



Mohammed Ahmed El-Affendi

Current Position:

Chairman of the Department of Computer Science, Prince Sultan University

Professor of Computer Science, Department of Computer Science, Prince Sultan University, Riyadh.

Education:

Ph.D. in Computer Science (in the area of network and Computer Systems), University of Bradford, U.K.,1983. The thesis introduced the **maximum entropy approach** as a new approach for the performance evaluation of network and computer systems. The results obtained are gradually being adopted and have now become text book material (see for example, “Performance Modeling of Communication Networks and Computer Architectures”, by Harrisom & Patel, published by Addison Wesley, 1993). As a side effect, the thesis also provided, for the first time, **exact mathematical solutions for some general performance models that were previously unsolvable for more than a decade.** The work has been documented in a couple of papers, one of which has been published in Acta Informatica and one in the journal of Computers & Mathematics with applications. A comprehensive paper has also been published in the Gulf Journal for Science & Engineering.

M.Sc. in Computer Science, University of Bradford, U.K., 1980.

This is a one-year intensive course that involves a dissertation at the end.

B.Sc., University of Khartoum, Sudan, 1976.

Major: Math & Physics + Geophysics.

I have been awarded the **University of Khartoum prize for the best performance** in the final examination.

Awards and Grants:

- 1- University of Khartoum prize for best performance in the final B.Sc. examinations,.
- 2- A Scholarship from university of Khartoum to study for MS in computer science.
- 3- A scholarship from university of Khartoum to study for the PhD in University of Bradford,.

Consultancy and Strategic Planning Activities:

- Head of the team that conducted the Higher Education Cost & financing study as part of the well known AAFAQ project. The study included forecasting, analysis, projections and strategic planning.
- Founded Prince Salman Research Center at PSU from scratch, prepared its strategic plan and directed it for 3 years.
- A former part-time IT consultant for Al-Obeikan Printing House.
- Participated actively in preparing the ICT plan for the Kingdom.
- I have been entrusted with translating the KSA ICT plan into English.
- Cooperated with the Ministry of Communication & Information Technology regarding some IT issues.
- Translated the Kingdom e-Government plan from English to Arabic (Assigned the job by YESSER and Mckinsey Consultants).
- Close contacts with Cisco and Elm Company.

Employment History:

- 1- 2009: Professor of Computer Science and Chairman of the Department of Computer Science.
- 2- 2002- 2008: Associate Professor of Computer Science, PSU (Chairman of CS department (2006-2007) and director of the Prince Salman Research center (2005-2008)).
- 3- 2001-2002: Associate professor of computer science, department of computer science, university of Sharjah.
- 4- 1994 – 2001: **Associate professor** of computer science, Department of Computer Science, College of Computer & Information Sciences, King Saud University.
- 5- 1987-1994: Assistant professor of computer science, college of computer & information sciences, KSU.
- 6- 1983-1987: **Assistant professor** of Computer Science, school of mathematical sciences, university of Khartoum. During this period I established with two of my colleagues the first BS program in computer science in Sudan.
- 7- 1986-1987: The director of the computer center, University of Khartoum. I have been assigned this job in addition to my teaching duties in the School of mathematical sciences.
- 8- 1979-1983: On a scholarship from the University of Khartoum to obtain an MS and Ph.D. in computer science.
- 9- 1976-1978: Teaching assistant in the computer center, University of Khartoum. The

Administrative Experience:

- 1- Director of the Computer Center, University of Khartoum, 1986-1987.
- 2- Coordinator of the Computer Science Track(Department Head) in the School of Mathematical Sciences, University of Khartoum, 1984-1985.
- 3- Member of the College Council, College of Computer and Information Sciences, KSU, 1990-1991.

