SAYEED NURUL GHANI

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POWER ELECTRONICS & CONTROL ENGINEER

Adapt at providing outstanding consultancy service to governments, enterprises and service providers for research, solve problem using innovative ideas, design, optimize and manufacture high quality world class engineering devices and systems based on imagination, dreams and creativity. **http://www.OptimumSystemsDesigners.com**

Cited in Covington Who's Who www.CovingtonWhosWho.com by invitation.

Core Competency :
My core competencies are in:

* Power Electronics
* Control Engineering
* Electrical Machines
* Real-time Computer Control
* Unified Modeling Language (UML)
* Artificial Intelligence & Expert Systems
* Computer Simulation of Systems
* Analysis of Systems
* Dynamics of Systems
* Electrical Power Systems
* Optimization of Devices and Systems

I am an ardent practitioner of Design for Six Sigma (DFSS) principles.

In traditional systems design the objective is merely to meet the specifications. There is no formal attempt to reach the best design in the strict mathematical sense of minimizing cost or weight or volume or maximizing profit.
The science of optimization is a formalism that allows not only all specifications (design constraints) to be met, but would also yield design which is the best in terms of some figure(s) of merit.

Very often we need most economical design.

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EDUCATION HIGHLIGHTS

Doctor of Philosophy (PhD) Degree in Electrical & Electronic Engineering from UNIVERSITY OF LONDON (Imperial College of Science & Technology now known as simply IMPERIAL COLLEGE, London) --- 1969 Specializing in Power Electronics.

Title of my PhD thesis: 'Design of Impulse Commutated Thyristor Inverters and Calculation of Induction Motor Performance Under Variable Speed Operation'
Published by University of London and can be obtained through inter-university loan system.

Diploma of Imperial College (DIC) in Electrical Engineering. A post graduate qualification .

Imperial College ranks amongst TOP THREE EDUCATIONAL & RESEARCH INSTITUTIONS in the United Kingdom (UK). The other two are University of Oxford and University of Cambridge.

http://www.topuniversities.com/university/357/imperial-college-london

"It is consistently rated among the United Kingdom as top three universities, and was **ranked 5th in the world** by the Times Higher Education Supplement in 2009."

http://en.wikipedia.org/wiki/Imperial_College_London

PROFESSIONAL QUALIFICATIONS

Membership of learned societies

* Chartered Engineer (CEng) --- Institution of Engineers, UK 1976

http://www.engc.org.uk/

"The Engineering Council is the regulatory body for the engineering profession in the UK. We hold the national registers of 235,000 Chartered Engineers (CEng), Incorporated Engineers (IEng), Engineering Technicians (EngTech) and Information and Communications Technology Technicians (ICT*Tech*).

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In addition, the Engineering Council sets and maintains the internationally recognized standards of professional competence and ethics that govern the award and retention of these titles. This ensures that employers, government and wider society - both in the UK and overseas - can have confidence in the knowledge, experience and commitment of registrants."

Qualifications required for registration

http://en.wikipedia.org/wiki/Chartered_Engineer_(UK)

"In the United Kingdom, a **Chartered Engineer** is a professional engineer registered with Engineering Council UK (the British regulatory body for engineers). Contemporary Chartered Engineers are master's degree-qualified and have gained professional competencies through training and experience. The formation process (academic + internship / apprenticeship / graduate training + peer reviewed professional practice) of a Chartered Engineer spans a minimum of 8–12 years. The title Chartered Engineer is protected by civil law. With over 180,000 registrants, it is one of the most recognizable international engineering qualifications with registrants in many countries.

According to Engineering Council UK, Chartered Engineers "are characterized by their ability to develop appropriate solutions to engineering problems, using new or existing technologies, through innovation, creativity and change. They might develop and apply new technologies, promote advanced designs and design methods, introduce new and more efficient production techniques, marketing and construction concepts, pioneer new engineering services and management methods. Chartered Engineers are variously engaged in technical and commercial leadership and possess interpersonal skills."

For registration, it is necessary for candidates to demonstrate that they are professionally competent through education, training and professional practice. Although many Chartered Engineers have honours degrees in engineering, science or mathematics, since 1997 it has been necessary to demonstrate masters level knowledge and understanding, most commonly by completion of the four-year integrated MEng degree, or by gaining an appropriate masters degree following completion of a three-year bachelor degree in engineering or a cognate subject. Candidates are also required to demonstrate an appropriate level of professional competence to practice, through evidence gained from records of initial professional development, and by professional review.

