 90s, this curriculum has been changed and improved on a yearly basis, also based on the knowledge and the experience of other European universities, with which several contacts have been renewed or new established in the framework of EU programmes.

Due to the efforts of Mihail Voicu and Octavian Pastravanu, TEMPUS Joint European Projects (JEPs) have been developed in collaboration with the Control Engineering departments of other European universities, e.g. JEP 0886/1990 "Higher Education in Control Engineering", JEP 02011/1991 "Improvement in Automatic Control Technologies", JEP 07101/1994 "Development in Romania of Short-Term Higher Education in Computing, Centred on Distributed Processing and Its Application". The MJEP 11467/1996 "EU Compatible Training in Industrial Automation" – COMPANION included six Automatic Control departments from Romania and four from abroad (Vienna, Duisburg, Sheffield, Ghent) and was coordinated by Mihail Voicu and Octavian Pastravanu. The last TEMPUS project of the 90's, UM-JEP 13133/98 "Quality Management", has been managed by Alexandru Onea and it has resulted in a significant contribution to the implementation of the quality assurance system of our Faculty.

These projects also offered a good opportunity for establishing relationships between the Department of Automatic Control and Industrial Informatics and other European Universities, which materialized in the participation of all the teaching staff to workshops organized by the JEP members and dedicated to Control Engineering Education and in the acquisition of modern laboratory setups. Due to the JEP framework, most of the teaching staff and especially young PhD students had the possibility to attend training stages at the partner universities.

Based on TEMPUS programmes, the "traditional" approach towards teaching has been modified substantially. The Faculty has accepted and implemented the European Credit Transfer System (ECTS) starting with the academic year 1998 – 1999 and has made the teaching procedures compatible with similarly oriented universities in the world. This makes possible the exchange of students and academic staff and mutual recognition of study periods and qualifications.

The European Credit Transfer System formed the basis of future collaborations that continued after the end of the TEMPUS programme. Thus, with some of the partner universities, the programme Socrates-Erasmus began to grow at the end of the 90s. In the framework of this programme, each year students from our department worked on the diploma project at the following

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universities: University of Gent (Department of Electrical Energy, Systems & Automation), University of Sheffield (Department of Automatic Control and System Engineering), University of Duisburg (Department of Measurement and Control Engineering), Vienna University of Technology (Department of Robotics), Institut National Polytechnique de Grenoble and Université Joseph Fourier (Laboratoire d'Automatique de Grenoble). Within this programme, an important number of MSc and PhD students had also training stages. Since 1999 till now, in the framework of the Socrates – Erasmus programme, professor Robin De Keyser from the University of Ghent has taught each year a module of the Predictive Control Systems course for the MSc programme of our department. At the same time, professors Corneliu Lazar and Octavian Pastravanu have taught mini-courses on Predictive Control and respectively Process Modelling Using Bond Graph in the last two years at the University of Ghent.

Together with the development of a new curriculum for the Automatic control programme, at the beginning of the 90s, new teaching staff has been recruited from the research institutes and young graduates. In 1992 professor Mihail Voicu, who had a strong experience in managing research and teaching staff, has become the dean of the Faculty. Since the same year, professor Ganciu has been the head of the department of Automatic Control and Industrial Informatics.

As a consequence of the pro-European orientation of the Romanian Higher Education that appeared immediately after 1990, our department was entitled to offer a master programme – one year of specialization, ensuring further training in the following modern areas of Automatic Control: distributed parameter control systems, parallel programming algorithms and techniques, predictive control, parameter estimation, distributed control, artificial intelligence in control.

Also, it must be mentioned that due to the changes that took place in Romania at the beginning of 90s, besides professors Bejan and Sebastian, the professors Voicu, Hutanu, Balaban, Botan and Olah have also received the right to be PhD supervisors in Automatic Control. Thus, new research areas have appeared and a greater number of graduates in Automatic Control have become PhD students, which ultimately led to an increased research activity. As a result of this, the number of scientific works published in journals and at international conferences and congresses has also increased considerably. Recently, the Ministry of Education has also authorised professor Pastravanu to promote and supervise PhD theses.

