

# Gheorghe M. STEFAN

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## EDUCATION:

1980 Ph.D. in Electronics, Politehnica University of Bucharest (PUB), coordinator:  
Professor Mihai Draganescu  
1971 BS & MS in Electronics, Politehnica University of Bucharest

## EXPERIENCE:

2012-*to date*: Head of **DCAE Department**, ETTI, UPB  
2011-*to date*: Corresponding Member of the **Romanian Academy**  
2003-2009: Chief Scientist & co-Founder, **BrightScale** (formerly *Connex Technology* (formerly *Gemicer*)), CA  
2001-2003: Visiting (research & teaching), **St. Marry's College of Maryland University**, MD  
2001-2003: Senior Consultant, **Infocruiser**, MD  
2001: Visiting (research), **Smith College**, Northampton, MA  
2000-2001: Senior Consultant, **NoBug Consulting**, Sunnyvale CA (Bucharest office)  
1997- *to date*: Professor, **PUB, Faculty of Electronics**  
1992-2000: Adjunct Professor, **University Transilvania of Brasov**  
1992- *to date*: Manager, **Center of New Electronic Architecture of the Romanian Academy**  
1990-91: Minister of Education & Science in the **Romanian Government**  
1990-97: Associate Professor, **PUB, ETTI**  
1988-90: Assistant Professor, **PUB, ETTI**  
1972-88: Teaching Assistant, **PUB, ETTI**  
1971-72: Assistant Researcher, **Institute of Atomic Physics**, Bucharest

## PATENTS & PUBLICATIONS & TALKS

### Patents

- Gheorghe Stefan, Dominique Thiebaut:  
*Memory Engine for the Inspection and Manipulation of Data*  
(United States Patent 6,760,821, July 6, 2004; Filed: August 10, 2001)
- Gheorghe Stefan, Dominique Thiebaut, Dan Tomescu:  
*Associative memory device*  
(United States Patent 7,069,386, June 27, 2006; Filed: May 10, 2004)
- Dan Tomescu, Gheorghe Stefan:  
*Data processing system having a Cartesian Controller*  
(United States Patent 7,107,478, September 12, 2006; Filed: December 4, 2003)
- Gheorghe Stefan, Dan Tomescu:  
*Cellular Engine for a Data Processing System,*  
(United States Patent 7,383,421, June 3, 2008 ; Filed: December 4, 2003)
- Bogdan Mitu, Gheorghe Stefan, Dan Tomescu:  
*Array of Boolean logic controlled processing elements with concurrent I/O processing and instruction sequencing*  
(United States Patent 7,451,293, November 11, 2008 ; Filed: Oct. 21, 2005,)
- Gheorghe Stefan, Dan Tomescu:  
*Cellular Engine for a Data Processing System,*  
(United States Patent 7,908,461, March 15, 2011 ; Filed: December 19, 2007)

### **Pending patent applications**

- Gheorghe Stefan:  
*Integral parallel machine,*  
Serial No. 11/897825 - Filed August 31, 2007.
- Bogdan Mitu, Gheorghe Stefan, Lazar Bivolarski:  
*Multi-sequence control for a data parallel system,*  
Serial No. 11/897798 - Filed August 30, 2007.
- Marius Stoian, Gheorghe Stefan:  
*Hardware Multi-Core Processor Optimized for Object Oriented Computing,*  
Serial No. 20080177979 - July 24, 2008.

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### **Electronic pre-prints posted at: <http://arh.pub.ro/gstefan/>**

- Gh. Stefan:  
*Loops & Complexity in Digital Systems. Lecture Notes on Digital Design in the Giga-Gate per Chip Era*
  - Gh. Stefan:  
*Limite care deschid. Eseuri despre o lume avida de intelesuri si coplesita de complexitate.*
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## Books and Monographs