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The final stage of assessment is a "professional review" (interview) conducted by two Chartered Engineers and a Chairperson at which the candidate's competence will be assessed. A full description of the requirements for registration appears at [1]. Overall it usually takes a minimum of 8 years but usually 10 years of university education and post graduate training to achieve the Chartered Engineer qualification."

* Member of Institution of Electrical Engineer (MIEE) --- Institution of Electrical Engineers, UK 1976

http://en.wikipedia.org/wiki/Institution_of_Electrical_Engineers

"The **Institution of Electrical Engineers** or **IEE** (pronounce: I-double-E or I-E-E) was a British professional organization for electronics, electrical, manufacturing and IT professionals. In 2006 it merged with the IIE to form the Institution of Engineering and Technology (IET). The IEE was founded in 1871 as the Society of Telegraph Engineers and was Incorporated by Royal Charter in 1921. Before the merger it was the largest professional engineering society in Europe with a worldwide membership of around 120,000."

EXPERIENCE HIGHLIGHTS

HONEYWELL AEROSPACE, Tucson, Arizona (1998 - 2005)

I was interviewed in England and offered a position of Senior Software Engineer. My initial responsibility was to train graduate engineers in object oriented C++ computer language and bring them up to speed.

My next assignment was quality assurance in aerospace real-time control software development. My responsibility was to review and correct various software development documents such as (i) Requirements Analysis Document, (ii) Design Document, (iii) Quality Assurance Document, (iv) Test Document, (v) Code Review etc. I was a member of software review board and had to discuss results of my scrutiny with the review panel.

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For this I required to demonstrate that I have thorough knowledge and understanding of real-time operating systems, the C and C++ computer languages. In this job I gained hands on detailed experience on aircraft engine control real-time software development and their working. This was a valuable experience overseeing many engineers cooperating in a team to develop large software. After working for seven and half years I requested for retirement from Honeywell, to attend my urgent personal and family needs elsewhere.

UNIVERSITY OF NORTHUMBRIA, Newcastle Upon Tyne, United Kingdom (1970 - 1998)

I was promoted and appointed as a Senior Lecturer (equivalent to Associate Professor) in the Department of Electrical & Electronic Engineering. I worked there for twenty six years with great dignity and professionalism.

My main activities were to teach in undergraduate and postgraduate courses, laboratory development, supervise postgraduate research for higher degrees, obtain funding for research & development, attract industry sponsored research, and to publish research findings in learned journals and conference proceedings. My main focus was in (i) Power Electronics, (ii) Electrical Machines, (iii) Control Engineering, (iv) Computer Simulation, (v) Artificial Intelligence, and (vi) Optimization.

After retiring I was invited by the university authorities to stay along as Honorary Research Fellow.

I succeeded in attracting funds from industry and from European Commission (EC). My (University of Northumbria) last research grant together with three other European universities collectively was 1 (one) million Euros. We were conducting research on energy efficient solar heated buildings in Europe. My contribution was to develop real-time computer software for intelligent control that exploited solar irradiation. We had an European industrial partner who had exclusive rights to our research for commercial utilization. The partner contributed only a small fraction towards the total cost of research.

Soon after the award of the research grant from the EC I was selected for a well paid position in US industry (Allied Signal latter Honeywell Aerospace) mentioned above. As my pension was only a meager sum, and in order to keep my body and soul together I accepted the offer and headed for USA.

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ROLLS ROYCE, United Kingdom (1996)

While at University of Northumbria a global company, ROLLS ROYCE, offered me a consultancy position to conduct feasibility study to develop a real-time computer control system based on fuzzy logic/sets for electric arc welding. I invented the full control strategy and coded the system in C computer language. I modeled the electric arc and the entire feedback control loop as a time discrete system. I studied the total system under computer simulation and demonstrated that the fuzzy control performed superbly well indeed. All that my client needed to do was to replace the digital model of the electric arc and the work-piece, used in my simulation study, with actual hardware.

UNITED KINGDOM ATOMIC ENERGY AUTHORITY (UKAEA), Harwell, Didcot, Surrey, UK (1983 - 1984)

UKAEA offered me a position of research associate (research fellow) to further develop my nonlinear, non-gradient, constrained optimization software EVOP. I was also asked to extend their computer software for monitoring nuclear radiation over a large geographical area. My brief was to incorporate artificial intelligence (AI) to their existing code written in standard C language. For this I was given a British expert system shell STIMULUS.

