

Erol Gelenbe: ISCIS and Beyond

Mehmet Ufuk Çağlayan

Abstract We celebrate the 30-th annual ISCIS (International Symposium on Computer and Information Sciences) that Erol Gelenbe started in 1986 and pursued uninterruptedly as a service to the Turkish Computer Science and Engineering Community. We also outline his scientific contributions over the last fifteen years covering half of the life-time of ISCIS. These include his innovative work on a new representation of Intermittent or Renewable Energy Sources, and *Energy Packet Networks* which are a convenient representation for the flow, storage and consumption of electrical energy, both at the microscopic level (in electronic chips) and at the macroscopic level (e.g. in buildings or data centres). The discussion then turns to his work on ICT systems that parsimoniously use energy in order to achieve quality of service (QoS). His pioneering work on Autonomic Communications and the Cognitive Packet Network is also reviewed, followed by network security, Emergency Management Systems, Gene Regulatory Networks, and analytic models of computer systems and networks.

1 Introduction

The International Symposia on Computer and Information Sciences (ISCIS) was started in 1986 by Professor Erol Gelenbe to provide the Computer Engineering and Computer Science community in Turkey with a venue for their academic research, and to interact with their peers from abroad, and create a tradition of refereed international quality publications in this newly formed community. Since 1986, ISCIS has been held annually without interruption, with the 30-th held at Imperial College London in September 2015. In recent years, the Proceedings of ISCIS have been published by Springer.

Mehmet Ufuk Çağlayan
Department of Computer Engineering, Boğaziçi University, Bebek, Istanbul, Turkey, e-mail: caglayan@boun.edu.tr

The first ISCIS was held at Bilkent University, Ankara, Turkey, with the active support of Professor Ali Dođramacı. Bilkent University was newly formed, and emphasised Computer Engineering, Electrical and Electronic Engineering and Industrial Engineering, as key areas for Turkey’s future. Very quickly, several Turkish universities, including the Middle East Technical University, Bođaziçi University in Istanbul, Ege University in Izmir, Istanbul Technical and Yıldız Technical Universities. Sabancı University in Istanbul also participated in organising this annual event. In the early years ISCIS was actively supported by the Department Chairs Council for Computer Engineering, itself chaired by the late Professor Ođuz Manas of Ege University. Other active colleagues included Professors Erol Arkun and Cevdet Aykanat of Bilkent University, Professors Ugur Halıcı, Hakkı Toroslu and Adnan Yazıcı of the Middle East Technical University, Professors Ali Rıza Kaylan and myself of Bogaziçi University. ISCIS was hosted by these several times. Erol actively selected the venues and teams that would run the conference, and “transferred” the know how and procedures to make it all work, thus training colleagues young and old in the “art” of organising scientific events without any subsidies, including organisation, venues, refereeing and paper selection, and keeping down the costs. There were indeed problems, for lack of funds, speakers who were unable to attend, quality control issues during certain years, attempts to cancel the publication of proceedings by third parties due to foreign political pressure, such as North Cyprus). Since 1998, the venues have included sites in Europe, in Turkey and America:

- 29. ISCIS 2014: Krakow, Poland [20],
- 28. ISCIS 2013: Paris, France [84],
- 27. ISCIS 2012: Paris, France [82],
- 26. ISCIS 2011: London, UK [88],
- 25. ISCIS 2010: London, UK [89],
- 24. ISCIS 2009: North Cyprus [1],
- 23. ISCIS 2008: Istanbul, Turkey,
- 22. ISCIS 2007: Ankara, Turkey,
- 21. ISCIS 2006: Istanbul, Turkey [145],
- 20. ISCIS 2005: Istanbul, Turkey [160],
- 19. ISCIS 2004: Antalya, Turkey [11],
- 18. ISCIS 2003: Antalya, Turkey [159],
- 17. ISCIS 2002: Orlando, Florida, USA [38],
- 15. ISCIS 2000: Istanbul, Turkey,
- 14. ISCIS 1999: Ege University, Turkey,
- 13. ISCIS 1998: Ankara, Turkey.

Turning to Erol himself, it is hard to describe the scientific content of an ongoing career starting in the early 1970’s for a highly productive researcher whose curiosity ranges widely in Computer Science, Applied Probability, Operational Research, Electrical Engineering and even Theoretical Biology. The variety of Erol’s work over the past fifteen years is unknown to those who know him through some specific research area. Thus our brief review points to his work in several areas since

the year 2000, such as energy efficiency of ICT [14] and autonomic communications [24] where Erol has authored influential papers.

2 Energy Packet Networks

Erol's first work published in 2015 analyses the link between the random nature of harvested energy, and the random nature of the data collection activities of a wireless sensor [58], leading to an original analysis of "synchronisation" between the two resources that in this case enable wireless communications: the data packets and the energy packets, first studied in a paper published in 2014 [57]. However in some earlier work he had introduced of a novel way to view energy as a "packet-based" resource that can be modelled in discrete units which he called Energy Packets [52, 53]. While Ohm's Law in the complex variable domain is a good way to analyse the steady flow of electricity in RLC networks, there are areas where it is not the best model:

- At a nano-scopic level, say at the level of the flow of individual electrons, both the stochastic nature of the sources and the physical non-homogeneities which govern the medium (e.g. metal) imply that different models may be needed; thus Erol recently proposed a stochastic flow model that addresses the conveyance of energy and information by individual particles [56].
- At a more macroscopic level, when one deals with intermittent sources of energy so that energy must be stored in batteries or other storage units (such as compressed air cylinders) that can include conversion losses to and from the electrical storage, and energy usage itself is intermittent, models descended from G-Networks [34, 37] become useful [54, 5, 55].
- This approach has raised interesting questions about how such large networks may be analysed in the presence of flow of energy and flow of work [57, 61] and some recent interesting results regarding "product form solutions" for such multi-hop networks have also been obtained [99].

3 Energy in ICT and its Optimisation

However, Erol's concern for energy consumption for communications actually started a decade earlier [79, 39] in the context of Wireless Ad-Hoc Networks, contributing a technique to extend overall life of a multi-hop network by using paths that have the most energy in reserve, i.e. the most full batteries. This work was pursued in papers related to network routing and admission control based on energy considerations [115, 114, 97, 97, 102, 95, 101, 122, 156] and this resulted in a practical design for an energy aware routing protocol.

His research group's involvement with energy consumption in information technology was also developed through their participation in EU Fit4Green Project

which resulted in a widely cited paper [14] regarding the energy optimisation of Cloud Computing servers and of software systems [151]

Although energy consumption by ICT is an important issue, it must be viewed as a compromise between the two aspects, where a reduction in energy consumption in the manner a specific system is being operated, for instance as a function of workload or of workload distribution, is “paid for” by a loss in performance or an increase in the response times experienced by users. This issue has been studied in several of Erol’s recent papers [81, 151, 80, 85].