At the end of the 90s, what seemed to be a “natural” development took place, and the research groups from the department of Automatic Control and Industrial Informatics merged and they formed the Automatic Control and Applied Informatics (ACAI) Research Centre accredited by Ministry of Education and Research after the evaluation by the National Council for

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Scientific Research in Higher Education. ACAI Research Centre, managed by professor Mihail Voicu, was designed as an interdisciplinary research centre within the Faculty of Automatic Control and Computer Science and its mission was to fulfil statements of the University and of the Faculty within the field of Systems and Control Engineering by creating and sustaining a world class research group. The main directions of the scientific research have been the following: System Theory, Robotics and CIM, Optimal and Predictive Control, Artificial Intelligence in Process Control, Systems Identification and Fault Detection, Microprocessor Based Control Systems, CAD for Dynamic Systems.

In 2005, a group of researchers separated from the ACAI Research Centre and founded a new centre, called System Theory and Engineering, whose scientific interests focus on the following areas: Qualitative theory of dynamical systems; Discrete event and hybrid systems; Artificial intelligence in automatic control. This centre has been recently ranked "Centre of excellence" by CNCSIS - The National Council for Scientific Research in Higher Education.

The staff of the two research centres had a very productive period from 2000 to 2005, publishing 15 monographs and courses, 16 journal papers among which 14 in ISI journals and 121 conference papers. Among these publications, it should be mentioned the volume: M. Voicu_(Ed.), *Advances in Automatic Control*, Kluwer Academic Publishers, Boston, 2004 (456 pp.), which contains 27 papers authored by members of our department and other well-known scientists from Romania, Germany, France, Austria, Czech Republic and United States, who, in various forms, developed collaborative works with our department. The two research centres have also carried out projects financed by the Ministry of Education and Research, as well as by industrial companies (grant directors: Mihail Voicu, Corneliu Botan, Corneliu Lazar, Octavian Pastravanu, Alexandru Onea, Stefan Dumbrava, Lucian Mastacan, Letitia Mirea).

In September 1998, the Faculty has been moved in a new building having 7700 m² useful area with 2 amphitheatres, 7 lecture rooms, 30 laboratories and 32 offices for the teaching staff. The two departments of the Faculty develop their activity in the new building beside the Faculty Library and the Communication Centre of the Technical University "Gheorghe Asachi" of Iasi. It is important to say that the building has been started off at the beginning of the 90s at the initiative of professor Mihail Voicu, supported by professor Ioan Bejan, to take the initial necessary steps at the Ministry of Education and Research.

Unfortunately, the 90's economic decline of Romania created serious problems regarding higher education financing. As a result of this, several young people from the teaching staff left the department trying to fulfil their professional careers in more developed countries. At the same time serious

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difficulties have appeared in providing facilities for teaching and research work. However, the department members could adapt to the new forms of financing by having access to external funds, mainly from the following sources: European Trading Foundation – TEMPUS JEPs, Higher Education Financing Council of Ministry of Education and Research, World Bank, Romanian Government and industrial companies.

Thus, during 1998 – 2003 the following five major projects have been financed by the World Bank and Romanian Government: System of Integrated Laboratories for Studying CIM (director Mihail Voicu – 216,000 USD), Training Laboratory in the Field of Computer Aided Process Control (director Octavian Pastravanu – 150,000 USD), Laboratory for Electrical Drives Control (director Corneliu Botan – 150,000 USD), Integrated Laboratory for Studying, Designing and Implementation of Digital Structure for Process Control (director Teohari Ganciu – 150,000 USD), Upgrading of the Short Cycle Degree Programme on Automation Equipment (director Alexandru Onea – 35,000 USD). There were also 2 individual projects only for the equipment acquisition: Microprocessor Based Control Systems (director Corneliu Hutanu – 5,000 USD) and Digital Controller for Process Control (director – Corneliu Lazar – 5,000 USD). These funds allowed the development of new laboratories and the update of most of the existent laboratories at our department with the following major facilities for teaching and research work:

