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NEW ASPECTS OF ENGINEERING EDUCATION

Proceedings of the 5th WSEAS / IASME International Conference on ENGINEERING EDUCATION (EE'08)

Heraklion, Crete Island, Greece, July 22-25, 2008

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Preface

This book contains the proceedings of the Proceedings of the 5th WSEAS / IASME International Conference on ENGINEERING EDUCATION (EE'08) which was held in Crete, Greece, July 22-24, 2008. This conference aims to disseminate the latest research and applications in Basic Science in Engineering Education, Continuing Education & Its Delivery, International Recognition of Qualifications, Studies in Engineering and the needs of the Production and Market, New Technologies in Education, Research and Education, Globalisation in engineering education, World Integration and Engineering Education, Women in Engineering Education, Computers, Internet, Multimedia in Engineering Education, Changes and Challenges in Engineering Education, Organization of Laboratories, Environmental and Geosystems Engineering Education, Mechanical Engineering Education, Electric & Electronic Engineering Education, Civil Engineering and Architectural Engineering Education and other relevant topics and applications.

The friendliness and openness of the WSEAS conferences, adds to their ability to grow by constantly attracting young researchers. The WSEAS Conferences attract a large number of well-established and leading researchers in various areas of Science and Engineering as you can see from **http://www.wseas.org/reports**. Your feedback encourages the society to go ahead as you can see in **http://www.worldses.org/feedback.htm**

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Expanded and enhanced versions of papers published in this conference proceedings are also going to be considered for possible publication in one of the WSEAS journals that participate in the major International Scientific Indices (Elsevier, Scopus, EI, ACM, Compendex, INSPEC, CSA .... see: www.worldses.org/indexes) these papers must be of high-quality (break-through work) and a new round of a very strict review will follow. (No additional fee will be required for the publication of the extended version in a journal). WSEAS has also collaboration with several other international publishers and all these excellent papers of this volume could be further improved, could be extended and could be enhanced for possible additional evaluation in one of the editions of these international publishers.

Finally, we cordially thank all the people of WSEAS for their efforts to maintain the high scientific level of conferences, proceedings and journals.

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CEREMONY for Prof. SIFAKIS

Opening by the Deputy Minister of National Defence of GREECE
Ioannis Plakiotakis
(Biochemical Engineer, M.Sc and Economics, M.Sc.)

http://www.plakiotakis.gr

Born in 1968 in Sitia, in the prefecture of Lasithi on the island of Crete. Plakiotakis studied chemical engineering at the University of Wales and obtained a Master's degree in biochemical engineering at London University with an MBA from the City University Business School of London. He worked at Eurocontrol, an inter-country Organisation that regulates Air Circulation and the flight safety in Europe. He is a member of the New Democracy Party since 1987. He was an active member of New Democracy's Student Movement (DAP) and in 1999 became Vice-president of the Local Committee of N.D. in Sitia (Crete). From 1998 to 2002 he acted as Municipal Advisor in Sitia. On January 2001 he was appointed as a permanent member of the Committee of Tourism by the President of the Hellenic Republic. He is a member of the Association of graduates of Biochemical Engineering at the University of London, as well as at the City University Business School.

Parliamentary- Governmental Activity:

- Member of Parliament's Special Permanent Committee of Protection of the Environment.
- New Democracy's Assistant Supervisor of Tourism and member of the Parliamentary Delegates of Production and Trade, Protection of Environment and Orthodoxy.
- He was elected MP of Lasithi with the N.D. in 2004 and in 2007.
- On 19 October 2007 he was appointed Deputy Minister of Defense.

KEYNOTE SPEAKER – TURING AWARD 2007

Embedded Systems – Scientific Challenges and Work Directions

Prof. Joseph Sifakis
Turing Award 2007,
http://www.acm.org/press-room/news-releases/turing-award-07/
1 hour Keynote Lecture (CONFERENCE ROOM 1),
Wednesday, July 23, 16:00-17:00

Nobel of Computing:
http://www.cmu.edu/homepage/practical/2008/winter/nobel-of-computing.shtml
Also: http://www-verimag.imag.fr/~sifakis/

Abstract: Embedded systems are components integrating software and hardware that are jointly and specifically designed to provide given functionalities, which are often critical. They are used in a very wide array of application areas - including transport, consumer electronics / electrical appliances, energy distribution, manufacturing systems, etc.
Designing embedded systems requires techniques taking into account extra-functional requirements regarding optimal use of resources such as time, memory and energy while ensuring autonomy, reactivity and robustness. Jointly taking into account these requirements raises a grand scientific and technical challenge: extending Computer Science with paradigms and methods from Control Theory and Electrical Engineering. Computer Science is based on discrete computation models, which are by their nature are very different from the analytic models used in other engineering disciplines, because they do not encompass physical time and resources. We discuss the main aspects of this challenge and their associated research directions for different areas such as modelling, programming, compilers, operating systems and networks.