Similar problems arise in wireless communications, but of course at far lower levels of energy consumption. Here the purpose is to minimise the amount of energy consumed per correctly received packet or bit. Indeed, in the wireless case, increasing the transmission power is often possible. This will overcome noise, but it has the opposite (negative) effect if *all* cooperating transceivers raise their power level, resulting in greater wireless signal *interference* and hence larger error probabilities for all parties. This in turn will *lengthen* the time needed to correctly receive a data unit, and hence will also increase the net energy consumed per correctly received bit or packet [83, 149, 108, 68].

4 Autonomic Communications and CPN

Erol has been long intrigued with the adaptive control of computer systems and networks since the 1970’s [109, 13, 12, 153, 76, 77], where the challenge is to deal both with the very large size of the systems encountered in computer science, the imperfection of the dynamic models that describe them, and the very large size of these dynamic models.

His most recent foray into this area, starting with early papers [126, 78, 65, 107] that describe the Cognitive Packet Network (CPN) routing algorithm both for wired and wireless networks that uses reinforcement learning to provide network Quality of Service (QoS) in an automatic manner, is a pioneering initiative in the field of Autonomic Communications [40]. He is also the co-author of a paper that made this field popular a few years later [24].

CPN related was a clear break with Erol’s traditional research which has relied essentially on mathematical modeling and simulation [30, 31, 103, 32, 116]. Related work [113, 150] suggests that decisions that have a “natural” appearance could also be incorporated in a similar manner, simulation systems where complex agent interactions occur, and agents take decisions based on their collective best interest. Similar questions have also been discussed with other methods in the context of search algorithms in dangerous environments [60].

The basic idea of CPN, amply tested in many experiments [91, 90, 86, 87, 93] is to use probe or “smart” Cognitive Packets (CPs) to search for paths and to measure QoS while the network is in operation. The search for paths is run via Reinforcement Learning using a Random Neural Network, based on the QoS objective of goal pursued by the end user. The CPs furnish information to the end user about the QoS

offered by different paths, and in particular those actually being used by the end user, but in CPN it is the end user, which may be a representative decision maker for a QoS Class, that actually decides to switch to a new path or select a given path [92, 79, 49]. An extension to CPN that uses genetic algorithms to construct hitherto untested paths based on predicted QoS was also proposed [146].

More recent work has considered CPN for specific applications. For instance in [72] the issue of dealing with web access applications where the uplink may require short response times for Web requests, while the download may require high bandwidth and low packet loss for video downloads, is considered, and a specific system that supports these needs is designed, implemented and tested. Similarly, other recent work deals with the QoS needs of Voice, and a VoCPN system is designed and evaluated [157] on an experimental test-bed.

One of the interesting developments of CPN relates to novel energy aware routing algorithms [95, 96] that link to Erol's concern with energy savings. Other useful application concerns admission control [110] and denial of service defense [64, 94]. Other work that is unrelated to CPN but that proposes adaptive techniques for the management of wireless sensor networks in order to achieve better QoS are discussed in [104, 105, 147, 106], while adaptivity for the management of secondary memory systems is discussed in [162].

Of course, the Random Neural Network was reported in Erol's earlier work [33, 35, 36, 63, 62, 98, 70]. Some of its other applications can be found in [10, 9, 75, 19, 117, 18, 8, 66, 3, 4, 2, 132, 73, 74] and several papers reviewing this subject can be found in the papers of the special issue in [37].

4.1 Network Security

Erol's work on network security came through some work on the impact of Distributed Denial of Service (DDoS) Attacks on network QoS, and a proposal to use CPN as a way to detect DDoS, counter-attack by tracing the attacking traffic upstream and use CPN's ACK packets as a tool to give "drop orders" to upstream routers that are conveying the attacking traffic [94, 148]. This approach was also evaluated on a large network test-bed as a means to detect worm attacks and react to them by sending the users' traffic on routes that avoid the infected nodes [155, 154]. His work on security continued with more algorithmic issues [161], but recently moved to the analysis of signalling storms in mobile networks [128, 127, 7] and is currently one of the main centres of his attention.

5 Emergency Management Systems

Like many people around the world who have a personal experience of large scale disasters, Erol was deeply struck by what he saw in Turkey in 1999, right after the

major earthquake that took place near Istanbul, in the areas around Izmit and Yalova. Although he was not present during the earthquake, he went to the sites just *after* the earthquakes with family members in order to try to find two family members who were missing and who has in fact perished during the event. Finding, identifying, and transporting the bodies was a traumatic experience. He was impressed by the very rudimentary nature of technology that was being used to seek, locate and try to evacuate the victims. The destruction of roads, bridges, electrical power lines and telecommunication networks, meant that only rudimentary construction technologies could be used by the numerous family members and professional rescuers who flocked to the area in the days that followed the earthquake.

Since that time, Erol has devoted a part of his research effort to better understanding the ongoing research of emergency management technologies [123, 125], and developing a deeper understanding of the appropriate models and algorithms which are specific to this domain of research [67, 124, 22, 21]. Unfortunately, many aspects of emergency management have a significant overlap with tactical planning of military operations [71, 120, 121] whose purpose is to destroy the capabilities of an adversary but also to save the lives of friendly forces and evacuate the injured of both sides. In particular, his team has investigated different simulation approaches [71, 69, 25] that could be used to represent the extremely dynamic and fast changing “transient” events in an emergency, and then developed a novel agent based simulator named the Distributed Building Evacuation Simulator (DBES) [23] for evacuation planning and simulation. A constant concern of this work has been to develop decentralised techniques that do not require large and expensive infrastructures [28], and his team has organised a series of annual workshops related to the Pervasive Communications conferences of the ACM [111, 112, 26].

His team studied fast decision algorithms based on learning a wide range of problem instances and their optimal rescuer and rescue vehicle allocations [118, 29, 119], and selecting in real-time the allocation that best matches the current observed emergency situation. They also studied low-cost, light-weight and disruption tolerant techniques that can offer robust communications in emergency environments [131], and many of these methods actually span both the military and the civilian domain [158, 130, 144, 129, 27]. More recent work has been devoted to autonomous routing techniques based on ideas derived from CPN or from directional techniques so that the management of evacuees can be carried out without the intervention of any centralised decision making agent [16, 16, 15, 17, 59, 143]

6 Gene Regulatory Networks

Erol’s interest in Gene Regulatory Networks [44], a very important topic in health sciences, started fortuitously during a visit in the mid 2000’s to the well known French gene splicing centre, the Genopole in Evry, near Paris. He had been invited there by a friend, Gabriel Mergui who was then the Genopole’s industrialisation and marketing director and who knew about Er’s interests in the interface between

biology and computer science [51], to give a seminar (on his work in general) and to meet other colleagues.

