

# Géza KOLUMBÁN

Fellow of IEEE, Professor of System Engineering

D.Sc., Dr.habil, C.Sc., Ph.D., M.Sc.

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## 1 Personal information

Surname: Kolumbán  
First name: Géza  
Sex: male  
Nationality: Hungarian  
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Date and place of birth: April 16, 1951, Budapest, Hungary  
Present employer: Department of Measurement and Information Systems  
Budapest University of Technology and Economics  
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## 2 Academic degrees and education

Date	Qualification gained	Institution
2005	Dr.habil	Budapest University of Technology and Economics
2004	Doctor of Technical Science degree in telecommunication (D.Sc.)	Hungarian Academy of Sciences
1990	Candidate of Technical Science degree in circuit theory (C.Sc.)	Hungarian Academy of Sciences
1990	Doctor - Univ. degree in telecommunication (Ph.D.)	Technical University of Budapest
1977	M.Sc. Degree in teaching of technical sciences	Technical University of Budapest
1976	M.Sc. Degree in electrical engineering	Technical University of Budapest

### 3 Knowledge of languages

Proficiency exam in English (written and spoken) and in Russian.

### 4 Awards

Date	Award
2003-2006	Széchenyi Scholarship of most outstanding Hungarian University Professors
2002	Siemens Research Award
1999-2002	Széchenyi Scholarship of most outstanding Hungarian University Professors
1986	prize for a published paper
1985	prize for an oral contribution
1984	"Excellent Engineer"
1983	"Excellent Inventor" - golden degree
1978	"Excellent Engineer"

### 5 Memberships in societies and other bodies

#### 5.1 IEEE membership

Date	Grade	Citation
2005	Fellow	<i>"for contributions to double sampled phase-locked loops and noncoherent chaotic communications"</i>
1998	Senior Member	
1992	Member	

#### 5.2 Technical Committee on Nonlinear Circuits and Systems (IEEE-CAS Society)

Date	Grade
2000-	Member

#### 5.3 Circuits, Systems and Computers Joint Chapter (CS&C) (IEEE – Hungary Section)

Date	Grade
2006-	Chapter Chair

#### 5.4 Other bodies

Date	Institution	Grade or duty
2001-	Centre for Chaos Control and Synchronization, City University of Hong Kong	Associate Member
1997-2000, 2003- 2004	NDES Scientific Committee	Member
1994-1998	MATE, Electronic Measurement Society	Secretary

## 6 Member of Editorial Board

<b>Date</b>	<b>Journal</b>	<b>Duty</b>
2003-	Dynamics of Continuous, Discrete and Impulsive Systems, Series B (DCDIS-B)	Assoc. Editor

## 7 Participation in organizing international conferences

<b>Date</b>	<b>Conference</b>	<b>Duty</b>	<b>Co-organizer</b>
2008	NOLTA	General Co-Chair	T. Endo
2003-	IEEE-ISCAS	Review Committee Member	
2003	IASTED-CSS	Member of International Program Committee	
2001	IEEE-ISCAS	Organization of a special session on "Application of Chaos to Communication Systems"	G. M. Maggio
2000	IEEE-ISCAS	Organization of a presymposium tutorial on "Chaotic communications"	M. P. Kennedy
1998	NOLTA	Organization of a special session on "Communicating with Chaos"	M. P. Kennedy
1998	NDES	Conference Chairman	
1998	IEEE-ISCAS	Organization of a special session on "Communicating with Chaos"	M. P. Kennedy
1997	ECCTD	Organization of a special session on "Spread Spectrum Communications and Chaos"	M. P. Kennedy

## 8 Work experience

<b>Date</b>	<b>Employer/Institution</b>	<b>Position</b>
1993-	Budapest University of Technology and Economics (called Technical University of Budapest before 2000)	Professor of System Engineering, Head of the Chaotic Systems Team
1992-1993	Eastern Mediterranean University, Famagusta, Cyprus	Associate Professor
1991-1992	Bilkent University, Ankara, Turkey	Assistant Professor
1983-1991	Research Institute for Telecommunications	Senior Research Fellow, Head of the Frequency Synthesizer Team
1980-1983	Hungarian Academy of Sciences	Holder of scientific scholarship
1976-1980	Fine Mechanical Enterprise	Research Engineer

## 9 Publications

**Number of publications:** 114 in English:      The most significant ones:  
8 book chapters published in the USA  
20 referred international journal papers  
8 invited tutorials and keynote addresses  
3 in Russian  
23 in Hungarian

**Total number of citations:**      **775** (all self citations are excluded)

**Number of cited publications:**      **63**

**Two** of his papers, co-authored with Profs. M.P. Kennedy and L.O. Chua, have been ranked in **top-cited IEEE Trans.-I articles**.