Biography: Joseph Sifakis is CNRS researcher and the Founder of Verimag laboratory (http://www-verimag.imag.fr/), in Grenoble, France. He studied Electrical Engineering at the Technical University of Athens and Computer Science at the University of Grenoble.

Verimag is a leading research laboratory in the area of critical embedded systems. It developed the underlying theory and technology for the SCADE tool, used by Airbus for the design and validation of its critical real-time systems, and is becoming a de facto standard for aeronautics. Verimag has a lasting and strategic collaboration with ST Microelectronics, France Telecom R&D, and Airbus, through which numerous results on validation and testing have been transferred.

Joseph Sifakis is recognized for his pioneering work on both theoretical and practical aspects of Concurrent Systems Specification and Verification. He contributed to emergence of the area of model-checking, currently the most widely-used method for the verification of industrial applications. His current research activities include component-based design, modeling, and analysis of real-time systems with focus on correct-by-construction techniques (http://www-verimag.imag.fr/~sifakis/).

Joseph Sifakis has broad experience with industry, notably though joint projects with partners such as Astrium, the European Space Agency, France Telecom, ST Microelectronics and he has also been active for many years in consulting.

Joseph Sifakis is the Scientific Coordinator of the European Network of Excellence ARTIST2 on Embedded Systems Design. (http://www.artist-embedded.org/). This network gathers 35 of the best European teams in the area, and aims to produce innovative results for cost-effective design of dependable embedded systems. It will also promote innovative methods safe and secure systems, notably through cooperation with key European industrial partners such as Thalès, Airbus, Ericsson, Philips, and ST Microelectronics.

Joseph Sifakis is the chair of "Chamber B" (Public Research Organisations) of ARTEMISIA, which is the Industrial Association within the ARTEMIS European Technology Platform on Embedded Systems (http://www.cordis.lu/ist/artemis/).

Joseph Sifakis is the director of the CARNOT Institute "Intelligent Software and Systems" in Grenoble.

Joseph Sifakis is a member of the editorial board of several journals, co-founder of the International Conference on Computer Aided Verification (CAV) and a member of the Steering Committee of the EMSOFT (Embedded Software) conference.

Joseph Sifakis has received with Ed Clark and Allen Emerson for their contribution to Model Checking, the Turing Award for 2007 (http://awards.acm.org/homepage.cfm?srt=all&awd=140). He is also the recipient of the CNRS Silver Medal in 2001.

Plenary Lecture I

Collaborative learning in the university education: from the theory to the practice

Prof. Jaime Lloret Mauri
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Abstract: Collaborative learning an educational strategies that should be incorpored in all plan of studies in the university careers. It is considered as one of the main learning strategies in the Bologna process. In collaborative practices students are divided in groups to do their activities and they are evaluated by their productivity. The fact of doing a common task in which each one of them depends on and is accountable to each other, prepare the students personal and socially for the enterprise environment. It is demonstrated that this educational strategy improves students' communication habilities, enhances the students responsability and shows them how they should organize for any enterprise. This talk will review some practical examples and several study cases, and how they have been set up in order to obtain the best result. Collaborative learning basic elements such as objetives, environment, motivation, kind of process, individual contribution and group process steps, will be discussed. Examples and cases reviewed will show their benefits and the students results given when it is used.

Brief Biography of the Speaker: Jaime Lloret received his M.Sc. in Physics in 1997 at University of Valencia and he finished a postgraduate Master in Corporative networks and Systems Integration from the Department of Communications in 1999. Later, he received his M.Sc. in Electronic Engineering in 2003 at University of Valencia and his Ph.D. in telecommunication engineering (Dr. Ing.) at the Polytechnic University of Valencia in 2006. He is a Cisco Certified Network Professional Instructor of the regional academy "Universidad Politécnica de Valencia" in the Cisco Networking Academy Program (CNAP) and he is the Legal Main Contact of UPV-ADIF (local academy of the CNAP). He teaches at the "Escuela Politecnica Superior de Gandia" from the Polytechnic University of Valencia. He has been co-editor in several international conference proceedings, he is a editorial Board Member of several international journals and he has been a guest editor in several WSEAS journals. Dr. Lloret is a TPC member of WSEAS, IIS, IASTED, IARIA, and he has been involved in more than 20 IPCs of international conferences till 2007. He is the chairman of SENSORCOMM 2007 and Ubicomm 2008, both proceedings published by IEEE Computer Society Press. One of his main research interests are educational approaches and strategies.