At the Genopole, he met Professor Gilles Bernot who had known Erol when Gilles was an Assistant at the Laboratoire de Recherche en Informatique, co-founded by Erol at the Université de Paris Sud in Orsay, south of Paris, towards 1978-79. As we say in Turkish “nereden nereye” – as an expression of surprise about the fortuitous chains of events .. “from where to where”. At the Genopole, Gilles (whose background is in Formal Methods in Computer Science) was heading a group specialised on the formal specification and simulation of Gene Regulatory Networks ... and he handed to Erol some of the early papers on graph models of gene regulatory networks (GRNs). On his return to London, Erol jumped into the subject and came up with the basic model that was published in the previously cited paper [44] and various conferences such as [41]. This initial paper took some time to attract interest from biologists, but it did attract interest in two directions.

It gave rise to an interesting development regarding the use of Erol’s GRN model to detect anomalies in genetic data that can help detect or point to predisposition to certain diseases [135, 138, 140, 134, 136, 141]. Typically, this line of work involved using Erol’s GRN model to represent a set of gene interactions, including some measure of the time scale of these interactions through appropriate time constants, and then estimating the parameters from measured micro-array from known “normal” (i.e. non-disease) data [139, 137], for instance using a learning algorithm similar to some earlier work [35, 70]. Once this phase of model identification is complete, the model can be used for comparison with other micro-array data, to determine whether this other data shows an anomaly or a propensity for some disease such as cancer [142, 133]. Another line of collaboration also emerged with biologists [152] regarding difficult problems of protein interaction networks. Interestingly enough, Erol also investigated how some of the underlying chemistry could be modelled [47].

7 How About Analytical Models?

In fact, in all of the areas we have listed, Erol’s work has been driven by the use, or invention, of appropriate probability models [100]. However, an interesting development has been Erol’s incursion into the literature on Statistical Physics with his theoretical papers on analytical solutions for chemical master equations [46], and the related issue of stochastic modeling in gene regulatory networks [45]. Another multi-disciplinary link he has been able to make links the behaviour of adversarial biological populations (such as germs and cells) to viruses in software or in computer networks [42]. His recent work has also linked particle motion in non-homogenous media [50, 6], where he has studied both the time it takes for a set of particles to attain a target, and the energy that is consumed in the process, which is related to the random motion of packets in a very large multi-hop sensor network [43].

Finally in my list of unusual analytic results, let me mention his work where he considers an (economic) market composed of N English auctions [48] where customers arrive according to a random process, select some auction and bid for a product with a probability that may depend on the current value that has been attained by that product, leave the marketplace if they are successful in purchasing the product, and may go to some other auction (or may leave the market) if they are unsuccessful. This analysis leads to a closed form expression for the equilibrium prices of all the products in the market.

References

1. The 24th International Symposium on Computer and Information Sciences, ISCIS 2009, 14-16 September 2009, North Cyprus. IEEE (2009)
2. Abdelbaki, H., Gelenbe, E., El-Khamy, S.E.: Random neural network decoder for error correcting codes. In: Neural Networks, 1999. IJCNN'99. International Joint Conference on, vol. 5, pp. 3241–3245. IEEE (1999)
3. Abdelbaki, H., Gelenbe, E., Kocak, T.: Matched neural filters for emi based mine detection. In: Neural Networks, 1999. IJCNN'99. International Joint Conference on, vol. 5, pp. 3236–3240. IEEE (1999)
4. Abdelbaki, H., Gelenbe, E., Koçak, T., El-Khamy, S.E.: Random neural network filter for land mine detection. In: Radio Science Conference, 1999. NRSC'99. Proceedings of the Sixteenth National, pp. C43–1. IEEE (1999)
5. Abdelrahman, O.H., Gelenbe, E.: Packet delay and energy consumption in non-homogeneous networks. *The Computer Journal* **55**(8), 950–964 (2012)
6. Abdelrahman, O.H., Gelenbe, E.: Time and energy in team-based search. *Physical Review E* **87**(3), 032,125 (2013)
7. Abdelrahman, O.H., Gelenbe, E.: Signalling storms in 3g mobile networks. In: IEEE International Conference on Communications, ICC 2014, Sydney, Australia, June 10-14, 2014, pp. 1017–1022. IEEE (2014). DOI 10.1109/ICC.2014.6883453. URL <http://dx.doi.org/10.1109/ICC.2014.6883453>
8. Aguilar, J., Gelenbe, E.: Task assignment and transaction clustering heuristics for distributed systems. *Information Sciences* **97**(1), 199–219 (1997)
9. Atalay, V., Gelenbe, E.: Parallel algorithm for colour texture generation using the random neural network model. *International Journal of Pattern Recognition and Artificial Intelligence* **6**(02n03), 437–446 (1992)
10. Atalay, V., Gelenbe, E., Yalabik, N.: The random neural network model for texture generation. *International Journal of Pattern Recognition and Artificial Intelligence* **6**(01), 131–141 (1992)
11. Aykanat, C., Dayar, T., Korpeoglu, I. (eds.): Computer and Information Sciences - ISCIS 2004, 19th International Symposium, Kemer-Antalya, Turkey, October 27-29, 2004. Proceedings, *Lecture Notes in Computer Science*, vol. 3280. Springer (2004)
12. Badel, M., Gelenbe, E., Leroudier, J., Potier, D.: Adaptive optimization of a time-sharing system's performance. *Proceedings of the IEEE* **63**(6), 958–965 (1975)
13. Badel, M., Gelenbe, E., Leroudier, J., Potier, D., Lenfant, J.: Adaptive optimization of the performance of a virtual memory computer. *ACM SIGMETRICS Performance Evaluation Review* **3**(4), 188 (1974)
14. Berl, A., Gelenbe, E., Di Girolamo, M., Giuliani, G., De Meer, H., Dang, M.Q., Pentikousis, K.: Energy-efficient cloud computing. *The Computer Journal* **53**(7), 1045–1051 (2010)
15. Bi, H., Desmet, A., Gelenbe, E.: Routing emergency evacuees with cognitive packet networks. In: Information Sciences and Systems 2013, pp. 295–303. Springer International Publishing (2013)