UKAEA hosted me for one full year, paid me a salary and accommodated me in their hall of residence. In return I gave them my software EVOP, wrote a UKAEA publication on the algorithm. I also developed AI based computer software for monitoring radiation over a large geographical area. These works have been published and quoted in my list of publications.

LUCAS RESEARCH, Solihull, United Kingdom (1979 - 1982)

A large British company showed considerable interest in my research activity in computer emulation of large induction motor drives fed from variable frequency variable voltage power electronic inverters. In order to impart fast torque response (similar to that of a separately excited direct current machine) the effect of field oriented control was studied in depth under emulation. My method was totally different from well known simulation techniques developed over long period in time by other researchers.

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Original dynamic equivalent circuit models for two and three phase induction machines were synthesized along many reference frames. The advantage of such an approach was to enable emulating electrical interconnection of power electronic subsystems of arbitrary complexity and induction machines together with any intricate control strategy. This tactic had all the elegance of imitating electrical interconnection of devices and subsystems just as in the actual physical hardware system.

The procedure I proposed also required development of electric circuit models for semiconductor switching devices of one kind or another such as conventional thyristors, gate turn off (GTOs) devices, Power MOSFETs etc.

Lucas Research sent one of their engineers to assist me in my investigation and I transferred the new knowledge to their establishment. This engineer was awarded a Master of Philosophy (MPhil) degree for presenting a part of the research finding.

The new information has been fully published in various engineering literatures.

KINGSTON POLYTECHNIC (now KINGSTON UNIVERSITY), Kingston Upon Thames, Surrey, United Kingdom (1966 - 1970)

Soon after my doctoral study at Imperial College, London I received an offer of Lectureship (equivalent to Assistant Professorship) at this institution in the Department of Electrical & Electronic Engineering. My main activity here was primarily teaching at undergraduate level. It is here I wrote my thesis and submitted it to the University of London for award of a doctorate degree. Subjects I taught were Electrical Principles, Power Electronics and Electrical Machines.

THERMAL ELECTRONICS, Surrey, United Kingdom (1968)

While I was at Kingston Polytechnic during the summer three months vacation I worked with this company on resonant commutated variable frequency thyristor inverters for induction heating. My brief was to conduct feasibility study of various such inverters and advise the company on most suitable topology and its optimum (most economical) design. I concluded my investigation by submitting a research report to the company.

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INDUSTRIAL INSTRUMENTS, Kent, United Kingdom (1966)

During my post graduate study at Imperial College, London for a doctorate degree, the managing director of this company used to visit me in my laboratory. He was keen on developing high power variable frequency thyristor inverters for speed control of induction motor drives. For this he required a thorough quantitative analysis of the behavior of such a drive system. Just as I completed my study and research at Imperial College the managing director invited me to work in his laboratory at his company premises. I faithfully passed all information I accumulated during my doctoral research to this company.

PUBLICATIONS

Refereed Original Papers

1. S. N. Ghani: 'EVOP: 'A global optimisation algorithm'. Under preparation.

2. Nazrul Islam, Shohel Rana, Raquib Ahsan and Sayeed Nurul Ghani: 'An Optimized Design of Network Arch Bridge using Global Optimization Algorithm', Advances in Structural Engineering, Vol. 17, No. 2, 2014, pp. 197 – 210.

3. Shohel Rana, Nazrul Islam, Raquib Ahsan and Sayeeed Nurul Ghani: 'Application of Evolutionary Operation to the Minimum Cost Design of Continuous Prestressed Concrete Bridge', Engineering Structures, Vol. 46, January 2013, pp. 38-48.

4. R. Ahsan, S. Rana and S. N. Ghani: 'Cost Optimum Design of Posttensioned I-Girder Bridge Using Global Optimization Algorithm', Journal of Structural Engineering, Vol 138, No 2, February 1, 2012, pp 273 – 284, ASCE, SSN0733-9445/2012/2.

5. S. N. Ghani:`Performance of global optimisation algorithm EVOP for non-linear non-differentiable constrained objective functions', Proceedings of the IEEE International Conference on Evolutionary Computing, November 27, 1995 - December 2, 1995 (IEEE ICEC'95), The University of Western Australia, Perth, Western Australia, pp. 320 - 325.

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6. S. N. Ghani: ‘An unified approach to the simulation of induction machine dynamics. Part I. Review and Modelling’, Archiwum Elektrotechniki (Archive of Electrical Engineering), Polska Akademia Nauk Komitet Elektrotechniki, TOM XXXIX ZESZYT 151/154 - 1/4/1990, Kwartalnik, Wydawnictwo Naukowe Pwn, Warszawa 1993, pp. 43 - 61, PL ISSN 0004-0746.

