About:

In this and the next issues, we publish a collection of papers from:

– the Institute for Informatics and Automation Problems at the National Academy of Sciences of the Republic of Armenia

– the Faculty of Informatics and Applied Mathematics of Yerevan State University of the Republic of Armenia

Firstly, we will give short information about these outstanding institutions.

INSTITUTE FOR INFORMATICS AND AUTOMATION PROBLEMS

Institute for Informatics and Automation Problems (IIAP) is the leading ICT research and technology development center at the National Academy of Sciences of the Republic of Armenia. Since its establishment in 1957 IIAP is the only state supported structure for software, hardware and brainware technologies. IIAP has become the leading force in ambitious State programmes developing Information Society and Information Industry in Armenia. ICT - a proven driver for global economic activity and growth, and the convergence point of all multidisciplinary research and all State societal and economic initiatives, - requires IIAP involvement, by serving with mathematical models, electronic implementation, and ICT expertise.

Historically IIAP is linked to the first computer designed and assembled in Armenia in 1960 at the famous Yerevan Scientific Research Institute for Mathematical Machines, whose research partner IIAP became.

Scientific achievements include famous fundamental theoretical results and diverse applied ICT systems and services. First machine translation system for Armenian language was created in 1963-67, which made it possible today the development of computer support tools of Armenian language. The main characteristics of real numbers, functions, and plane curves were investigated within the framework of constructive and intuitive analysis, the estimation of the complexity of logical conclusions in classic and non-classic systems were established. The existence conditions of computable and noncomputable solutions of the general form of recursive equations were investigated. The solutions to discrete optimization problems of isoperimetry and tomography were found and applied in search engines and in pattern recognition. The inductive methods of algorithm synthesis and methods of knowledge representation for expert systems development were investigated. A symmetric cryptosystem SAFER++ was developed, and successfully participated in encryption competitions. In the area of automata theory, the recognisability and definability of languages related to homogeneouuse flow event structures were investigated.

Today the main fields of scientific and applied research include theory of algorithms; theory of automata and applications, mathematical logic; discrete mathematics and combinatorics; information theory and applied statistics; algebraic coding theory; artificial intelligence and management support systems; pattern recognition and image processing; distributed processing and data bases; scientific computations; design and testing; telecommunication and networking.

IIAP has a history of successful international collaborative R&D projects and grants within the following frameworks:

INTAS[1]

- *No. 93-1702 "Efficient symbolic computing".*
- *No. 94-3094 "Information theory and combinatorics".*
- *No. 94-469 "Mathematical and statistical research in information theory and telecommunications.*
- *No. 96-52 "Concurrent heuristics in data analysis and prediction".*
- *No. 00-397 "Data Mining Technologies And Image Processing: Theory And Applications".*
- *No. 00-626 "Data Mining Algorithm Incubator".*
- *No. 01-447 "Weak Arithmetics".*
- *No. 04-77-7173 "Data Flow Systems – algorithms and complexity".*

ISTC[2]

- *No. A-823 "Creation of High-Performance Computation Cluster and Databases in Armenia".*
- *No. A-1451 "Development of Scientific Computing Grid on the Base of Arm cluster for South Caucasus Region".*
- *No. A-1606 "Development of Armenian-Georgian Grid Infrastructure and Applications in the Fields of High Energy Physics, Astrophysics and Quantum Physics".*

EU FP4

- *GEIXS "Geological Electronic Information exchange System".*
- *AMETMAS NOE "Specific research, technological development and demonstration programme in the field of cooperation with third countries and international organizations - Scientific and technological cooperation with the countries of Central and Eastern Europe".*

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[1]The independent European science foundation **INTAS** in Brussels was founded in 1993 with the objective of promoting cooperation with scientists from the New Independent States of the Soviet Union in order to preserve the scientific potential of those countries.

[2]**ISTC** (International Science and Technology Center) is an intergovernmental organization connecting scientists from countries of the Commonwealth of Independent States with their peers and research organizations in Canada, EU, Japan, Republic of Korea, Norway and the United States.

EU FP5

- *SPARTA "Security Policy Adaptation Reinforced Through Agents".*
- *ADONIS "Application Development Outsourcing to the New Independent States".*
- *TRISTAN-EAST "TRaining of IST multipliers and Awareness Nurturing in the 3rd Countries of EAST and South East Europe (NIS)".*

EU FP6

- *PORTA OPTICA "Distributed Optical Gateway to Eastern Europe".*
- *Idealist-extend "Extension of idealist34 project (the partner search and NCP support network for participants in the IST priority) in INCO Balkan and NIS countries".*

EU FP7

- *SEE GRID SCI "South East European Grid eInfrastructure for regional eScience".*
- *HP SEE "High-Performance Computing Infrastructure for South East Europe's Research Communities".*
- *BSI "Black Sea Interconnection".*
- *EGIInSPIRE "European Grid Initiative: Integrated Sustainable Pan-European Infrastructure for Researchers in Europe".*
- *IDEALIST "Your Worldwide ICT Support Network"*
- *EXTEND "EXTENDing ICT research co-operation between the European Union, Eastern Europe and the Southern Caucasus"*

IIAP has broad professional contacts in Europe (France, Germany, Hungary, Finland, Bulgaria, Netherlands, United Kingdom, Czech Republic, Poland, etc.), but also Russia, Ukraine, Georgia, Belarus and USA. List of annual publications in refereed scientific journals - more than 100. Active leadership at the helm of IIAP, always is ready to grasp new collaborative R&D opportunities, understanding their importance both for IIAP and Armenia.