16. Bi, H., Gelenbe, E.: Routing diverse evacuees with cognitive packets. arXiv preprint arXiv:1311.4818 (2013)
17. Bi, H., Gelenbe, E.: A cooperative emergency navigation framework using mobile cloud computing. In: Information Sciences and Systems 2014, pp. 41–48. Springer International Publishing (2014)
18. Cramer, C., Gelenbe, E., Bakircioglu, H.: Video compression with random neural networks. In: Neural Networks for Identification, Control, Robotics, and Signal/Image Processing, 1996. Proceedings., International Workshop on, pp. 476–484. IEEE (1996)
19. Cramer, C., Gelenbe, E., Bakircioglu, H.: Low bit-rate video compression with neural networks and temporal subsampling. Proceedings of the IEEE **84**(10), 1529–1543 (1996)
20. Czachórski, T., Gelenbe, E., Lent, R. (eds.): Information Sciences and Systems 2014 - Proceedings of the 29th International Symposium on Computer and Information Sciences, IS-CIS 2014, Krakow, Poland, October 27-28, 2014. Springer (2014). DOI 10.1007/978-3-319-09465-6. URL <http://dx.doi.org/10.1007/978-3-319-09465-6>
21. Desmet, A., Gelenbe, E.: Graph and analytical models for emergency evacuation. Future Internet **5**(1), 46–55 (2013)
22. Desmet, A., Gelenbe, E.: Interoperating infrastructures in emergencies. In: Computer and Information Sciences III, pp. 123–130. Springer London (2013)
23. Dimakis, N., Filippoupolitis, A., Gelenbe, E.: Distributed building evacuation simulator for smart emergency management. The Computer Journal p. bxq012 (2010)
24. Dobson, S., Denazis, S., Fernández, A., Gaiti, D., Gelenbe, E., Massacci, F., Nixon, P., Saffre, F., Schmidt, N., Zambonelli, F.: A survey of autonomic communications. ACM Transactions on Autonomous and Adaptive Systems (TAAS) **1**(2), 223–259 (2006)
25. Filippoupolitis, A., Gelenbe, E.: A distributed simulation platform for urban security. In: Green Computing and Communications (GreenCom), 2012 IEEE International Conference on, pp. 434–441. IEEE (2012)
26. Filippoupolitis, A., Gelenbe, E., Abdelrahman, O.H., Ardito, L., Bulut, E., Desmet, A., Falcarin, P., Gorbil, G., Islam, S., Loukas, G., et al.: Pernem’14: The fourth international workshop on pervasive networks for emergency management, 2014-welcome and committees welcome message from the pernem’14 co-chairs. In: Proceedings PerCOM 2014 (2014)
27. Filippoupolitis, A., Gorbil, G., Gelenbe, E.: Spatial computers for emergency management. In: Self-Adaptive and Self-Organizing Systems Workshops (SASOW), 2011 Fifth IEEE Conference on, pp. 61–66. IEEE (2011)
28. Filippoupolitis, A., Gorbil, G., Gelenbe, E.: Pervasive emergency support systems for building evacuation. In: Pervasive Computing and Communications Workshops (PERCOM Workshops), 2012 IEEE International Conference on, pp. 525–527. IEEE (2012)
29. Filippoupolitis, A., Hey, L., Loukas, G., Gelenbe, E., Timotheou, S.: Emergency response simulation using wireless sensor networks. In: Proceedings of the 1st international conference on Ambient media and systems, p. 21. ICST (Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering) (2008)
30. Gelenbe, E.: A unified approach to the evaluation of a class of replacement algorithms. Computers, IEEE Transactions on **100**(6), 611–618 (1973)
31. Gelenbe, E.: On approximate computer system models. Journal of the ACM (JACM) **22**(2), 261–269 (1975)
32. Gelenbe, E.: Probabilistic models of computer systems. Acta Informatica **12**(4), 285–303 (1979)
33. Gelenbe, E.: Stability of the random neural network model. Neural computation **2**(2), 239–247 (1990)
34. Gelenbe, E.: G-nets and learning recurrent random networks. Proc. Int. Conf. on Artificial Neural Networks, Brighton, England (1992)
35. Gelenbe, E.: Learning in the recurrent random neural network. Neural Computation **5**(1), 154–164 (1993)
36. Gelenbe, E.: G-networks: a unifying model for neural and queueing networks. Annals of Operations Research **48**(5), 433–461 (1994)

37. Gelenbe, E.: The first decade of g-networks. *European Journal of Operational Research* **126**(2), 231–232 (2000)
38. Gelenbe, E. (ed.): *International Symposium on Computer and Information Sciences*. CRC Press (2002)
39. Gelenbe, E.: Quality of service in ad hoc networks. *Ad Hoc Networks* **2**(3), 203 (2004)
40. Gelenbe, E.: Users and services in intelligent networks. *IEE Proceedings-Intelligent Transport Systems* **153**(3), 213–220 (2006)
41. Gelenbe, E.: Analytical solution of gene regulatory networks. In: *Fuzzy Systems Conference, 2007. FUZZ-IEEE 2007*. IEEE International, pp. 1–6. IEEE (2007)
42. Gelenbe, E.: Dealing with software viruses: a biological paradigm. *information security technical report* **12**(4), 242–250 (2007)
43. Gelenbe, E.: A diffusion model for packet travel time in a random multi-hop medium. *ACM Transactions on Sensor Networks* **3**(2) (2007)
44. Gelenbe, E.: Steady-state solution of probabilistic gene regulatory networks. *Physical Review E* **76**(3), 031,903 (2007)
45. Gelenbe, E.: Steady-state solution of probabilistic gene regulatory networks. *Physical Review E* **76**(1), 031,903 (2007)
46. Gelenbe, E.: Network of interacting synthetic molecules in equilibrium. *Proceedings of the Royal Society A* **464**, 22192228 (2008)
47. Gelenbe, E.: Network of interacting synthetic molecules in steady state. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Science* **464**(2096), 2219–2228 (2008)
48. Gelenbe, E.: Analysis of single and networked auctions. *ACM Transactions on Internet Technology (TOIT)* **9**(2), 8 (2009)
49. Gelenbe, E.: Steps toward self-aware networks. *Communications of the ACM* **52**(7), 66–75 (2009)
50. Gelenbe, E.: Search in unknown random environments. *Physical Review E* **82**, 061,112 (2010)
51. Gelenbe, E.: Ubiquity symposium: Natural computation. *Ubiquity* **2011**(February), 1 (2011)
52. Gelenbe, E.: Energy packet networks: adaptive energy management for the cloud. In: *Proceedings of the 2nd International Workshop on Cloud Computing Platforms*, p. 1. ACM (2012)
53. Gelenbe, E.: Energy packet networks: Ict based energy allocation and storage. In: *Green Communications and Networking*, pp. 186–195. Springer Berlin Heidelberg (2012)
54. Gelenbe, E.: Energy packet networks: smart electricity storage to meet surges in demand. In: *Proceedings of the 5th International ICST Conference on Simulation Tools and Techniques*, pp. 1–7. ICST (Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering) (2012)
55. Gelenbe, E.: Adaptive management of energy packets. In: *Computer Software and Applications Conference Workshops (COMPSACW), 2014 IEEE 38th International*, pp. 1–6. IEEE (2014)
56. Gelenbe, E.: Error and energy when communicating with spins. In: *Signal and Information Processing (GlobalSIP), 2014 IEEE Global Conference on*, pp. 784–787. IEEE (2014). DOI 10.1109/GlobalSIP.2014.7032226
57. Gelenbe, E.: A sensor node with energy harvesting. *ACM SIGMETRICS Performance Evaluation Review* **42**(2), 37–39 (2014)
58. Gelenbe, E.: Synchronising energy harvesting and data packets in a wireless sensor. *Energies* **8**(1), 356–369 (2015). DOI 10.3390/en8010356
59. Gelenbe, E., Bi, H.: Emergency navigation without an infrastructure. *Sensors* **14**(8), 15,142–15,162 (2014)
60. Gelenbe, E., Cao, Y.: Autonomous search for mines. *European Journal of Operational Research* **108**(2), 319–333 (1998)
61. Gelenbe, E., gce Ceran, E.T.: Central or distributed energy storage for processors with energy harvesting. In: *The Fourth International Conference on Sustainable Internet and ICT for Sustainability*. IEEE (2015)

