



Yerevan State University
IT Educational and Research Center

ALIGNMENT OF UNIVERSITY EDUCATION TO IT DEVELOPMENT TRENDS

Samvel K. Shoukourian

samshouk@sci.am

Doctor of Science in Physics and Mathematics

Member of the National Academy of Sciences of Armenia

Scientific Leader

IT Educational & Research Center

Yerevan State University

Sr. Manager,

Embedded Test and Repair,

Solutions Group

Synopsys, Inc.

Scientific Leader of IT Educational and Research Center



Phone: +374 60 710044 Cell: +374 93 411396

Email: samshouk@sci.am

1 A.Manoogian Street Yerevan Armenia 0025

Received the Doctor of Science degree in Physics and Mathematics in 1990 and the Academic Rank of Professor in Computer Science and Software Engineering in 1993 from the Supreme Certification Board (Moscow). In 1996, was elected a Full Member of the National Academy of Sciences of Armenia. Since 1994, simultaneously with the work at YSU, he has been Chief Scientific Advisor and Development Director in different international companies. Since 2000, is directing the Department of Embedded Test and Repair at Virage Logic Corporation (USA) and since 2010, the same department at Synopsys, Inc (USA). State Prize of Armenia in 2013, has authored more than 90 papers, and holds Russian and U.S. patents. The main topics of his current research interests include **testing of electronic devices and systems, formal models of distributed systems, information technologies and architectures for multimedia virtual environments.**



Content

- Strategic Directions
- Achievements in Education and Research
- IT Market Development and Industry-University Cooperation



Background and Goals

Established in 2007, IT Educational and Research Center (IT ERC) serves as an interdisciplinary hub for educational programs, for research in information science and technology, and for development and implementation of e-governmental and quality assurance information systems in education.

Center's expertise is set in four main areas: traditional education, online and distance learning, scientific research, and advanced solutions for career development.



Center of Excellence

- Covering all technology sectors is impossible
- Concentration of expertise
 - Leverage existing university and industrial expertise
- Develop certain technology sectors
- Accelerate new investments to Armenia
- ROI: Short term profitability needed
- VLSI Design & Test as a Center of Excellence
- Formal Models of Distributed Systems
- Combined Methods of Education and Embedded Systems as the next centers

Collaboration between industry and university
- establish education, training and research programs
to build infrastructure centers for excellence



Strategic Directions

Pipeline for Life-Long Education and Training

Develop a pipeline driving new talent into IT industry

- Ensure that graduating students have necessary skills, experience and drive to work within IT field

Foster attractive environment for continuous stream of new applicants

IT Industry Oriented Research Environment

Actively participate in research and development of current topics and emerging issues within IT industry

Develop and implement mechanisms for continuous engagement in research activities

- Ensure funding and attract talented students

Strategic Development of IT Market

Advance development of IT industry ecosystem

- Ensure reflection of new technologies in curricula and research
- Bring together industry and academia to accelerate industry expansion

Promote establishment of startups on university campuses (TIGER project)



Research Activities: Test and Repair Infrastructure for Electronic Devices and Systems

- 14 PhD theses in the area
- Multiple publications, particularly, in IEEE Design and Test of Computers, JETTA, IEEE TCAD
- 12 US patents
- Over 500 references to the published papers and patents
- State Prize of Armenia in 2013
- Presentations and invited talks at ITC, DATE, IEEE VLSI Test Symposium, IEEE European Test Symposium, IEEE East-West Design and Test Symposium
- Participation in Program Committees of international conferences
- Participation as reviewers in internationally recognized journals
- In 2008 Gurgen Harutyunyan and in 2017 Grigor Tchagharyan have received IEEE G.W.Gordon Award for Student Service at International Test Conference



Research Activities: Formal Models of Distributed Computing Systems

- 15 PhD theses in the area
- Solution of several known open problems
- Multiple publications, particularly, in Journal of Computer and System Sciences, Fundamenta Informaticae, Lecture Notes in Computer Science
- Presentations and invited talks at international conferences
- Participation in Program Committees of international conferences
- Participation as reviewers in internationally recognized journals and conferences
- In 2008 Hayk Grigoryan has received feedbacks on his PhD thesis from many famous scientists including Michael S. Paterson and Donald Knuth



Yerevan State University
IT Educational and Research Center

Discussion on IT Education and Research with Professor Donald Knuth





Examples of Research Grants, Publications and Conferences

Grants

ATT Bell Labs (USA), CRDF (USA), INTAS (EU), DAAD, DFG (Germany), NATO, ISTC (USA, Japan, EU), TEMPUS (EU), OSI, EU FP, Erasmus+

Patents

12 US Patents, several pending applications

Journals

Journal of Computer and System Sciences (JCSS)

Fundamenta Infomaticae (FI)

Lecture Notes in Computer Science (LNCS)

Journal of Electronic Testing: Theory and Applications (JETTA)

IEEE Design and Test of Computers

IEEE Transaction on CAD of Integrated Circuits and Systems

Conferences

International Test Conference (ITC)