7. ‘Part II. Simulation along ABC-abc reference frame’, ibid, pp. 63 - 84.

8. ‘Part III. Simulation along ABC-odq reference frame’, ibid, pp. 85 - 107.

9. S. N. Ghani: ‘A versatile algorithm for optimisation of a nonlinear nondifferentiable constrained objective function’, UKAEA Harwell Report Number R-13714, December 1989, ISBN 0-7058-1566-8, HMSO Publications Centre, PO Box 276, London, SW8 5DT.

10. S. N. Ghani: ‘A software package for monitoring radiation level’, UKAEA Harwell Report Number R-13536, June 1989, ISBN 0-7058-1528-5, HMSO Publications Centre, PO Box 276, London, SW8 5DT. (Expert Systems).

11. S. N. Ghani: ‘On simulating dynamic behaviour of three phase induction machines with squirrel cage rotor’, Simulation, May 1988, Vol. 50, (5), pp.182 - 193. (Corrigenda: Simulation, March 1989, Vol. 52, (3), pp.121).

12. S. N. Ghani: ‘Digital computer simulation of three phase induction machine dynamics - A generalized approach’, IEEE Trans. Ind. Appl., January/February 1988, Vol. 24, (1), pp. 106-114. (Corrigenda: IEEE Trans. Ind. Appl., September/October, 1994, Vol. 30, (5), p.1437).

13. S. N. Ghani: ‘Thyristor models for computer-aided analysis and design’, IEEE Trans. Ind. Elect., August 1986, Vol. IE-33, (3), p. 340.

14. A. R. Shirley, R. Champaneri and S. N. Ghani: ‘Continuous simulation of power electronic induction motor drives’, 18th Universities Power Engineering Conference, Department of Electrical and Electronic Engineering, University of Surrey, Guildford, England, April 11 - 13, 1983, pp. 53 - 58.

15. S. N. Ghani and R. Champaneri: ‘Dynamic models of two phase induction machines along physically existing holonomic two phase reference frame ą^{I}ß^{I}”, Proceedings of International AMSE Conference on Modelling and Simulation, Paris-Sud, July 1-3, 1982, Vol. 6, Group 6 (Electrical Machines), pp. 64 - 86.

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16. S. N. Ghani and R. Champaneri: ‘Dynamic models of two phase induction machines along nonholonomic rotating crossfield reference frame $ą^{II}ß^{II}$’’, Proceedings of International AMSE Conference on Modelling and Simulation, Paris-Sud, July 1 - 3, 1982, Vol. 6, Group 6 (Electrical Machines), pp. 87 - 106.

17. S. N. Ghani: ‘A dynamic model and a frequency domain static network model for two phase induction machines along nonholonomic forward and backward rotating reference frame $ą^{III}ß^{III}$’, Proceedings of International AMSE Conference on Modelling and Simulation, Paris-Sud, July 1-3, 1982, Vol. Supplement, pp.71 - 82.

18. S. N. Ghani: ‘A dynamic model and a frequency domain static network model for two phase induction machines along holonomic complex plane sequence reference frame $ą^{IV}ß^{IV}$’’, Proceedings of International AMSE Conference on Modelling and Simulation, Paris-Sud, July 1-3, 1982, Vol. Supplement, pp. 83 -102.

19. S. N. Ghani: ‘Low-frequency switching circuit model of a triac’, Computer-aided Design, January 1981, Vol. 13, (1), pp. 7 - 17. (Corrigenda: CAD, September 1981, Vol. 13, (5), p. 300

20. S. N. Ghani: ‘Low-frequency switching circuit model of a thyristor’, Computer -aided Design, September 1979, Vol. 11, (5), pp. 281 - 288. (Corrigenda: CAD, March 1980, Vol. 12, (2), p. 66 and CAD, September 1981, Vol. 13, (5), p. 300).

21. S. N. Ghani and L. Barnes: ‘Parameter optimisation for unconstrained objective functions - a bibliography’, Computer-aided Design, October 1972, Vol. 4, (5), pp. 247 - 259. (Corrigenda: CAD, September 1981, Vol.13, (5), p. 300).

22. S. N. Ghani: ‘The teaching of parameter optimisation in electrical engineering’, Int. J. Elect. Eng. Educ., February 1972, Vol. 10, (1), pp. 51 - 58.