Plenary Lecture II

Science teachers' collaborating learning for scientific literacy: from practice to the practice

Dr. Michail Kalogiannakis
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Abstract: In the information society, the ability to collect, develop, exchange, store and manage information from various and dispersed data along with the ability to generate additional information is essential. Distance learning is not a new phenomenon. The term distance learning is extensively used by colleges and universities to describe remote delivery of course contents. In the last three decades a rapid development of information and communication technology (ICT) has opened new horizons for distance learning providing new magnificent opportunities for mankind in the area of education. The traditional organisation of education creates often practical difficulties in using new technologies in class. The limited impact of ICT has as much to do with science teachers' attitudes and skills as with access to equipment. Science teachers should prepare their students for a multiplicity of roles that will be called to play in the future. We argue that there is a great need to restructure science teachers' education if we wish school science to serve the purpose of scientific literacy. The mailing lists can be used as collaborative work tools for interaction and dialogue creating educational communities. Generally speaking, online communities can offer a lot of opportunities to teachers which are comparable with face to face meetings. Those who communicate on-line maintain a variety of links, exchanging information, emotional aid creating complex relationships. Subscription to and participation in mailing lists could be a part of science teacher's on-going professional development. This particular individual commitment follows the logics of action of a social experience: integration, strategy and subjectivation. Science teachers belonging to mailing lists have specific interests in professional training, ICT and knowledge. Science and technology are two of the most important areas of the modern human culture. If science and technology education is meant to have any functional role to play in the future lives of the students, then a holistic reorientation of both its content and the association with that pedagogical approach is required. Although we can not predict how virtual learning environments will influence learning effectiveness, an important point to consider is that, for sciences teachers, a virtual space is an open space, a space where they can try new approaches. Teaching has always been an individual work: teachers do not collaborate a lot; they rarely attend to each others lectures, and they rarely exchange teaching material. The challenge here is to turn teaching into a collective performance using the paradigm of the mailing lists.

Brief Biography of the Speaker: Michail Kalogiannakis received his Bachelor in Physics in 1993 at the University of Crete and he acquired two postgraduate Masters in didactic of sciences and technology at the University Paris 7-Denis Diderot in 1994 and in sciences education at the University Paris 5-René Descartes in 2000. Later, he received his Ph.D in sciences education at the University Paris 5 in 2004. Michail Kalogiannakis is currently a researcher at the University Paris 5 (Laboratory: Education et Apprentissages) and he is working at the Hellenic Open University, at ASPETE (School of Pedagogical and Technological Education) and at TEI (Technological Educational Institute) of Crete. He is the author of a book in French concerning science teachers' education, distant education and pedagogy and co-editor of a book (in Greek) about distance-learning approaches in institutions of tertiary education. He has participated in several international conferences and has published a considerable number of research papers in journals, books and conference proceedings in English, French, Greek and Russian. His research interests concern science teaching and learning, ICT and science teacher's education and pedagogy.

Plenary Lecture III

Measuring and Evaluating Perception and Expectation of Engineering Graduates in Malaysia

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Abstract: This paper discusses a comprehensive study of employers' perception and expectation of Malaysian engineering graduates towards assessing measurable qualities. To have better overview in this issue, a survey on the needs, perception and expectation of Malaysian industries towards graduate engineers is conducted. In order to create a smoother transition from education to practice, some argue that engineering education should put more emphasis on the engineering-based knowledge. Thus, this study investigates also the gap analysis which is defined as the difference between expectation and perception among majority of Malaysian industries towards existing engineering graduates. For the purpose of this paper, both technical and generic attributes are analyzed and discussed. A total of 422 companies from various industries in Malaysia were chosen for the face-to-face interview sessions using a set of questionnaires. The respondents were mainly come from high ranking personnel in their firm. The outcomes of this study will later be considered as a revision guideline for the engineering education curricula of Malaysian Institutions of Higher Learning.