- Fred Popovici, Gheorghe M. Stefan:  
*Sunet si complexitate. Strategii nelineare in compozitia muzicala*,  
Ed. UPB, 2013.
  - Gheorghe M. Stefan:  
*Ethos - Pathos - Logos. Eseuri despre unitatea triadica*,  
Ed. ALL, 2010.
  - Gheorghe M. Stefan:  
*Circuite si sisteme digitale*,  
Ed. tehnica, 2000.
  - Gheorghe M. Stefan:  
*Circuit Complexity, Recursion, Grammars and Information. Multiple Morphisms*,  
Ed. Transilvania University of Brasov, 1997.
  - Gheorghe M. Stefan:  
*Introduction to Functional Design of Digital Systems*,  
IPB Press, 1994, (preprint, TIMA, ENPG, Grenoble, France, iulie 1993).
  - Gheorghe M. Stefan:  
*Circuite integrate digitale*,  
Ed. Denix, Bucuresti, 1993.
  - Mihai Draganescu, Gheorghe M. Stefan, Corneliu Burileanu:  
*Electronica functionala*,  
Ed. Tehnica, Bucuresti, 1991.
  - Gheorghe M. Stefan:  
*Functie si structura in sistemele digitale*,  
Ed. Academiei Romane, Bucuresti, 1991.
  - Gheorghe M. Stefan, Ioan Draghici, Tiberiu Muresan, Eneea Barbu:  
*Circuite integrate digitale*,  
Ed. Didactica si pedagogica, Bucuresti, 1983.
  - Mihai Draganescu, Victor Sahleanu, Constantin Balaceanu, Alexandru Giuculescu,  
Gheorghe M. Stefan, Petre Mocanu:  
*Precursori romani ai ciberneticii*,  
Ed. Academiei RSR, Bucuresti, 1979; (the English version: *Odoubleja between Amper  
and Wiener*, Ed. Academiei RSR, Bucuresti, 1981).
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## Text Books / Curriculum Materials

- Gh. Stefan, V. Bistriceanu:  
*Circuite integrate digitale. Probleme. Proiectare*,  
Ed. Didactica si pedagogica, Bucuresti, 1992. Reprinted by Editura Albastra, 2000.
- A. Rusu, Gh. Stefan, Gh. Brezeanu:  
*Dispozitive si circuite electronice - Clegere de probleme de proiectare*,  
IPB Press, 1988; Reprinted IPB Press, 1991
- D. Dascalu, Gh. Stefan, Gh. Brezeanu, A. Rusu, et all.:  
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Ed. Didactica si pedagogica, Bucuresti, 1982.
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*Circuite electronice - Culegere de probleme*,  
IPB Press, 1980.
- Sanda Maican, Gh. Stefan:  
*Culegere de probleme de circuite integrate digitale*,  
IPB Press, 1979.
- M. Bodea, I. Mihut, M. Hancu, Sanda Dumitrescu, Gh. Stefan:  
*Aparate de masura si control - Indrumar de laborator*,  
IPB Press, 1977.
- Sanda Stefan, Gh. Stefan:  
*Circuite integrate digitale - Indrumar de laborator*,  
IPB Press, 1976.

## Papers and Communications

### 2015

- Mihaela Malita, Gheorghe M. Stefan: "MapReduce Programmable Accelerator for Neural Networks", *ICAT 2015*, Antalya, Aug., 2015.
- Mihaela Malita, Gheorghe M. Stefan: "From Kleene's Model to the Parallel Abstract Machine", *DACS 2015*, Bucuresti, June, 2015.
- Mihaela Malita, Gheorghe M. Stefan: "Functional Language for Map-Reduce Architecture", *ICTEI 2015*, Chisinau, May, 2015.
- Mihaela Malita, Gheorghe M. Stefan: "MapReduce Accelerator for Embedded Applications", *BARC 2015*, Boston, January, 2015.

### 2014

- Gheorghe M. Stefan, Mihaela Malita: "Can One-Chip Parallel Computing Be Liberated From Ad Hoc Solutions? A Computation Model Based Approach and Its Implementation", *18th International Conference on Circuits, Systems, Communications and Computers (CSCC 2014)*, Santorini Island, Greece, July 17-21, 2014, 582-597.

- Calin Bira, Liviu Gugu, Mihaela Malita, Gheorghe M. Stefan: "*Transpose-MapReduce Applications on Connex Architecture*", in *ROMJIST*, Volume 17, Number 2, 2014, pp. 150-176.
- Gheorghe M. Stefan: "MapReduce - an Integrative Paradigm in Cyber-Physical Systems" in *Proceedings of The Third International Workshop on Cyber-Physical Systems*, May 2014.
- Gheorghe M. Stefan: "Arhitectura emergentei" in *Academica*, no. 3, martie, 2014, pp. 49-53.
- Gheorghe M. Stefan: "Structural-fenomenologia lui Mihai Draganescu" in *Lettre Internationale*, no. 89, 2014, pp 82-85.