23. S. N. Ghani: ‘An improved ‘complex’ method of function minimization’, Computer-aided Design, January 1972, 4, (2), pp 71-78. (Corrigenda: CAD, September 1981, Vol. 13, (5), p.300).

24. S. N. Ghani: ‘Design of impulse commutated thyristor inverters and calculation of induction motor performance under variable speed operation’, PhD thesis (1968), University of London.

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Internet Archives of leading US Universities

25. S. N. Ghani and C. H. Leung: 'Twelve EMTP data cases for simulation of current forced single-phase reversible rectifier (VSRR)', Website address in the US "http://www.ee.mtu.edu/atp/" in the secure ftp site "/pub/atp/dcase" file name "ghanvsrr.zip", July 7,1994. Password can be obtained from Professor Bruce Mork. bamork@mtu.edu.

26. S. N. Ghani and M. Y. Leung: 'Four EMTP data cases for simulation of nonlinear dynamics of two phase induction machines', Website address in the US "http://www.ee.mtu.edu/atp/". Secure ftp site "/pub/atp/dcase" file name "ghanind.zip", July 11, 1994. Password can be obtained from Professor Bruce Mork. bamork@mtu.edu

27. S. N. Ghani and M. Y. Leung: 'Five EMTP data cases for simulation of nonlinear dynamics of three phase induction machines'. Website address in the US "http://www.ee.mtu.edu/atp/". Secure ftp site "/pub/atp/dcase" file name "ghanind.zip", July 11, 1994. Password can be obtained from Professor Bruce Mork. bamork@mtu.edu.

28. S. N. Ghani and M. Y. Leung: 'Two EMTP data cases for simulation of indirect vector control of three phase induction machines fed from controlled three phase current source, and controlled three phase voltage source ac power supply', Website address in the US "http://www.ee.mtu.edu/atp/". Secure ftp site "/pub/atp/dcase" file name "ghanind.zip", July 11, 1994. Password can be obtained from Professor Bruce Mork. bamork@mtu.edu.

Workshops

29. S. N. Ghani: 'Intensive workshop on modern computer-aided analysis of electrical power systems', The Institution of Engineers, Bangladesh, Dhaka, July 17 - 31, 1993. Attendees were all professional engineers from Assistant Engineer to Principal Engineer level. Certificates were awarded by the Minister of Establishment, Government of Bangladesh, Honorable Mr Aminul Huq.

30. S. N. Ghani: 'An Introduction To C++ Computer Language', AlliedSignal Aerospace at Tucson, Arizona, USA, Course Notes in Microsoft Power Point, 35 hours, 5 weeks beginning June 10, 1998.

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31. S. N. Ghani: ‘An Introduction To C++ Computer Language Using UML – Basics’, AlliedSignal Aerospace at Tucson, Arizona, USA, 40 hours, 5 weeks beginning October 5, 1998.

32. S. N. Ghani: ibid, AlliedSignal Aerospace at Tucson, Arizona, USA, 40 hours, 5 weeks beginning February1, 1999.

33. S. N. Ghani: ibid, AlliedSignal Aerospace at Tucson, Arizona, USA, 40 hours, 5 weeks beginning May 6, 1999.

34. S. N. Ghani: ibid, AlliedSignal Aerospace at Tucson, Arizona, USA, 40 hours, 5 weeks beginning October 4, 1999.

35. S. N. Ghani: ‘Introduction to Using Real-Time Operating Systems (RTOS)’, Honeywell at Tucson, Arizona, USA, 32 hours, 4 weeks beginning July 10, 2000. (Did not run --- Assigned to urgent Software Quality Assurance)

36. S. N. Ghani: ‘Elements of the Machinery of A Modern Real-Time Operating System (RTOS): MicroC/OS-II’, Honeywell at Tucson, Arizona, USA, 40 hours, 5 weeks beginning Sept 11, 2000. (Did not run --- Assigned to urgent Software Quality Assurance)

Unpublished Research Reports

37. S. N. Ghani: ‘Software for monitoring radiation level’, UKAEA Harwell Report Number, R-13537, June 1989. (Expert Systems).

38. S. N. Ghani: ‘Performance of Algorithm EVOP for optimisation of a nonlinear nondifferentiable constrained objective function’, Departmental Research Report, Department of Electrical, Electronic Engineering and Physics, University of Northumbria, 1994.

39. S. N. Ghani: ‘A versatile optimisation programme EVOP for optimisation of a nonlinear nondifferentiable constrained objective functions: Further work’, Departmental Research Report, Department of Electrical, Electronic Engineering and Physics, University of Northumbria, 1994.

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