Doctor Honoris Causa

PROFESSOR

Dr. ALFRED M. BRUCKSTEIN

Ollendorff Chair in Science
Computer Science Department
Technion, Israel Institute of Technology
Haifa 32000, Israel

and

Visiting Professor, Mathematics Department
School of Physical and Mathematical Sciences
Nanayang Technological University
50 Nanyang Avenue, Singapore, 639798

ORADEA
MAY 9, 2018

AGORA UNIVERSITY OF ORADEA

Prof. Adriana Manolescu, PhD
*President of The Senate
of Agora University*
adriana.manolescu@univagora.ro

Prof. Mişu-Jan Manolescu, PhD
*President of The Administration Council
of Agora University*
mmj@univagora.ro

Prof. Ioan Dzitac, PhD
Rector of Agora University
rector@univagora.ro

DOCTOR HONORIS CAUSA

OF AGORA UNIVERSITY

UNIVERSITATEA AGORA
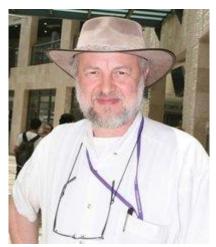
IN HOC SIGNO VINCES

PROFESSOR

Dr. ALFRED M. BRUCKSTEIN

ORADEA, MAY 9, 2018

LAUDATIO to Prof. Alfred M. Bruckstein, PhD(Stanford,84) upon awarding the title of Doctor Honoris Causa of the Agora University of Oradea

Prof. Alfred M. Bruckstein
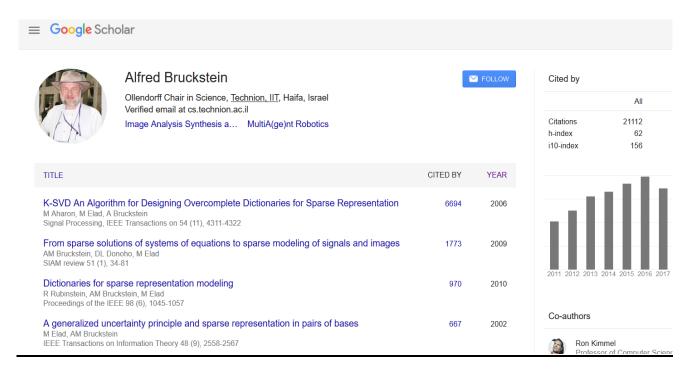**(b. 1954, Sighetu Marmatiei, Maramures, Transylvania, Romania)**

In 1993, Professor Bruckstein published a paper titled "Why the Ant Trails Look So Straight and Nice" in "The Mathematical Intelligencer" Journal (Vol 15/2, pp.59-62), introducing a chain-pursuit model for the process of ant-trail optimization based on
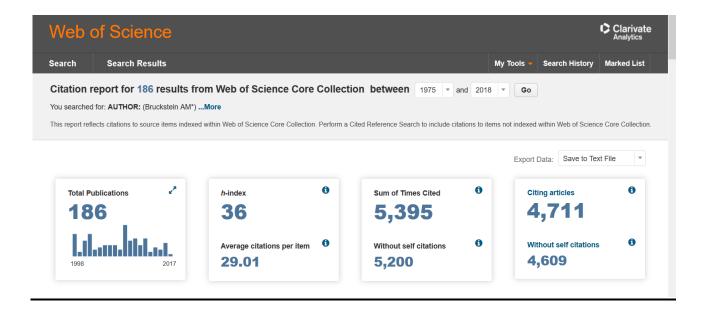a simple rule of local interactions between consecutive agents in the chain. The paper was reviewed in Science (USA), The New Scientist (England), Resonance (India), and many other popular scientific publications world-wide and was selected as a Top Story in Mathematics, in a Special Issue "The Year 1993 in Science" of the Journal Discover (USA). This paper subsequently led to a series of research theses and papers examining various examples of local interactions betweens simple agents leading to emergent global behaviours in swarms. Professor Bruckstein's work in this field, which by now has resulted in five PhD Dissertations and seven MSc Theses at the Technion by a distinguished group of students under his guidance, made a notable impact in the field of Ant-Robotics and Multi-Agent Systems.