62. Gelenbe, E., Feng, Y., Krishnan, K.R.R.: Neural network methods for volumetric magnetic resonance imaging of the human brain. *Proceedings of the IEEE* **84**(10), 1488–1496 (1996)
63. Gelenbe, E., Feng, Y., Ranga, K., Krishnan, R.: Neural networks for volumetric mr imaging of the brain. In: *Neural Networks for Identification, Control, Robotics, and Signal/Image Processing, 1996. Proceedings., International Workshop on*, pp. 194–202. IEEE (1996)
64. Gelenbe, E., Gellman, M., Loukas, G.: An autonomic approach to denial of service defence. In: *World of Wireless Mobile and Multimedia Networks, 2005. WoWMoM 2005. Sixth IEEE International Symposium on a*, pp. 537–541. IEEE (2005)
65. Gelenbe, E., Gellman, M., Su, P.: Self-awareness and adaptivity for quality of service. In: *Computers and Communication, 2003.(ISCC 2003). Proceedings. Eighth IEEE International Symposium on*, pp. 3–9. IEEE (2003)
66. Gelenbe, E., Ghanwani, A., Srinivasan, V.: Improved neural heuristics for multicast routing. *Selected Areas in Communications, IEEE Journal on* **15**(2), 147–155 (1997)
67. Gelenbe, E., Gorbil, G., Wu, F.J.: Emergency cyber-physical-human systems. In: *Computer Communications and Networks (ICCCN), 2012 21st International Conference on*, pp. 1–7. IEEE (2012)
68. Gelenbe, E., Gunduz, D.: Optimum power level for communications with interference. In: *Digital Communications-Green ICT (TIWDC), 2013 24th Tyrrhenian International Workshop on*, pp. 1–6. IEEE (2013)
69. Gelenbe, E., Hussain, K., Kaptan, V.: Simulating autonomous agents in augmented reality. *Journal of Systems and Software* **74**(3), 255–268 (2005)
70. Gelenbe, E., Hussain, K.F.: Learning in the multiple class random neural network. *Neural Networks, IEEE Transactions on* **13**(6), 1257–1267 (2002)
71. Gelenbe, E., Kaptan, V., Wang, Y.: Biological metaphors for agent behavior. In: *Computer and Information Sciences-ISCIS 2004*, pp. 667–675. Springer Berlin Heidelberg (2004)
72. Gelenbe, E., Kazhmaganbetova, Z.: Cognitive packet network for bilateral asymmetric connections. *IEEE Trans. Industrial Informatics* **10**(3), 1717–1725 (2014). DOI 10.1109/TII.2014.2321740. URL <http://dx.doi.org/10.1109/TII.2014.2321740>
73. Gelenbe, E., Koçak, T.: Area-based results for mine detection. *Geoscience and Remote Sensing, IEEE Transactions on* **38**(1), 12–24 (2000)
74. Gelenbe, E., Koçak, T., Wang, R.: Wafer surface reconstruction from top-down scanning electron microscope images. *Microelectronic Engineering* **75**(2), 216–233 (2004)
75. Gelenbe, E., Koubi, V., Pekergin, F.: Dynamical random neural network approach to the traveling salesman problem. In: *Systems, Man and Cybernetics, 1993.'Systems Engineering in the Service of Humans', Conference Proceedings., International Conference on*, pp. 630–635. IEEE (1993)
76. Gelenbe, E., Kurinckx, A.: Random injection control of multiprogramming in virtual memory. *Software Engineering, IEEE Transactions on* **SE 4**(1), 2–17 (1978)
77. Gelenbe, E., Labeled, A.: Esprit ltr project 8144 lydia load balancing and g-networks: Design, implementation and evaluation. Tech. rep., Technical Report, IHEI, Univ. René Descartes, Paris V (1996)
78. Gelenbe, E., Lent, R.: Mobile ad-hoc cognitive packet networks. *Proc. IEEE ASWN* pp. 2–4 (2002)
79. Gelenbe, E., Lent, R.: Power-aware ad hoc cognitive packet networks. *Ad Hoc Networks* **2**(3), 205–216 (2004)
80. Gelenbe, E., Lent, R.: Optimising server energy consumption and response time. *Theoretical and Applied Informatics* **24**(4), 257–270 (2012)
81. Gelenbe, E., Lent, R.: Trade-offs between energy and quality of service. In: *Sustainable Internet and ICT for Sustainability (SustainIT), 2012*, pp. 1–5. IEEE (2012)
82. Gelenbe, E., Lent, R. (eds.): *Computer and Information Sciences III - 27th International Symposium on Computer and Information Sciences, Paris, France, October 3-4, 2012*. Springer (2013). DOI 10.1007/978-1-4471-4594-3. URL <http://dx.doi.org/10.1007/978-1-4471-4594-3>
83. Gelenbe, E., Lent, R.: Energy-qos trade-offs in mobile service selection. *Future Internet* **5**(2), 128–139 (2013)