Languages and Automata: Theory and Application (LATA)

VLSI Test Symposium (VTS)

SCS Advanced Simulation Technologies Conference (ASTC)

Advances in Databases and Information Systems (ADBIS)

European Test Symposium (ETS)



Research Activities: Infrastructure for Learning Environments

1. Activities in combined methods of education started in 1997

2. Armenian Virtual College (AVC) Goals:

- to reach a wider base of Armenian diaspora students worldwide beyond limits of traditional face-to-face educational institutions - **outreach**
- to provide state-of-the-art multimedia resources to students and instructors in traditional Armenian educational system – **strength**
- to cover a variety of education languages: Eastern Armenian, Western Armenian, English, Russian, French, Spanish – **ease-of-use**

www.avc-agbu.org

STATE OF ART: Traditional vs. Virtual Learning

Computerized frameworks supporting traditional learning:

- reached maturity
- widely available
- impressively easy to use
- became the commodity on the market
- variety of applications and environments including:
 - e-content development automation,
 - desktop publishing,
 - data visualization
 - office management automation

Virtual Learning already offers:

- A variety of infrastructural concepts, requiring complex computerized frameworks
- performance studies of these concepts are difficult
- understanding of delivered
- performance is poor
- framework development is platform dependent and expensive
- few vendors offer applications and problem solving environments for distance learning

Implementation Tactics

- To provide mature support of virtual learning
- To provide continuous practical advices to learners and to facilitate learning with new technologies
- To provide support of tutoring using synchronous and asynchronous communications with tutors/instructors
- To provide new learning tools, to develop training, testing and evaluation of study outcomes
- To provide crediting and certification for developed courses and programs

Realization Outcomes

- Leverage
 - Educational experience and infrastructure
 - Global virtual learning pedagogic expertise, know-how, and use models
 - Present expertise in subject matter
 - Technical development expertise in creation of courseware and virtual education framework
- Extend the educational mission of IT ERC

Requirements to a Virtual Educational System

- Course Information
 - Lectures (sound, text, pictures, video, animations., etc.)
 - Syllabus
 - Outcomes
- Communications w Virtual Tutor/Instructor and Classmates
 - Chat / Discussions
 - Mail
 - Office hours
- Calendar, FAQ
- Study Tools – Games, puzzles, crosswords, etc.
- Quizzes, Evaluations, Blocking Tests
- Assignment Drop Box
- My Grades
- Supplemental Resources



AVC - Curriculum

- Stand-alone courses and Certificate Programs for students
- Armenian Studies Courses (Core)
 - A- Armenian **Language** (9 levels)
 - B- Armenian **History** (8 levels)
 - C- Armenian **Culture** (Music, Architecture, Visual Art, etc)
- Chess
- New courses regularly augmented
- Multilingual support (in six languages):
Western Armenian, Eastern Armenian, English, Russian, French,
Spanish, Turkish

AVC in Buenos Aires



Other Applications of the Infrastructure

- Common Multimedia Courses for Armenian Universities
 - Ecology
 - Basics of Natural Sciences
 - Armenian Studies
- Common Database for Electronic Courses, Supportive Materials and Projects at Yerevan State University
- Tuning of the Infrastructure to individual students and hybrid forms of education
- Support of interactive learning



EU ERASMUS+: DOCMEN - Development of two cycle Innovative curricula in microelectronic engineering

www.docmen-project.pl

EU partners

Cracow University of Technology www.pk.edu.pl Poland, Cracow

Technische Universität Berlin www.tu-berlin.de Germany, Berlin

Technical University of Sofia www.tu-sofiag Bulgaria, Sofia

Politecnico di Torino www.polito.it Italy, Turin

ECM Space Technology GmbH www.ecm-space.de Germany, Berlin

Partner countries / target universities

L.N. Gumilyov Eurasian National University www.enu.kz Kazakhstan, Astana

Caspian Public University www.cu.edu.kz Kazakhstan, Almaty

Shakarim State University of Semey www.semgu.kz Kazakhstan, Semey

North Kazakhstan State University www.nkzu.kz Kazakhstan, Petropavlovsk

Yerevan State University www.ysu.am Armenia, Yerevan



EU ERASMUS+: DOCMEN - Development of two cycle Innovative curricula in microelectronic engineering (cont.)