- *Flexible Manufacturing System* containing two ABB robots (IRB 1400 and IRB 2400), machine tool (EMCO PC Mill), conveyor (FlexLink), computer vision system (OptiMaster), CAD system (8 PC stations); Robot Soccer System containing 8 MiaBot mobile robots and a computer vision system; Androtec mobile robot;
- *Process control setups*: FieldPoint Distributed Control System (National Instruments) for the distributed control of industrial processes, PROCON process control trainers for level, flow and temperature (Feedback), LEYBOLD and ELWE electrical drive control trainers, Twin Rotor MIMO System (Feedback), Moeller PLCs, Laboratory kits for teaching microprocessor based systems;
- *Laboratory installation for making printed circuit boards* (Lpkf Germany);
- *Computers*: 45 computers (IBM compatible) with operating systems and basic software, 5 analogue COMDYNA computers, 7 data acquisition cards – National Instruments ATMIO16E10 with starter Kit and related drivers;
- *Software*: CATIA V5R8 (CAD); Robot Studio (robot simulation software), Eclipse, RT++, AgentOCX, LPA Prolog, Flex, Agent Toolkit (artificial intelligence software), Sucosoft V5 (PLC software), Discovery computer control aided learning software, MATLAB-

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Simulink 6.0, HMI/SCADA software Lookout, Cadence software (OrCAD) for PCB design.

The above mentioned funds have also been used to purchase important textbooks in the field of automatic control for the Faculty Library. They also contributed in the publishing of monographs and university manuals, the development of new courses in Automatic Control degree programme, the finalization of PhD thesis and the participation at international conferences.

Based on the experience accumulated from his last TEMPUS project, Alexandru Onea initiated and led other two projects having the same theme, quality assurance in higher education: MATRA project – “Developing the national strategy in the field of quality assurance in higher education in Romania”, financed by EU through the Dutch Government and the Leonardo da Vinci project – “Training in quality management system for information technology in higher education”.

Due to his outstanding contributions which are indexed in Zentralblatt fuer Mathematik (41 reviewed papers) and in ISI Web of Knowledge (46 cited papers), professor Mihail Voicu was elected, in 2006, corresponding member of the Romanian Academy. Previously, professor Mihail Voicu was elected corresponding member (in 1999) and full member (in 2004) of the Romanian Academy of Technical Sciences. Since 1998 he is senior member of IEEE (Control Systems Society) and since 2004 he became Great Officer of the Romanian Order “Merit for Teaching”. Also, he has received the “Aurel Vlaicu” prize of the Romanian Academy for the year 1987 (awarded 1990) for the papers:

- M. Voicu, Observing the State with Componentwise Exponentially Decaying Error. *Systems & Control Letters* 9 (1987), pp. 33 – 42.
- M. Voicu, On the Application of the Flow-Invariance Method in Control Theory and Design. 10th World Congress of International Federation of Automatic Control, Munich, July 26–31, 1987. Preprints, vol. VIII, pp. 364–369.

We have also to notice here that due to his outstanding contributions which appear in ISI Web of Knowledge (12 papers cited in Web of Science, 4 in Current Contents Connect, and 31 in INSPEC), professor Octavian Pastravanu was elected in 2005 corresponding member of the Romanian Academy of Technical Sciences.

Starting with the Academic year 2005 – 2006 the Romanian higher education adhered to the Bologna process. This supposed that training in Automatic Control should be based on three cycles – Bachelor, Master and Doctorate. The Bachelor degree has been established for a period of four years. The main point of the curriculum was to provide the competence to the graduates as the market required for a control engineer. The graduates’ skills were discussed by the consultative council of the Automatic Control professors from Romania, resulting in high degree of compatibility for the

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curricula of all the Romanian universities. The first years of the Bachelor programme are supposed to assure the background by means of knowledge in Mathematics, Physics, Programming, Systems Theory, and the last years offer the possibility that students can choose between several optional courses, which may determine a deeper understanding of either the process control field or the applied informatics. Taking into consideration the new name of the Bachelor specialization – namely Automatic Control and Applied Informatics and also the research interest of our staff, starting with October 2005, the name of our department became Department of Automatic Control and Applied Informatics.

The numerous contacts with the western universities permitted the change of the national scientific symposium of the Faculty in the International Symposium on Automatic Control and Computer Science organized every two years, namely in 1993 and 1995 and every three years afterwards.