## 2013

- Gheorghe M. Stefan: "Forma si fenomen in muzica" in *Lettre Internationale*, no. 88, 2013, pp 40-42.
- Calin Bira, Liviu Gugu, Mihaela Malita, Gheorghe M. Stefan: "Maximizing the SIMD Behavior in SPMD Engines", in *Proceedings of the World Congress on Engineering and Computer Science 2013 Vol I WCECS 2013, 23-25 October, 2013, San Francisco, USA*, pp 156-161.
- Gheorghe M. Stefan: "Mintea de copil a lui Turing" in *Lettre Internationale*, no. 86, 2013, pp 44-47.
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- Mihaela Malita, Gheorghe M. Stefan: "Control Global Loops in Self-Organizing Systems" in *ROMJIST*, Volume 16, Numbers 2-3, 2013, pp. 177-191.

## 2012

- Mihaela Malita, Gheorghe M. Stefan: "Architectural Principles for One-Chip Parallel Computer", in *Recent Advances in Information Science. Proceedings of the 3rd European Conference of Computer Science*, Paris, France, December 2-4, 2012, pp 143-148.
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- Gheorghe M. Stefan: "Stiinta integrativa a cunoasterii", in *Academica*, Anul XXII, Nr. 6-7, Iunie - Iulie 2012.
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## 2011

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## 2010

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- Ana-Maria Calfa, Gheorghe Stefan: "Matrix Computation on the Connex Parallel Architecture", *International Conference on Signals and Electronic Systems*, Gliwice, Poland, Sept. 2010.
- Gheorghe M. Stefan: "Integral Humanism", *Conference on Intercultural Humanism*, Oxford, 9-12 September 2010.
- Mihaela Malita, Gheorghe Stefan: "Many-Processor & Kleene's Model", in *Scientific Buletin of UPB, serie C*, no. 3, 2010

## 2009

- Gheorghe Stefan: "One-Chip TeraArchitecture", in *Proceedings of the 8th Applications and Principles of Information Science Conference*, Okinawa, Japan on 11-12 January 2009.
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- Mihaela Malita, Gheorghe Stefan: "The Berkeley Motifs and an Integral Parallel Architecture", in *ROMJIST*, vol. 12, no. 1, 2009, pag. 35-49
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## 2008

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## 2007

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## 2006

- Gheorghe Stefan: "Integral Parallel Computation", in *Proceedings of the Romanian Academy, Series A: Mathematics, Physics, Technical Sciences, Information Science*, vol. 7, no. 3 Sept-Dec 2006, p.233-240.
- Gheorghe Stefan: "A Universal Turing Machine with Zero Internal States", in *Romanian Journal of Information Science and Technology*, Vol. 9, no. 3, 2006, pp. 227-243
- Gheorghe Stefan: "The CA1024: SoC with Integral Parallel Architecture for HDTV Processing", invited paper at *4th International System-on-Chip (SoC) Conference & Exhibit*, November 1 & 2, 2006, Radisson Hotel Newport Beach, CA
- Gheorghe Stefan, Anand Sheel, Bogdan Mitu, Tom Thomson, Dan Tomescu: "The CA1024: A Fully Programmable System-On-Chip for Cost-Effective HDTV Media Processing", in *Hot Chips: A Symposium on High Performance Chips*, Memorial Auditorium, Stanford University, August 20 to 22, 2006.
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- Dominique Thiebaut, Gheorghe Stefan, Mihaela Malita: "DNA search and the Connex technology" in *International Multi-Conference on Computing in the Global Information Technology - Challenges for the Next Generation of IT&C - ICCGI*, 2006 Bucharest, Romania, August 1-3, 2006
- Gheorghe Stefan: "The CA1024: A Massively Parallel Processor for Cost-Effective HDTV", in *SPRING PROCESSOR FORUM JAPAN*, June 8-9, 2006, Tokyo.
- Gheorghe Stefan: "The CA1024: A Massively Parallel Processor for Cost-Effective HDTV", in *SPRING PROCESSOR FORUM: Power-Efficient Design*, May 15-17, 2006, Doubletree Hotel, San Jose, CA.