Brief Biography of the Speaker: Dr Azami Zaharim worked first 13 years .as a lecturer in the University of MARA Technology (UiTM) before joining the National University of Malaysia (UKM) in the year 2003. He has published more than 50 papers in Journal and proceeding at the national and international conferences. He is currently active involve in outcome based education approach at the national level. He is also involved in the research for the future of engineering education in Malaysia 2006 under the Ministry of Higher Education of Malaysia.

Plenary Lecture IV

Case study as a teaching tool for analysis of real-world problems: applications of mathematics in engineering and business education

Professor Andrei Kolyshkin
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Abstract: Case study method is widely used in many business and law schools around the world to teach students about their fields using real-world business situations known as cases. The case method develops students' analytic and problem-solving skills. It is usually focused on an interest-arousing situation and stimulates students' active learning and participation. However, the case study method is not so widely used in engineering education. In the present paper we discuss some issues related to the use of mathematics as a tool for analysis of real-world problems through case studies. First, a brief history of case study method is presented. Second, advantages and disadvantages of case study methodology are discussed. Our experience in teaching mathematics to engineers shows that in order to be useful for engineering students, a case study should satisfy the following conditions: (1) The case should be based on a real-world problem; (2) Relatively simple mathematical models should be used to analyze the case; (3) Solution of complex, real-world problem requires knowledge of several mathematical methods (both analytical and numerical); (4) The results should be compared with experimental data. Several examples of real-world problems which can be solved with relatively simple mathematical methods are discussed in the paper such as leak and blockage detection in pipelines and bacteria regrowth in water distribution systems. Managerial statistics course is one of the core courses in many MBA programs. However, many students consider this course as one of the most difficult courses. There are several reasons for that: (1) many students have a negative impression about statistics course at undergraduate level; (2) some of them do not consider statistics as a useful tool in managerial decision making; (3) not all the students have solid background in mathematics and related areas. Case study as a teaching tool in these situations can help to overcome psychological barriers and stimulate students' active participation and develop necessary problem solving skills. Examples of real-world business situations which can be analyzed by means of statistical methods are given in the paper. Advantages and limitations of case study method are discussed.

Brief Biography of the Speaker: Andrei Kolyshkin received his undergraduate degree in Applied Mathematics in 1976 at the Riga Technical University. In 1981 he received a Ph.D in differential equations and mathematical physics at the University of St. Petersburg. Andrei Kolyshkin is currently a full professor at the Department of Engineering Mathematics at the Riga Technical University. His current research interests include investigation of stability problems in fluid mechanics with applications to open-channel flows and transient flows in hydraulic systems. He is the co-author of three monographs published by Academic Press and CRM. Andrei Kolyshkin has participated in more than 30 international conferences and has published amore than 50 papers in refereed journals since 1990. As a visiting professor and visiting researcher he spent a few years at the University of Ottawa and Hong Kong University of Science and Technology.

Plenary Lecture V

From The Real World To Models And Paradigms In Parallel Scientific Computing

Assoc. Prof. ION CÂRSTEA
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Abstract: The people are not isolated actors on the world scene. They enter in competition and co-operation. This real scenario is the basis of the parallel computing and finally, the basis of the parallel computers. The work in the team with the principal characteristics, the co-operation and the collaborative competition, is an education model. Cooperation and collaborative competition must be the basis of the educational process from universities, aspects that are often ignored in educational politics from Romania. The nature models are the starting points in many human projects like the parallel processing of data. The nature models must be the starting points of the educational process with emphasis on the inter-human relations. The real world offers a lot of models and paradigms for engineers in the area of the computer science and engineering. In a high- performance education we can not ignore the large computing power of the advanced computers as the parallel computers. To ignore the high-level information technology is an anti-social act in any university. Unfortunately, many professors are the slaves of an old-fashioned mode of understanding the education in engineering. It is not a good practice to solve a problem in any way; we must solve a problem with a good performance in terms of the limited physical and abstract resources of the world. An extrapolation of this idea can be done for computers where the physical resources and the abstract resource (as the processing time) are of the great importance for the engineers. We shall present some models and paradigms in parallel scientific computing starting from the real world models. The old Latin concept divide et impera is a good approach for the development of large engineering projects, for analysis and synthesis of the large-scale systems. The manager-workers paradigm is another paradigm for many parallel algorithms in engineering and business and the performance evaluation of the programs based on this paradigm is developed and presented. Engineering education from Romanian universities is analysed in context of the reconstruction process of the Romanian school. Some aspects of the politics in the area of human resources and infrastructure from universities are presented using target examples. The effects of the reform in engineering education are analysed in the context of the last decades and educational reform from Romania.