- 4- Member of the Saudi Computer Society Board, 1989-1991.
- 5- Department Council Secretary, Department of Computer Science, CCIS, KSU, 1990-2001.
- 6- Graduate Committee Convener, Department of Computer Science, CCIS, KSU, 1999-2001.
- 7- Graduate projects coordinator, department of computer science, university of Sharjah.
- 8- Member of the follow up and evaluation committee, college of Arts & Sciences, Sharjah university.
- 9- Member of the conference and symposium committee, college of Arts & Sciences, Sharjah University.
- 10- Member of the manpower committee, department of computer science, Sharjah university.
- 11- Chairman of the scientific committee, CIS, Prince Sultan University.
- 12- Director of the Computer Science Program, CIS, Prince Sultan University.
- 13- Director of Prince Salman Research & Translation Center
- 14- Chairman of Computer Science Department, Prince Sultan University.

Higher Education Strategic Planning

- 1- Head of the team that conducted the “Cost, Financing & Infrastructure” study for AAFAQ projects.
- 2- Participated actively in AAFAQ workshops and symposia, and represented PSU in all these activities.
- 3- Prepared a detailed study on future campuses and smart environments for AAFAQ.
- 4- Prepared a full research proposal to investigate the role of educational technologies on pedagogy and course delivery approaches.

Completed Research Projects:

It is my philosophy that a computer scientist should support his theoretical work by solid practice. Both directions feed each other and eventually produce the best of results. During the past few years I have been able to complete the following research projects (most of which resulted in actually working systems and prototypes and some of them led to publications):

- 1- **A Virtual Distributed Environment (VDE) for Software Development:**
This is a distributed environment that allows software engineers to collaborate and establish virtual software houses irrespective of their geographical location or time domain. The VDE is secure, portable, scalable and may accommodate a wide range of software process models.
- 2- **A Mobile Shopper Model for Virtual Market Places :** In this project mobile agents have been used to build a Web-based virtual market place in which shoppers are represented by mobile agents that are capable of moving from one place to another looking for goods in the market place. The mobile shopper negotiates deals and interacts with its owner while it moves. (see the paper listed in the publications below for more details).

- 3- **A Digital Payment System:** this system implements some of the recent digital payment protocols and has been built to support the virtual market place mentioned in above.
- 4- **An Internet-based Cluster Processing system:** This a Windows-based parallel processing environment that utilizes the infra-structure of the Internet to perform wide area parallel processing.
- 5- **The SeviceBase Distributed Virtual Collaboration Environment:** this is a secure object-oriented distributed collaboration environment that allows developers to build private wide area collaboration systems of any kind. The environment uses a special built-in security protocol that builds on SSL and Kerberos. The system is well described in a paper – listed in the publications section below.
- 6- **GIPPE: A Grammar Independent Parallel Parsing Engine for Natural Languages.** This engine provides a strong base for building adaptive natural language processing systems in which the grammar model grows and matures with time. The engine is based on custom-built parallel parsing algorithm derived by the author.
- 7- **Talkalam: A Connectionist Speaker Independent Speech Recognition System.** In this project a dynamic programming neural network model have been used to build an Arabic speech recognition system.
- 8- **SWAM: A Sliding Window Approximate Matching algorithm for Arabic morphological analysis.** This is a lightweight morphological analysis algorithm that is very suitable for Internet search engines. The algorithm has been deployed with the search engine described in 9 below.
- 9- **AISE: an Arabic Internet Search Engine** that have been built from scratch. AISE uses SWAM to perform Arabic morphological search on the Internet.
- 10- **KSU SSL Package:** this is a complete implementation of the SSL protocol that includes a complete native implementation for the main cryptographic and hashing algorithms (RSA, RC4, SHA, DES ...etc.).
- 11- **Aseel: An Arabic Internet browser** that have been built from scratch. Work on this browser started in the early days of the Web, before the major companies produce their browsers. The major advantage of this browser is that it is very slim, while performing most of the functionalities of big browsers.
- 12- **NeuroMorph: A neural Arabic morphological analysis engine** that have been built using the backpropagation algorithm.
- 13- **Sunbla:** A semi-natural Arabic Programming environment that generates Pascal programs from natural Arabic.