**Topics of publications:** Design and analysis of microwave oscillators and local generator circuits  
Large-signal characterization of microwave transistors  
Theory and implementation of satellite telecommunication systems  
Theory and development of microwave BURST-FH systems  
Theory and application of sampling phase-locked loops, development of frequency synthesizers  
Nonlinear dynamics and chaotic behavior of the phase-locked loops  
Application of chaotic signals in broadband measurements  
Digital data communication using chaotic signal as wideband carrier  
Theory and practice of ultra-wideband radio

**Number of patents:**      6 granted (5 Hungarian and 1 Irish)

## 10 Longer time periods spent abroad — Part I

<b>Date</b>	<b>Location</b>	<b>Purpose</b>
2007	The Hong Kong Polytechnic University Dept. of Electronic and Inf. Eng. Hong Kong / China	Visiting Overseas Professor
2004-2005	The Hong Kong Polytechnic University Dept. of Electronic and Inf. Eng. Hong Kong / China	Visiting Overseas Professor
2002	The Hong Kong Polytechnic University Dept. of Electronic and Inf. Eng. Hong Kong / China	Academic Visitor

## Longer time periods spent abroad — Part II

Date	Location	Purpose
2001	City University of Hong Kong Dept. of Electrical Engineering Hong Kong / China	Academic Visitor
2001	University College Cork Dept. of Microelectronic Engineering Cork / Ireland	Visiting Professor
1999	University College Dublin Dept. of Electronic and Electrical Eng. Dublin / Ireland	Joint research in the framework of INSPECT Project financed by EU
1998-1999	University College Dublin Dept. of Electronic and Electrical Eng. Dublin / Ireland	Joint research in the framework of INSPECT Project financed by EU
1997	University College Dublin Dept. of Electronic and Electrical Eng. Dublin / Ireland	Joint research in the framework of INSPECT Project financed by EU
1996	Technical University of Dresden Inst. for Fundamentals of Electrical Eng.	DAAD Scholarship
1996	University of California at Berkeley Dept. of Electrical Eng. and Comp. Sciences Nonlinear Electronics Laboratory	Visiting Researcher
1996	Swiss Federal Institute of Technology Lausanne Department D'Electricite Lausanne / Switzerland	Visiting Researcher
1996	Technical University of Dresden Inst. for Fundamentals of Electrical Eng. and Electronics	Visiting Professor
1995	University College Dublin Dept. of Electronic and Electrical Eng. Dublin / Ireland	Joint research
1995	The University of Hull Dept. of Electronic Engineering Hull / UK	Joint course development in the framework of the TEMPUS Program financed by EU
1994	Swiss Federal Institute of Technology Lausanne Department D'Electricite Lausanne / Switzerland	Joint research
1992-1993	Eastern Mediterranean University Dept. of Electrical and Electronic Eng. Famagusta / Cyprus	Associate Professor

## Longer time periods spent abroad — Part III

<b>Date</b>	<b>Location</b>	<b>Purpose</b>
1991-1992	Bilkent University Dept. of Electrical and Electronics Eng. Ankara / Turkey	Visiting Assistant Professor
1980	Kiev / USSR	Installation of a microwave radio relay equipment manufactured for the Moscow Olympic Games

### 11 Major projects involved

- **International scientific projects**

- Innovative signal processing exploiting chaotic dynamics (INSPECT), Esprit Project 31103, Open LTR, financed by European Union
- Spread spectrum communication exploiting chaos, financed by the Office of Naval Research, USA

- **System engineering projects**

- Low-capacity, easy-to-install digital microwave telecommunication system (FSK, 15 GHz)
- Microwave frequency hopping telecommunication system (1.5 GHz)
- Single channel per carrier satellite telecommunication system
  - \* microwave up (6 GHz) and down (4 GHz) converter
  - \* single channel per carrier channel unit (QPSK, 70 MHz)
  - \* Wireless local area network (WLAN) radio system (PRISM chipset, ISM band, 2.4 GHz)
  - \* Development of new modulation schemes for chaotic WLAN radio systems

- **Circuit development projects**

- High speed frequency synthesizer for frequency hopping system (UHF Band)
- Frequency synthesizers and local generators for satellite telecommunication (90-140 MHz) and mobile radio communication systems (130-170 MHz)
- Local oscillators for microwave analog radio relay systems (4 and 6 GHz)
- Microwave transistor power amplifiers and VCO circuits (2 GHz)
- Phase-locked loops for different applications