Brief Biography of the Speaker: The speaker is an Assoc. Professor at the Computer Engineering and Communications Department, Faculty of Automatics, Computers and Electronics, University of Craiova, Romania. He has a BSc and MSc in Automatics from the University of Craiova, Romania. He has a Ph.D. in Automatics from the University of Ploiesti, Romania. Also, he has a BSc and MSc in Mathematics from the Natural Sciences Faculty, University of Craiova, Romania. He was director of the research projects supported by international grants at University of Houston (USA)- 6 months (Fulbright Grant), at the University of Coimbra, Portugal – 9 months (NATO grant), at the Polytechnics of Milano, Italy- 4 months (a CNR-NATO grant). In 2004 he was invited at the Mathematics Department, University of Trento, Italy, for 2 months. Ion Cârstea published 10 books in the area of programming languages, advanced computers and CAD of the electromagnetic devices. He is the co-author of the book FINITE ELEMENTS in WSEAS Press, 2007. He is the author of more than 130 papers in revues, scientific journals and international conference proceedings. He is a reviewer for several WSEAS International Conferences and was a member in many international scientific committees. In the year 2007, he was plenary speaker and chair at the WSEAS Conferences from Arcachon (France) and Venice (Italy). His research interests include parallel algorithms and parallel programs for numerical simulation of the distributed-parameter systems, software products for coupled and inverse problems in engineering, domain decomposition method in the context of the finite element method.

Plenary Lecture VI

A combination of Computer Aided Learning and Real time Experiments to Support Engineering Training

Prof. M. Hatziprokopiou
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Technical and Educational University of Patras,
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Abstract: Laboratory training as a means for comprehending taught in-class course material is faced with problems including large student numbers, excessive cost of experimental apparatus, and lack of multiple experimental setups, especially in cases where the use of instrumental prototypes providing realistic simulations are needed. Nowadays sensors, especially those operating in real-time, play an important role in edge-technology systems. Such systems collect information from the outside world, through multi-channel USB type data loggers. The outputs from these sensors are connected to the data logger channels for digitization, and entered for further processing to a computer system. The development of appropriate software is needed for data handling and display of results in a graphic oriented user friendly environment, so that all parameters and control signals are well comprehended. In this type of training we have to develope a prototype, aiming to simulate real incidents. E-learning CAL software can be developed using Keithley's "Test Point" (versatile authoring tool) or other ways (i.e. visual basic) for training large audiences, simultaneously having visual contact of the real prototype. Students have the choice to collect experimental or software generated data for simulation.

Brief Biography of the Speaker: Name: M. Hatziprokopiou, Citizen of Greece & USA, 62 years old. Married. Education: Bachelor, Master, PhD Electrical and Computer Engineering from State University of N.Y. at Buffalo, USA. Academic Professional Position at USA (Past): Research Assistant Professor, at State University of N.Y. at Buffalo, USA. Academic Professional Position at Greece (Present): Vice President and President of the Research Foundation, T.E.I. Patras, Greece Affiliated at L.A.P.E.S. (Laboratories for Power and Environmental Studies), Image Processing Lab, Super Conductivity Institute. Fields of Interest: Data Acquisition and Control. Line Production Control. Educational Software Development. Multimedia, Distance Learning. Vocational training. Author of numerous books and publications.

Plenary Lecture VII

Simulating Real-Life IT Project Environments by Integrating Course Modules of Different Student Levels

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Abstract: There is an increasing need for university graduates entering today's job market to be skillful in adapting to novel work situations while sustaining a competitive advantage. To fulfill this requirement, students must adapt life long learning abilities in order to work successfully throughout their career development. In this paper I will argue that lifelong learning abilities can be enhanced by having curriculum activities structured in such a way as to allow students of varied expertise levels to participate in joint course projects. These courses ideally will all belong to the same prerequisite "ladder" allowing the students to be exposed to this unique teamwork experience throughout a student's academic years/semesters.