84. Gelenbe, E., Lent, R. (eds.): Information Sciences and Systems 2013 - Proceedings of the 28th International Symposium on Computer and Information Sciences, ISCIS 2013, Paris, France, October 28-29, 2013, *Lecture Notes in Electrical Engineering*, vol. 264. Springer (2013). DOI 10.1007/978-3-319-01604-7. URL <http://dx.doi.org/10.1007/978-3-319-01604-7>
85. Gelenbe, E., Lent, R., Douratsos, M.: Choosing a local or remote cloud. In: Network Cloud Computing and Applications (NCCA), 2012 Second Symposium on, pp. 25–30. IEEE (2012)
86. Gelenbe, E., Lent, R., Montuori, A., Xu, Z.: Cognitive packet networks: Qos and performance. In: Modeling, Analysis and Simulation of Computer and Telecommunications Systems, 2002. MASCOTS 2002. Proceedings. 10th IEEE International Symposium on, pp. 3–9. IEEE (2002)
87. Gelenbe, E., Lent, R., Nunez, A.: Self-aware networks and qos. *Proceedings of the IEEE* **92**(9), 1478–1489 (2004)
88. Gelenbe, E., Lent, R., Sakellari, G. (eds.): Computer and Information Sciences II - 26th International Symposium on Computer and Information Sciences, London, UK, 26-28 September 2011. Springer (2011). DOI 10.1007/978-1-4471-2155-8. URL <http://dx.doi.org/10.1007/978-1-4471-2155-8>
89. Gelenbe, E., Lent, R., Sakellari, G., Sacan, A., Toroslu, I.H., Yazici, A. (eds.): Computer and Information Sciences - Proceedings of the 25th International Symposium on Computer and Information Sciences, London, UK, September 22-24, 2010, *Lecture Notes in Electrical Engineering*, vol. 62. Springer (2010). DOI 10.1007/978-90-481-9794-1. URL <http://dx.doi.org/10.1007/978-90-481-9794-1>
90. Gelenbe, E., Lent, R., Xu, Z.: Design and performance of cognitive packet networks. *Performance Evaluation* **46**(2), 155–176 (2001)
91. Gelenbe, E., Lent, R., Xu, Z.: Measurement and performance of a cognitive packet network. *Computer Networks* **37**(6), 691–701 (2001)
92. Gelenbe, E., Lent, R., Xu, Z.: Towards networks with cognitive packets. In: Performance and QoS of next generation networking, pp. 3–17. Springer London (2001)
93. Gelenbe, E., Liu, P.: Qos and routing in the cognitive packet network. In: World of Wireless Mobile and Multimedia Networks, 2005. WoWMoM 2005. Sixth IEEE International Symposium on a, pp. 517–521. IEEE (2005)
94. Gelenbe, E., Loukas, G.: A self-aware approach to denial of service defence. *Computer Networks* **51**(5), 1299–1314 (2007)
95. Gelenbe, E., Mahmoodi, T.: Energy-aware routing in the cognitive packet network. In: EN-ERGY 2011, The First International Conference on Smart Grids, Green Communications and IT Energy-aware Technologies, pp. 7–12 (2011)
96. Gelenbe, E., Mahmoodi, T.: Distributed energy-aware routing protocol. In: Computer and Information Sciences II, pp. 149–154. Springer London (2012)
97. Gelenbe, E., Mahmoodi, T., Morfopoulou, C.: Energy aware routing in packet networks. *E-Energy* (2010)
98. Gelenbe, E., Mao, Z.W., Li, Y.D.: Function approximation with spiked random networks. *Neural Networks, IEEE Transactions on* **10**(1), 3–9 (1999)
99. Gelenbe, E., Marin, A.: Interconnected wireless sensors with energy harvesting. In: Proceedings of Analytical and Stochastic Modelling Techniques and Applications, ASMTA 2015. Springer International Publishing (2015)
100. Gelenbe, E., Mitrani, I.: Analysis and Synthesis of Computer Systems. World Scientific, Imperial College Press (2010)
101. Gelenbe, E., Morfopoulou, C.: A framework for energy-aware routing in packet networks. *The Computer Journal* **54**(6), 850–859 (2011)
102. Gelenbe, E., Morfopoulou, C.: Routing and g-networks to optimise energy and quality of service in packet networks. In: Energy-Efficient Computing and Networking, pp. 163–173. Springer Berlin Heidelberg (2011)
103. Gelenbe, E., Muntz, R.R.: Probabilistic models of computer systems part i (exact results). *Acta Informatica* **7**(1), 35–60 (1976)