## 12 Scientific projects co-ordinated and headed

<b>Date</b>	<b>Title</b>	<b>Financed by</b>
2002-2006	Development and analysis of novel signal processing architectures to be applied in integrated circuits	Hungarian Scientific Research Fund (OTKA), T038083
1999-2001	Chaotic signal synthesizers for telecommunications and measurement applications	Hungarian-French Intergovernmental S&T Cooperation Programme, NP-1856/98, F-29/98
1996-1999	Study of chaotic behavior of nonlinear circuits	Hungarian Scientific Research Fund (OTKA), T020522
1995-1999	Application of chaotic PLL in data transmission	Hungarian Telecommunications Company (MATÁV), 2/95
1994-1995	Theory and applications of nonlinear dynamics and chaos	Hungarian Ministry of Education

## 13 Courses taught in English

<b>University/Department</b>	<b>Subject</b>
The Hong Kong Polytechnic University Dept. of Electronic and Inf. Eng.	Advanced Telecommunication Systems Communication Fundamentals
Budapest Univ. of Technology and Economics Dept. of Measurement and Information Systems	Theory and Applications of Nonlinear Dynamics and Chaos (Ph.D. course)
University of Veszprém Dept. of Information Technology and Automation	Signals and Systems, Theory of Measure- ments
Eastern Mediterranean University Dept. of Electrical and Electronics Eng.	Analog Electronics Modern Electronic Communications Phase-Locked Loops (Ph.D. course)
Bilkent University Dept. of Electrical and Electronic Eng.	Analog Electronics Digital Electronics Microwave Circuits Sampling Phase-Locked Loop (Ph.D. course)

## 14 Courses taught in Hungarian

University/Department	Subject
Budapest Univ. of Technology and Economics Dept. of Measurement and Information Systems	Sensor Networks Theory and Design of Embedded Systems Networking Devices of Embedded Systems System Level Design of Wireless Networking Devices Analog and Digital Electronics
Technical University of Budapest Dept. of Measurement and Instrument Eng.	Electrical Instruments and Their Circuits
Technical University of Budapest Dept. of Microwave Telecommunications	Microwave Circuits

## 15 Industrial experience, consultancy service and research

### 15.1 Research Institute for Telecommunications (TKI), Budapest, Hungary 1980–1991

From 1980 to 1983, I spent three years on leave with the Research Institute for Telecommunications (TKI), supported by a scholarship of the Hungarian Academy of Sciences. In 1981, I joined a department which was set up to develop an SCPC satellite telecommunication system. I took part in the determination of the system specification and in the elaboration of the technical proposal. Subsequently, I developed the time/frequency unit providing the clock, reference and local signals for the equipment. I was the head of a group of engineers that was established to develop frequency synthesizers.

From 1983 to 1991, I was employed by the Research Institute for Telecommunication, working mainly in the fields of phase-locked loops and frequency synthesis. In 1986, I developed a frequency synthesizer system for a microwave BURST-FH system. In 1988, I determined the system specification and elaborated the technical proposal for an up/down converter equipment developed for the INTERSPUTNIK satellite telecommunication system. In 1989, I developed the system proposal for a low-capacity microwave digital radio relay system.

### 15.2 Fine Mechanical Enterprise (FMV), Budapest, Hungary 1976–1980

At the Fine Mechanical Enterprise (FMV), I developed high frequency oscillators and microwave local generators for high-capacity microwave radio relay systems. In addition to the development of these circuits, I took part in their transition from the development phase to their mass production. When it was needed I provided a support in the mass production. I also designed and built microwave transistor power amplifiers and VCO circuits. In 1980, I participated

in the installation of a high-capacity microwave radio relay system manufactured by the Fine Mechanical Enterprise for the Moscow Olympic Games.

### 15.3 Consultancy service

<b>Date</b>	<b>Company</b>	<b>Topic</b>
2004, 2005	Samsung Advanced Institute of Technology (SAIT) Suwon, Korea	Ultra-wideband radio
1998-1999	SSL Dublin, Ireland	Low-IF Bluetooth wireless data communication system

### 15.4 Industrial research

<b>Date</b>	<b>Company</b>	<b>Topic</b>
2007-2008	National Instruments Hungary	New networking data communications devices and their automated testing
2006-2007	Continental Automotive Systems Budapest	Automated production lines Embedded systems