Since 1991, owing to the initiative of professor Mihail Voicu, the Bulletin of the Polytechnic Institute of Iasi has a new Section dedicated to Automatic Control and Computer Science, executive editors for the Automatic Control part being from the beginning till now Octavian Pastravanu, Doru Panescu and Alexandru Onea. This journal (indexed in Zentralblatt data base) allowed the specialists in the automatic control field to point out the results of their scientific research activity.

At the present time, the Automatic Control degree programme and research programme at the Technical University “Gheorghe Asachi” of Iasi is carried out by the following teaching staff, of the Automatic Control and Applied Informatics Department from the Faculty of Automatic Control and Computer Engineering:

- *Honorary Professors*: Eugen Balaban, Ioan Bejan, Corneliu Hutanu, Leopold Sebastian
- *Professors*: Corneliu Botan, Teohari Ganciu (vice-dean of the Faculty), Corneliu Lazar (vice-dean of the Faculty), Iosif Olah, Cristea Pal, Doru Panescu (head of the Department), Octavian Pastravanu, Mihail Voicu (vice-rector of the University)
- *Associate Professors*: Stefan Dumbrava, Lavinia Ferariu, Lucian Mastacan, Mihaela Matcovschi, Letitia Mirea, Alexandru Onea (editor of the Automatic Control Section of the Bulletin of the Polytechnic Institute of Iasi), Andrei Pricop, Mihai Postolache, Gabriela Varvara
- *Lecturers*: Catalin Calistru, Florin Ostafi
- *Teaching Assistants*: Catalin Braescu, Sorin Carari, Vasile Dorin, Catalin Dosoitei, Marius Kloetzer, Mircea Lazar, Claudiu Lefter, Laurentiu Marinovici, Stefan Resmerita, Cristina Tugurlan
- *Junior Teaching Assistants*: Cristian Mahulea, Draguna Vrabie
- *PhD students*: Mircea Hulea, Ciprian Andrici, Cristina Halauca, Alexandru Toderascu

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Part of the above listed teaching assistants and junior teaching assistants are currently studying abroad as PhD students enrolled in several research programs developed by European or American Universities.

It should be noticed here that, in the nineties, many other colleagues were involved (for limited periods) in the teaching tasks and research programmes of the department. Among these Silviu Ifrim, Teodor Marcu, Bogdan Morosan, Ileana Poli, and Francisc Schönberger also obtained the PhD degree before leaving the department for other jobs (in USA, Canada, Germany, France, United Kingdom).

The academic staff of our department brought a substantial contribution to the continuous development of Automatic Control in Romania by publications with a wide degree of international visibility, as well as by participations in the highly ranked conferences of the field, organized by international professional societies, such as IFAC, IEEE, EUCA, IMACS, IFIP, IMEKO. During their activity, the academics of our department have published over 50 monographs and university courses, as well as a large number of journal and conference papers; among these papers, 177 are recorded by the ISI Web of Knowledge (22 papers cited in Web of Science, 9 in Current Contents Connect, and 146 in INSPEC). This information exclusively refers to the authors who are currently with the Department of Automatic Control and Applied Informatics (and does not include the authors on leave from our department).

After 1990, the higher education – industry liaison was materialized by different types of partnerships between our department and several national / international companies, as follows: Power Plant – CET Iasi, Honeywell SRL Bucharest, Astera Infotec SRL Bucharest (research project on neuro-predictive control of drum level); Power Plant – CET Iasi (retraining courses of automation and control engineering); Fortus Iasi, Omega Tehnoton Group Iasi, Termoelectrica Iasi, SCUDAS Pascani, FEPA Barlad, Electro Alfa International Botosani, Machine Tools Bacau, Industrial Taps Bacau, SARA Buzau (retraining courses of Robotics and CIM), Asea Brown Boverly SRL Bucharest (collaborative work in Robotics and CIM), Continental SRL Sibiu, Siemens PSE SRL Brasov, Siemens VDO SRL Timisoara, Siemens VDO SRL Iasi (collaborative work in control systems, practical training support for undergraduate and postgraduate students), The MathWorks Inc. USA (homologation of the software "Petri Net Toolbox for MATLAB" as a third party product advertised by www.mathworks.com).