104. Gelenbe, E., Ngai, E.C.: Adaptive qos routing for significant events in wireless sensor networks. In: *Mobile Ad Hoc and Sensor Systems, 2008. MASS 2008. 5th IEEE International Conference on*, pp. 410–415. IEEE (2008)
105. Gelenbe, E., Ngai, E.C.: Adaptive random re-routing in sensor networks. *Proceedings of the Annual Conference of ITA (ACITA08) September 16* **18**, 348–349 (2008)
106. Gelenbe, E., Ngai, E.C., Yadav, P.: Routing of high-priority packets in wireless sensor networks. *IEEE Second International Conference on Computer and Network Technology*, IEEE (2010)
107. Gelenbe, E., Núñez, A.: Self-aware networks and quality of service. In: *Artificial Neural Networks and Neural Information Processing ICANN/ICONIP 2003*, pp. 901–908. Springer Berlin Heidelberg (2003)
108. Gelenbe, E., Oklander, B.: Cognitive users with useful vacations. In: *Communications Workshops (ICC), 2013 IEEE International Conference on*, pp. 370–374. IEEE (2013)
109. Gelenbe, E., Potier, D., Brandwajn, A., Lenfant, J.: Gestion optimale d'un ordinateur multi-programmé à mémoire virtuelle. In: *5th Conference on Optimization Techniques Part II*, pp. 132–143. Springer Berlin Heidelberg (1973)
110. Gelenbe, E., Sakellari, G., D'arienzo, M.: Admission of qos aware users in a smart network. *ACM Transactions on Autonomous and Adaptive Systems (TAAS)* **3**(1), 4 (2008)
111. Gelenbe, E., Sakellari, G., Filippopolitis, A.: Pernem 2012: Second international workshop on pervasive networks for emergency management 2012, committees and welcome. In: *Proceedings PerCOM 2012* (2012)
112. Gelenbe, E., Sakellari, G., Filippopolitis, A.: Pernem 2013: Third international workshop on pervasive networks for emergency management 2013-committees and welcome. In: *Proceedings PerCOM 2013* (2013)
113. Gelenbe, E., Seref, E., Xu, Z.: Simulation with learning agents. *Proceedings of the IEEE* **89**(2), 148–157 (2001)
114. Gelenbe, E., Silvestri, S.: Optimisation of power consumption in wired packet networks. In: *Quality of Service in Heterogeneous Networks*, pp. 717–729. Springer Berlin Heidelberg (2009)
115. Gelenbe, E., Silvestri, S.: Reducing power consumption in wired networks. In: *Computer and Information Sciences, 2009. ISCS 2009. 24th International Symposium on*, pp. 292–297. IEEE (2009)
116. Gelenbe, E., Stafylopatis, A.: Global behavior of homogeneous random neural systems. *Applied Mathematical Modelling* **15**(10), 534–541 (1991)
117. Gelenbe, E., Sungur, M., Cramer, C., Gelenbe, P.: Traffic and video quality with adaptive neural compression. *Multimedia Systems* **4**(6), 357–369 (1996)
118. Gelenbe, E., Timotheou, S.: Random neural networks with synchronized interactions. *Neural Computation* **20**(9), 2308–2324 (2008)
119. Gelenbe, E., Timotheou, S.: Synchronized interactions in spiked neuronal networks. *The Computer Journal* **51**(6), 723–730 (2008)
120. Gelenbe, E., Wang, Y.: A mathematical approach for mission planning and rehearsal. In: *Defense and Security Symposium*, pp. 62,490Q–62,490Q. International Society for Optics and Photonics (2006)
121. Gelenbe, E., Wang, Y.: Modelling large scale autonomous systems. In: *Information Fusion, 2006 9th International Conference on*, pp. 1–7. IEEE (2006)
122. Gelenbe, E., Wu, F.J.: Distributed networked emergency evacuation and rescue. In: *Communications (ICC), 2012 IEEE International Conference on*, pp. 6334–6338. IEEE (2012)
123. Gelenbe, E., Wu, F.J.: Large scale simulation for human evacuation and rescue. *Computers & Mathematics with Applications* **64**(12), 3869–3880 (2012)
124. Gelenbe, E., Wu, F.J.: Sensors in cyber-physical emergency systems. In: *Wireless Sensor Systems (WSS 2012), IET Conference on*. IEEE (2012). DOI 10.1049/cp.2012.0578
125. Gelenbe, E., Wu, F.J.: Future research on cyber-physical emergency management systems. *Future Internet* **5**(3), 336–354 (2013)
126. Gelenbe, E., Xu, Z., Seref, E.: Cognitive packet networks. In: *Tools with Artificial Intelligence, 1999. Proceedings. 11th IEEE International Conference on*, pp. 47–54. IEEE (1999)

127. Gorbil, G., Abdelrahman, O.H., Gelenbe, E.: Storms in mobile networks. In: P. Mueller, L. Foschini, R. Yu (eds.) Q2SWinet'14, Proceedings of the 10th ACM Symposium on QoS and Security for Wireless and Mobile Networks, Montreal, QC, Canada, September 21-22, 2014, pp. 119–126. ACM (2014). DOI 10.1145/2642687.2642688. URL <http://doi.acm.org/10.1145/2642687.2642688>
128. Gorbil, G., Abdelrahman, O.H., Pavloski, M., Gelenbe, E.: Storms in mobile networks. arXiv preprint arXiv:1411.1280 (2014)
129. Gorbil, G., Filippoupolitis, A., Gelenbe, E.: Intelligent navigation systems for building evacuation. In: Computer and Information Sciences II, pp. 339–345. Springer London (2012)
130. Gorbil, G., Gelenbe, E.: Design of a mobile agent-based adaptive communication middleware for federations of critical infrastructure simulations. In: Critical Information Infrastructures Security, pp. 34–49. Springer Berlin Heidelberg (2010)
131. Gorbil, G., Gelenbe, E.: Opportunistic communications for emergency support systems. *Procedia Computer Science* **5**, 39–47 (2011)
132. Hocaoglu, A.K., Gader, P.D., Gelenbe, E., Kocak, T.: Optimal linear combination of order statistics filters and their relationship to the delta-operator. In: AeroSense'99, pp. 1323–1329. International Society for Optics and Photonics (1999)
133. Kim, H., Atalay, R., Gelenbe, E.: G-network modelling based abnormal pathway detection in gene regulatory networks. In: Computer and Information Sciences: 26th International Symposium on Computer and Information Sciences, p. 257. Springer Verlag (2011)
134. Kim, H., Atalay, R., Gelenbe, E.: G-network modelling based abnormal pathway detection in gene regulatory networks. In: Computer and Information Sciences II, pp. 257–263. Springer London (2012)
135. Kim, H., Gelenbe, E.: Stochastic gene expression model base gene regulatory networks. In: EKC 2009 Proceedings of the EU-Korea Conference on Science and Technology, pp. 235–244. Springer Berlin Heidelberg (2010)
136. Kim, H., Gelenbe, E.: Reconstruction of large-scale gene regulatory networks using bayesian model averaging. In: Bioinformatics and Biomedicine (BIBM), 2011 IEEE International Conference on, pp. 202–207. IEEE (2011)
137. Kim, H., Gelenbe, E.: Reconstruction of large-scale gene regulatory networks using bayesian model averaging. *NanoBioscience, IEEE Transactions on* **11**(3), 259–265 (2012). DOI 10.1109/TNB.2012.2214233
138. Kim, H., Gelenbe, E.: Stochastic gene expression modeling with hill function for switch-like gene responses. *Computational Biology and Bioinformatics, IEEE/ACM Transactions on* **9**(4), 973–979 (2012)
139. Kim, H., Gelenbe, E.: Stochastic gene expression modeling with hill function for switch-like gene responses. *Computational Biology and Bioinformatics, IEEE/ACM Transactions on* **9**(4), 973–979 (2012). DOI 10.1109/TCBB.2011.153
140. Kim, H., Gelenbe, E., et al.: G-networks based two layer stochastic modeling of gene regulatory networks with post-translational processes. *Interdisciplinary Bio Central* **3**(1), 8 (2011)
141. Kim, H., Park, T., Gelenbe, E.: Identifying disease candidate genes via large-scale gene network analysis. *International Journal of Data Mining and Bioinformatics* **10**(2), 175–188 (2014)
142. Kim, H., Park, T., Gelenbe, E.: Identifying disease candidate genes via large-scale gene network analysis. *International Journal of Data Mining and Bioinformatics* **10**(2), 175–188 (2014). DOI 10.1504/IJDMB.2014.064014
143. Kokuti, A., Gelenbe, E.: Directional navigation improves opportunistic communication for emergencies. *Sensors* **14**(8), 15,387–15,399 (2014)
144. Lent, R., Abdelrahman, O.H., Gorbil, G., Gelenbe, E.: Fast message dissemination for emergency communications. In: Pervasive Computing and Communications Workshops (PERCOM Workshops), 2010 8th IEEE International Conference on, pp. 370–375. IEEE (2010)
145. Levi, A., Savas, E., Yenigün, H., Balcisoy, S., Saygin, Y. (eds.): Computer and Information Sciences - ISCIS 2006, 21th International Symposium, Istanbul, Turkey, November 1-3, 2006, Proceedings, *Lecture Notes in Computer Science*, vol. 4263. Springer (2006)