Professor Bruckstein's work in other areas of research include contributions to Modeling of Neural Coding using Stochastic Point Processes, to Estimation and Scattering Theory in Signal Processing, to Sparse and Holographic Signal Representations, to Variational Models in Image Processing and Low-Level Machine Vision, to Pattern Recognition and Fiducial Design Methodologies, to Shape Analysis and Probing in Computer Vision and Robotics, and to Digital, Discretized and Applied Geometry Topics. His research in these areas, carried out over the past thirty years jointly with an outstanding group of students doing PhD and MSc Theses under his academic supervision, and with several Post-Docs, Visitors and Collaborators from several Universities and from Bell Laboratories, led over the years to significant and seminal research papers published in leading venues world-wide, and a total of thirteen PhD Theses and about fifty MSc Theses so far.

Among Professor Bruckstein's students, visitors and post-Docs over the years, one finds world-famous, and top-class researchers like Professor Michael Lindenbaum (Technion,Israel), Professor Nahum Kiryati (TelAvivU, Israel), Professor Ron Kimmel (Technion, Israel), Professor Guillermo Sapiro (DukeU, USA), Professor Polina Golland (MIT, USA), Professor Guy Lebanon (Georgia Tech/Netflix, USA), Professor Ilan Shimshoni (Haifa U, Israel), Professor Miki Elad (Technion, Israel), Dr. Doron Shaked (HP Research, GE Research, Israel), Dr Amir Arnon

(IBMResearch, USA) Dr. Israel Wagner (IBM Research, Israel), Dr. Yaniv Altshuler(ENDOR/MIT, USA), Dr. Noam Gordon (CamTek, Israel), Dr Ychin Pnueli (Google,Israel) , Dr Yotam Elor (Final, Israel), Dr. Eli Osherovich (Amazon Research, Israel), Dr Vladimir Yanovski (UToronto, Canada), Dr Tal Nir (HiTech, Israel), Dr Ruth Onn (HiTech, Israel), Dr. Rotem Manor (HiTech, Israel), Dr Wang Yu (HiTech, Singapore), Dr Daniel Vainshencher (PrincetonU, USA) and many further outstanding Scientists and Engineers, making significant contributions to HiTech, in Israel and world-wide.

Professor Alfred M. Bruckstein : A brief CV

Alfred M. Bruckstein, born in Sighetu Marmatiei – Maramures, Transylvania, Romania, in 1954, received his BSc and MSc degrees at the Technion, Haifa, in 1976 and 1980, respectively and then earned a Ph.D. degree in Electrical Engineering in Stanford University, California in 1984, his advisor being Professor Thomas Kailath.

From October 1984 he has been with the Technion, where he now holds of the Ollendorff Chair in Science, in the Computer Science Department. His research interests are in Ants and Swarm Robotics, Signal and Image Processing, Image Analysis and Synthesis, Pattern Recognition, and various aspects of Applied Geometry. Professor Bruckstein authored and co-authored over one hundred and fifty journal papers in the fields of interest mentioned.

Professor Bruckstein held visiting positions at MIT, Groningen University in Holland, Stanford University, and TsingHua University in Beijing, China, Evry University and at CEREMADE, Dauphine University in Paris, France, and was a visiting Member of Technical Staff at Bell Laboratories at Murray Hill, from 1987 to 2000, working with Dr. Arun Netravali and several colleagues there on Image Processing and Computer Vision topics. Since 2009 he is also a Visiting Professor at the Nanyang Technological University in Singapore, at the School of Mathematical and Physical Sciences.

From 2002 till 2005 he served as the Dean of Technion's Graduate School, and from 2006-2011 as the Head of Technion's Excellence Program for Undergraduate Studies.
Professor Bruckstein is a member of the AMS, and MAA, and is a SIAM Fellow for contributions to Signal Processing, Image Analysis, and Ant Robotics, and received SIAM's 2014 SIAG-Imaging Science Prize (with David Donoho and Michael Elad, for the paper "From Sparse Solutions of Systems of Equations to Sparse Modeling of Signals and Images").

Professor Bruckstein is happily married to Rita and they have one son, Ariel, with whom they wrote and illustrated a bestiary of imaginary animals of Ariel's invention called "The Knocktopus and His Friends", published by Panopticum Press in 2013. He also illustrated several books, most of them published by his late father Ludovic Bruckstein, in Romanian, Hebrew and French, and a collection of humorous verse in Hebrew, by Professor Irad Yavne, entitled "Comical Relief", describing Academic Life in general, and at the Technion, in particular.