Partner countries/target universities

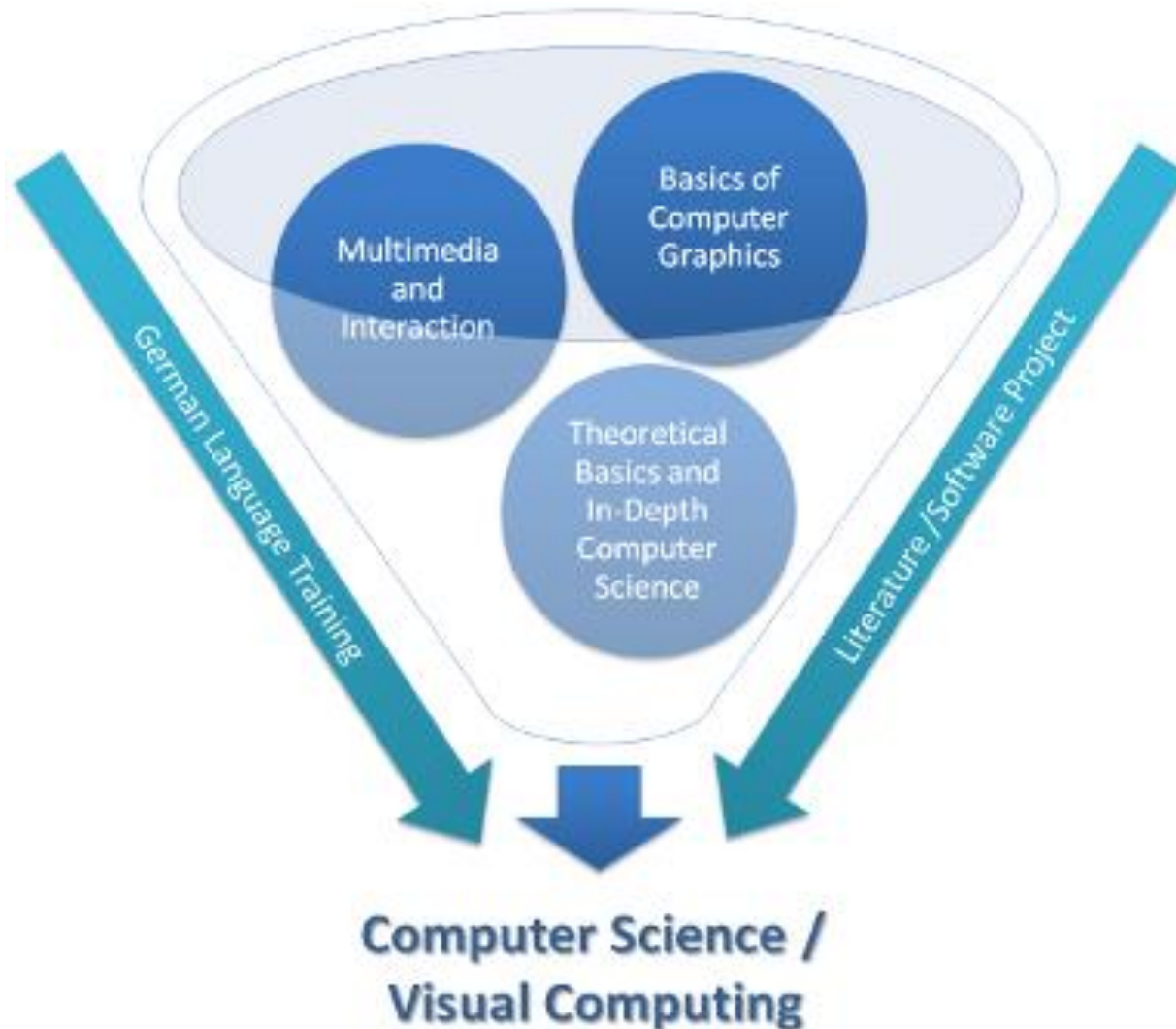
- National Polytechnic University of Armenia www.polytech.am Armenia, Yerevan
European Regional Educational Academy Foundation www.era.am Armenia, Yerevan
Gavar State University www.gsu.am Armenia, Gavar
Tel Aviv University www.tau.ac.il Israel
Tel Aviv Bar-Ilan University www.biu.ac.il Israel
Ramat Gan Sami Shamoon College of Engineering www.sce.ac.il Israel
Beer-Sheva Holon Institute of Technology www.hit.ac.il, Israel, Holon

Associated partners

- Kazcosmos / National Center of Space Research and Technology kazcosmos.gov.kz
Kazakhstan, Astana
Ray Techniques Ltd www.nanodiamond.co.il Israel Givat Ram



Visual Computing Program Structure





Visual Computing Program

First double degree graduate program in Armenia

For the first three years the project is supported by German Academic Exchange Agency (DAAD).

First three semesters – combined (remote+local) studies in Yerevan, one semester – local studies in Rostock (Germany)

Language of Study - English

Application Requirements :

- BS or MS in relevant field with min 30 credits in CS and 27 credits in Math
- iBT TOEFL score of 55% or higher

Study Methods and Tools

- Lectures are recorded in Rostock and in Yerevan
- All learning materials (including supplemental handouts etc.) are posted on U of Rostock website (Moodle platform)

Welcome to IT ERC Commencement





Evolution of Combined Learning at IT ERC

- Virtual labs
- Separate courses

- Educational Programs
- Armenian Virtual College

- International Graduate Programs

- Participation in Educational Consortia (like SAKAI)
- Development of Integration Interfaces
- Multilingual Support of Beginners

- International Cooperation
- International Student Community