146. Liu, P., Gelenbe, E.: Recursive routing in the cognitive packet network. In: Testbeds and Research Infrastructure for the Development of Networks and Communities, 2007. TridentCom 2007. 3rd International Conference on, pp. 1–6. IEEE (2007)
147. Ngai, E.C., Gelenbe, E., Humber, G.: Information-aware traffic reduction for wireless sensor networks. In: Local Computer Networks, 2009. LCN 2009. IEEE 34th Conference on, pp. 451–458. IEEE (2009)
148. Oke, G., Loukas, G., Gelenbe, E.: Detecting denial of service attacks with bayesian classifiers and the random neural network. In: Fuzzy Systems Conference, 2007. FUZZ-IEEE 2007. IEEE International, pp. 1–6. IEEE (2007)
149. Oklander, B., Gelenbe, E.: Optimal behaviour of smart wireless users. In: Information Sciences and Systems 2013, pp. 87–95. Springer International Publishing (2013)
150. Ören, T.I., Numrich, S.K., Uhrmacher, A.M., Wilson, L.F., Gelenbe, E.: Agent-directed simulation: challenges to meet defense and civilian requirements. In: Proceedings of the 32nd conference on Winter simulation, pp. 1757–1762. Society for Computer Simulation International (2000)
151. Pernici, B., Aiello, M., vom Brocke, J., Donnellan, B., Gelenbe, E., Kretsis, M.: What is can do for environmental sustainability: a report from caise2011 panel on green and sustainable is. Communications of the Association for Information Systems **30**(1), 18 (2012)
152. Phan, H.T., Stemberg, M.J., Gelenbe, E.: Aligning protein-protein interaction networks using random neural networks. In: Bioinformatics and Biomedicine (BIBM), 2012 IEEE International Conference on, pp. 1–6. IEEE (2012)
153. Potier, D., Gelenbe, E., Lenfant, J.: Adaptive allocation of central processing unit quanta. Journal of the ACM (JACM) **23**(1), 97–102 (1976)
154. Sakellari, G., Gelenbe, E.: Adaptive resilience of the cognitive packet network in the presence of network worms. Proceedings of the NATO Symposium on C3I for Crisis, Emergency and Consequence Management pp. 11–12 (2009)
155. Sakellari, G., Hey, L., Gelenbe, E.: Adaptability and failure resilience of the cognitive packet network. DemoSession of the 27th IEEE Conference on Computer Communications (INFOCOM2008), Phoenix, Arizona, USA (2008)
156. Sakellari, G., Morfopoulou, C., Mahmoodi, T., Gelenbe, E.: Using energy criteria to admit flows in a wired network. In: Computer and Information Sciences III, pp. 63–72. Springer London (2013)
157. Wang, L., Gelenbe, E.: An implementation of voice over ip in the cognitive packet network. In: Information Sciences and Systems 2014, pp. 33–40. Springer International Publishing (2014)
158. Witkowski, M., White, G., Louvieris, P., Gorbil, G., Gelenbe, E., Dodd, L.: High-level information fusion and mission planning in highly anisotropic threat spaces. In: Information Fusion, 2008 11th International Conference on, pp. 1–8. IEEE (2008)
159. Yazici, A., Sener, C. (eds.): Computer and Information Sciences - ISCIS 2003, 18th International Symposium, Antalya, Turkey, November 3-5, 2003, Proceedings, *Lecture Notes in Computer Science*, vol. 2869. Springer (2003)
160. Yolum, P., Güngör, T., Gürgen, F.S., Özturan, C.C. (eds.): Computer and Information Sciences - ISCIS 2005, 20th International Symposium, Istanbul, Turkey, October 26-28, 2005, Proceedings, *Lecture Notes in Computer Science*, vol. 3733. Springer (2005)
161. Yu, C.M., Ni, G.K., Chen, I.Y., Gelenbe, E., Kuo, S.Y.: Top-k query result completeness verification in tiered sensor networks. IEEE Transactions on Information Forensics and Security **9**(1), 109–124 (2014)
162. Zhu, Q., Gelenbe, E., Qiao, Y.: Adaptive prefetching algorithm in disk controllers. Performance Evaluation **65**(5), 382–395 (2008)

The series of ISCIS (International Symposium on Computer and Information Sciences) symposia have been held each year since 1986, mostly in Turkey and occasionally abroad. It is the main computer science and engineering meeting organized by Turkish academics and was founded by Erol Gelenbe. Each year ISCIS attracts a significant number of international participants from all over the world. The 19th ISCIS was organized by Bilkent University, Department of Computer Engineering, and was held in Kemer-Antalya, Turkey during 27-29 October 2004. For ISCIS 2004, a total of 335 papers went through the r

Erol Gelenbe has introduced new modeling methods such as G-networks and the random neural network. He has transformed Computer Science in France [http://fellows.acm.org/fellow_citation.cfm?id=4447025&srt=all ACM: Fellows Award / Erol Gelenbe] by creating research teams at INRIA and in French Universities. * M. Ufuk Ağlayan "Erol Gelenbe's Career and Contributions" in Proc. ISCIS 2005, Springer Lecture Notes in Computer Science LNCS No. 3733, ISBN 3-540-29414-7, pp. 966-970, Berlin and Heidelberg, 2005. * A. Bensoussan "Erol Gelenbe's Contributions to Computer and Networks Performance" pp. 1-5, in J. Barria (ed.) Erol Gelenbe, Tadeusz Czac̓rski, Dimitrios Tzovaras, Ioannis Komninos, Luigi Romano, Paolo Campegiani, Sokratis K. Katsikas. Security in Computer and Information Sciences: First International ISCIS Security Workshop 2018, Euro-CYBERSEC 2018, London, UK, February 26-27, 2018, Revised Selected Papers. 465 printed pages. This open access book constitutes the thoroughly refereed proceedings of the First International ISCIS Security Workshop 2018, Euro-CYBERSEC 2018, held in London, UK, in February 2018. The 12 full papers presented together with an overview paper were carefully reviewed and selected from