ANALYSIS COMMISSION FOR LAUDATIO*
on the occasion of awarding the title
Doctor Honoris Causa
to Professor Alfred M. Bruckstein

President:
Acad. Florin Gheorghe Filip, Romanian Academy, Romania.

Members:

1. Prof. Misu-Jan Manolescu, Agora University of Oradea, Romania.
2. Prof. Razvan Andonie, Central Washington University, USA.
3. Prof. Felisa Cordova, University Finis Terra, Chile.
4. Prof. Barnabas Bede, DigiPen Institute of Technology, USA.
5. Prof. Yezid Donoso, University de los Andes, Colombia.

*Note. The Commission has been nominated by Rector Decision No. 420/12.01.2018 based on approval of Agora University Senate.

RESPONSE TO THE LAUDATIO

From Ants to A(ge)nts:
The Wonderfully Weird World of Multi-Agent Swarms

Alfred M. Bruckstein
Ollendorff Chair in Science

My talk surveys recent work on swarms of simple, myopic, mute, memoryless (oblivious) and mobile agents. Such multi agent systems in nature, like ant and bee colonies, schools of fish, or flocks of starlings, can perform various tasks by implicit collaboration via local sensing and/or pheromone signaling. The tasks are gathering, foraging, surveillance, cleaning, patrolling and intruder detection, and accomplishing these is the result of some motion reactions by the agents, in response to information they gather locally on the environment and on their nearby neighbors. In man-made swarms of simple mobile robotic agents, the local response algorithms must be designed in order to achieve desired global behaviors, and the process of design and subsequent analysis and proofs of performance often pose formidable mathematical challenges. A successful design, however, can achieve scalable systems, with built-in reliability through redundancy, with performance factors dependent on the number of agents active in the system.

GAUDEAMUS IGITUR

Gaudeamus igitur	Să ne bucurăm, aşadar,
Iuvenes dum sumus.	Cât încă suntem tineri
Post iucundam iuventutem	Fiindcă dup-o tinereţe agitată,
Post molestam senectutem	Şi-o bătrâneţe-ngreunată,
Nos habebit humus.	Ţărâna ne va avea pe toţi.
Ubi sunt qui ante nos	Unde-s, oare
In mundo fuere?	Cei ce-au trăit înainte-ne?
Vadite ad superos	Poţi s-ajungi până-n Ceruri
Transite in inferos	Sau să păşeşti prin Iad
Hos si vis videre	De doreşti să-i revezi.
Vita nostra brevis est	Viaţa ne este scurtă
Brevi finietur.	Va fi terminată prea curând,
Venit mors velociter	Moartea vine fulgerător
Rapit nos atrociter	Atroce ne agaţă-n ghearele-i.
Nemini parcetur.	Nimeni nu-i cruţat de-aceasta.
Vivat academia!	Trăiască şcoala!
Vivant professores!	Trăiască profesorii!
Vivat membrum quodlibet;	Trăiască fiecare-ntrebător!
Vivant membra quaelibet;	Trăiască fiecare-ntrebătoare!
Semper sint in flore.	Fie ca ei să-nflorească de-a pururi!
Vivant omnes virgines	Trăiască toate fecioarele
Faciles, formosae.	Binevoitoare şi curate la suflet!
Vivant et mulieres	Trăiască, de-asemeni,
Tenerae, amabiles,	Femeile tandre, iubitoare
Bonae, laboriosae.	Şi pline de hărnicie!
Vivat et res publica	Trăiască patria
et qui illam regit.	Şi cei ce-o conduc!
Vivat nostra civitas,	Trăiască-ne oraşul
Maecenatum caritas	Şi binefăcătorii acestuia
Quae nos hic protegit.	Care, prin caritatea lor, ne oferă siguranţă!
Pereat tristitia,	Fie ca tristeţea să piară!
Pereant osores.	Fie ca urâtorii să piară!
Pereat diabolus,	Fie ca Diavolul să piară!
Quivis antiburschius	Fie ca oricine-i împotriva şcolii noastre,
Atque irrisores.	Oricine-ar râde de-aceasta, să piară!