## 2004

- Gheorghe Stefan: "Ethos -- Pathos -- Logos. The New Old Ways of Knowledge" in *Noesis XXIX*, 2004.



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## 2001

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## 2000

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## 1990

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## 1987

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## 1985

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## 1983

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## 1982

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## 1981

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## 1980

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## 1978

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## 1977

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## 1976

- Gh. Stefan "Definitia formala a notiunii de procesor", in *Automatica, management si calculatoare*, Vol. 22, Ed. Tehnica, Bucuresti, 1976. p. 279 - 284.

## 1975

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## 1974

- Gh. Stefan, "Analiza determinista a generatoarelor de impulsuri cvasialeatoare", in *Probleme de automatizare*, Vol. 8, Ed. Academiei RSR, Bucuresti, 1974.

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## Talks

- University of Southern California, Los Angeles, CA, USA, February, 1997: "Architectures with Connex Memory"
  - Universidad Politecnica de Catalunya, Barcelona, Spain, July 30 1997: "The Connex Memory and Some of Its Applications"
  - University of Massachusetts of Amherst, MA, USA, February, 20, 2001: "Loops & Complexity in Digital Systems"
  - University of Maryland, St. Mary's College, MD, USA, October, 4, 2001: "String Search in Bioinformatics and Some Architectural Solutions"
  - Old Dominion University, VA, USA, Aug, 23, 2002: "Loops and Complexity in Digital Systems"
- 

## Workshops on Teaching Methods

European Colloquium on Education:

- Witten 1990: lecture on "Education / Training in Learning".
- Oxford 1995

## TEACHING EXPERIENCE:

- Digital Integrated Circuits (Politehnica University of Bucharest)
- Computer Architecture (St. Mary's College of Maryland University & University Transilvania of Brasov)
- Functional Electronics (master course at Politehnica University of Bucharest)
- Self-Organizing Systems (master course at Politehnica University of Bucharest)
- Advanced Digital Systems (master course at Politehnica University of Bucharest)
- Theory of Computation (St. Mary's College of Maryland University)

## MAIN TECHNICAL PROJECTS:

- 1985- ...: CONNEX PROJECT
  - Dec. 2003: CA4096 - the first prototipe produced at TSMC (the first ever made one-chip having 4096 16-bit PEs)
  - Febr. 2007: BA1024 - a SoC for the HDTV market, containing CA1024 (a ConnexArray of 1024 PEs) produced at TSMC (90 nm standard process) is the first one chip parallel machine with the following performances:
    - 200 GOPS (Giga 16-bit **OP**erations per **S**econd)
    - >60 GOPS/Watt
    - >2 GOPS/mm<sup>2</sup>



- July 2007: the first real & complex application (HDTV postprocessing) running on BA1024 in Universitatea Politehnica Bucuresti (the software team coordinated by Bogdan Mitu, Marius Stoian, and Radu Weiss)
- March 2008: BA1024B - a SoC for the HDTV market, containing CA1024 (a ConnexArray of 1024 PEs) produced at TSMC (65 nm standard process) with the following performances:
  - 400 GOPS (**G**iga **16**-bit **O**perations per **S**econd)
  - >120 GOPS/Watt
  - >6.25 GOPS/mm<sup>2</sup>
- 1982-1986: DIALISP system
- 1976-1985: DIAGRAM system
- 1969-1973: initial stages of the CORAL system project

PATENTS & PUBLICATIONS & TALKS in digital design, computer architecture, education, epistemology of information and noetic sciences.

### **GRANTS**

- 2001-2003: In-Memory Data-Base with Connex Technology, granted by *Infocruiser* at St. Marry's College of Maryland University
- 1999-2000: Information Society Starts from School, in the TEMPUS program
- 1995: Interdisciplinary Laboratory for Self-Organizing Systems, from the Scientific Research Council of Romania
- 1993: research stage in ENPG, Grenoble, France, in the TEMPUS program

### **PROFESSIONAL AFFILIATIONS:**

IEEE, ACM, New York Academy of Sciences, The World Academy of Arts and Science

### **HOBBY:**

singing: Bach, Haendel, Mozart, Schubert, Schumann, Rossini, Verdi.