Brief Biography of the Speaker: Dr. Nicholas Harkiolakis holds a Ph.D degree in Computer Science from the Agricultural University of Athens. He also has a BSc in Physics from the Kapodistrian University of Athens and he received a graduate studies certificate in Aerodynamics from Cranfield Institute of Technology, England. He served as an Associate Professor and Chair of the Computer Science Department of the University of LaVerne - Athens Campus where he developed the Master's in Business Information Technology and the MBA - IT concentration, chairing both. Professionally he has20 years experience in development and implementation of business information systems and he continues to consult in that area. His research interests extend to the areas of distributed and web applications, bioinformatics and artificial intelligence. Currently he is Professor of Information Technology and Director of Research at the Hellenic American University in Athens, Greece. His research interests are in the areas of IT Strategy and Management, Numerical Analysis, Artificial Intelligence and Bioinformatics.

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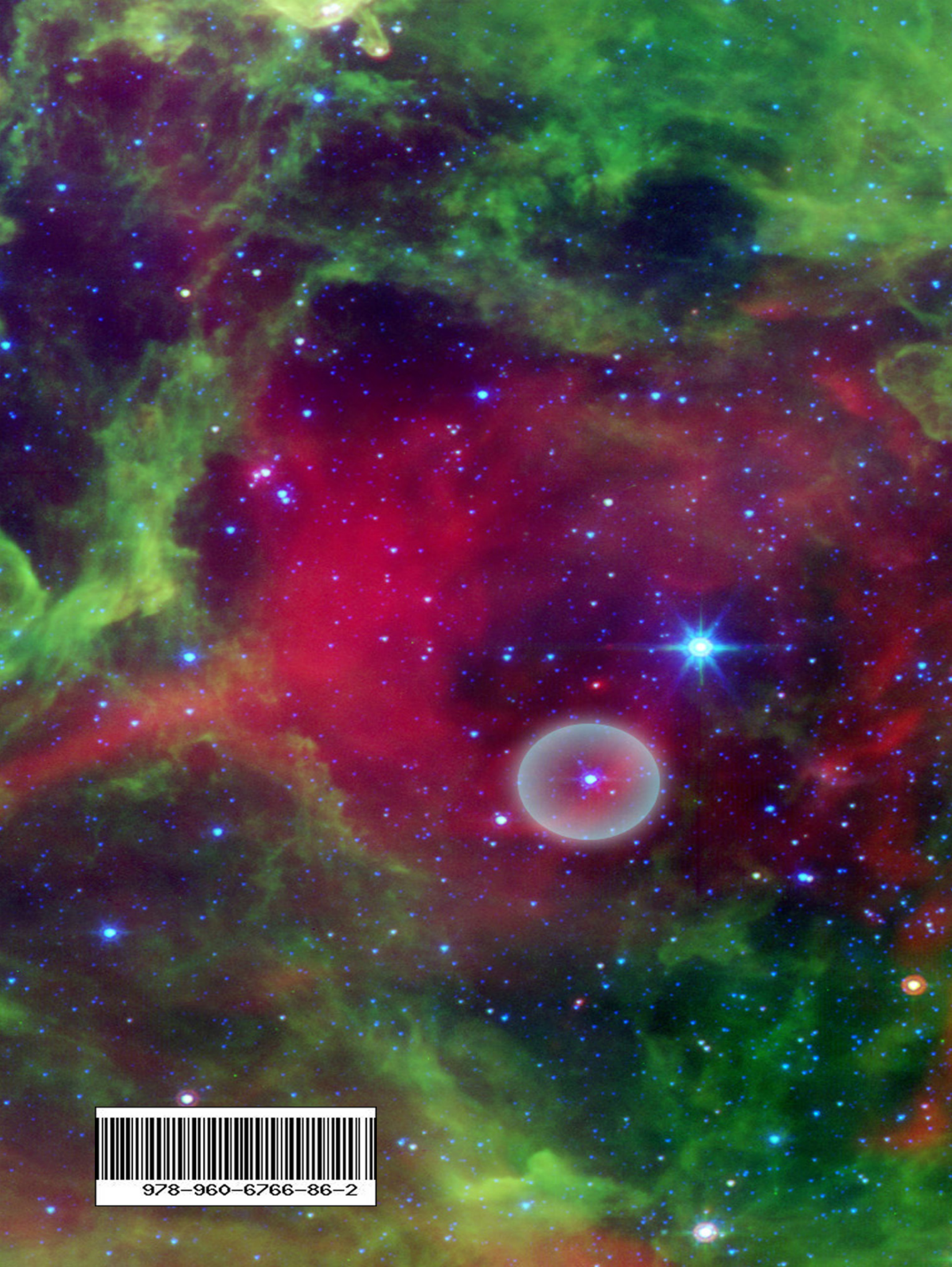
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