IIAP designed and created the Academic Scientific Research Computer Network (ASNET-AM)[1]of Armenia and now is responsible for the developing and managing the infrastructure. IIAP is the leading institute for two State target programs funded by the Armenian Government - Creation of Armenian State Computing System and Deployment of National Grid Infrastructure. As a result the infrastructure[2] of the Armenian National Grid Initiative has been deployed.

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[1]**ASNET-AM** unifies more than 50 academic, scientific, research, educational, cultural and other organizations located in the 4 cities of Armenia.

[2] The Armenian Grid infrastructure consists of seven Grid sites (about 500 cores) located in the leading research (National Academy of Sciences of the Republic of Armenia, Yerevan Physics Institute) and educational (Yerevan State University, State Engineering University of Armenia) organizations of Armenia (in Yerevan and Ashtarak cities).

IIAP acts as the EC FP7 INCO and ICT National Contact Point for Armenia.

There are many joint activities and structure inside Armenia that involve IIAP, such as

- *The United Multidisciplinary Laboratory of Information Biology of IIAP and the Institute of Molecular Biology (acting as Health NCP for Armenia),*

- *Joint investigations with National Seismic Protection Service Agency, State Hydrometeorology and Monitoring Service of Armenia, Center for Ecological Noosphere Studies of NAS RA aiming at identifying new paradigms and algorithms, mathematical analysis and computer modelling of biological, geological and eco systems.*

- Similar initiatives link IIAP and its modeling and computation power to State Department of Emergency, Ministry of Economy with projects e-Gov, and Computer for All, Broadband Armenia and others. Other cooperation links address issues such as drug design and evaluation, cosmic rays and astronomy, banking and information security, border security, languages, cultural heritage and others. IIAP is moderator between high tech and state and social projects, and regional developments both in physical infrastructural and in electronic infrastructural levels. IIAP organizes Master's degree courses of the IT department of the International-Scientific Center of NAS RA[1] and provides the postgraduate education in computer science field.

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[1] ISEC (International Scientific-Educational Center of the National Academy of Sciences of Republic of Armenia) was established in 1997 on the basis of PhD studies operating at National Academy of Sciences of RA. Taking into consideration rich scientific potential of (most of the country's scientific potential is concentrated in) ISEC expanded its activity starting education in master degree programs in 2004.

FACULTY OF INFORMATICS AND APPLIED MATHEMATICS
OF YEREVAN STATE UNIVERSITY

Yerevan State University was established in May, 1919 and was officially inaugurated on January 23, 1921.

The Faculty of Informatics and Applied Mathematics (IAM) of the Yerevan State University is a leading educational and scientific centre preparing fundamental research scientists as well as highly-qualified programmers.

The Faculty was founded in 1971 (initially called the Faculty of Applied Mathematics) on the base of the Chair of Computing Mathematics, which was established at the Faculty of Physics and Mathematics in 1957. A decisive role in Faculty's establishment, defining the roadmap of its scientific research and preparing human resources for the Faculty was played by such distinguished scientists as: A.A. Lyapunov, S.N. Mergelyan, Yu.I. Zhuravlev. S.N. Mergelyan was also the first Head of the Chair of Numerical Analysis - one of the three Chairs of the newly founded Faculty.

At present the Faculty of IAM consists of three chairs: the Chair of Programming and Information Technologies, the Chair of Discrete Mathematics and Theoretical Computer Science and the Chair of Numerical Analysis and Mathematical Modelling. The Staff of the Faculty includes more than 10 Doctors of Sciences and around 50 of the employees are Candidates of Science. Many of them are well-known not only in Armenia but also abroad. The Faculty prepares Bachelors specialized in "Informatics and Applied Mathematics" (both, full - and part-time). All three Chairs of the Faculty provide courses for this purpose. The Faculty provides Master degree in four different programmes. Three of them are carried out by the Faculty Chairs and one is being realized in collaboration with SYNOPSYS company. The study plan for the students of the Faculty provides a fundamental mathematical training and a wide spectrum of courses, related to computers and programming; a significant part of study is a practical work realized on computers.

Since its establishment the Faculty of IAM has been collaborating productively with the Yerevan Research Institute of Mathematical Machines and the Institute for Informatics and Automation Problems of NAS of Armenia (former Computing Centre of Academy of Sciences of Armenian SSR), being the main provider of highly-qualified specialists for these organizations. The Faculty has close scientific contacts with leading educational and scientific centres of Russia, such as M.V. Lomonosov Moscow State University, Dorodnicyn Computing Centre and Steklov Mathematical Institute of the Russian Academy of Sciences. Employees and post-graduate students of the Faculty defend their dissertations in Armenia and also in mentioned above centres in Russia. The Faculty has scientific contacts with the Trier University, Germany.

Lots of the graduates are working in different countries in the fields, where computers are used, that is academic and research institutes, universities, state and government organizations, banks, companies with IT profile etc.