Editorial Experience:

Member of the editorial board of King Saud University computer science journal 1995-2001.

Currently I am a member of the editorial board of the journal of applied computing and informatics, SCS, Riyadh.

Extracurricular Activities:

- College sports activities coordinator and organizer from 1987-1995.

- Social committee coordinator for the department of computer science from 1990 to present.
- I have participated actively in delivering cultural and general education lectures and seminars in Riyadh.

Software Engineering Practice and Experience:

For the past few years I have been teaching software engineering at the graduate and undergraduate levels. I have also taught object-oriented methodologies for a wide range of community groups through the Saudi computer society. In addition to the regular software courses, I have taught and developed deep experience with:

- The Personal Software Process (PSP) introduced by Humphrey from the Software Engineering Institute (SEI) at Carnegie Mellon. This is one of the most effective approaches in training software engineers and teaching them how to adopt appropriate software engineering practice.
- The Team Software Process (TSPi), by the same author: While the PSP concentrates on promoting the skills of individual engineers, the TSPi concentrates on team work and is used to train and promote the skills of groups that interact and collaborate to build a large scale project.
- Design Patterns: This is a popular approach to prepare libraries of objects that may be readily used repeatedly in new designs. It is a new way of avoiding the wheel re-invention.

The Pool Software Process: This a light software development process that I have developed for teaching purposes. It has all the elements of general software processes and supports collaborative software development. Pool has been specifically developed to support component-based development,

PhD Supervision:

The following PhD's have been completed under my supervision:

- 1- "A Secure Mobile Agent Generator and its implementation". In this project a complete secure mobile agent environment has been built from scratch using C# and the .NET framework. One of the major features of the system is that it includes a secure generator that automatically generates mobile agents, based on a submitted user specification.
- 2- "Relative Distance Vectors Neural Networks: A Highly Accurate, Speaker Independent Speech Recognition Model". In this project a new simple, hybrid speech recognition model has been derived, built and tested using TIMIT, Tdigits and other international speech corpora. The results have been highly accurate and much better than previous connectionist models.
- 3- "A Multi-Level Web-Based Parallel Processing System: A Volunteer Computing Approach": In this project a full working, adaptive parallel processing approach have been belt with a novel performance-based scheduling strategy.

MS Supervision:

The following MS theses have been completed under my supervision:

- 1- Building and Internet-Based Cluster Processing Environment Using DCOM technology.
- 2- Building a Distributed Virtual Environment for Software Development.
- 3- Building A Mobile Agent Development Environment.
- 4- Building a Secure Distributed Collaboration Environment.
- 5- Evaluating the Performance of Computer & Network Systems: A Generalized Model.
- 6- Using the Computer in the Study of Hadeeth Shareef

Publications:

- 1- "Injected Surface-Lexical Mappings and Memory Bitmaps: A Simple Solution for the Irregularity Problem in the SWAM Part-of-Speech Morphological Tagger", Accepted for publication in the ACI Journal, 2008
- 2- "A Two-Level Digital Watermarking Solution to the Ambiguity Problem in Arabic Names Romanization", Accepted for publication in the ACI Journal, 2008.
- 3- "An Optimized Real Time Generation of S-Box Inverses Using Arithmetic Modulo Powers of Two" International Journal of Computer Science & Network Security, Vol 7, No 12, pp 240-246, 2007
- 4- "A Real Time S-Box Construction Using Arithmetic Modulo Prime Numbers", Journal of Digital Information Management, Volume 5, No 6, December, 2007.
- 5- "Completing the Circuit in e-Government Automation Processes: Remote Physical Signatures & Stamps: A Digital Watermarking Approach", the Business Process Management Journal, Emerald, UK, Vol 14, No 1, 2008.
- 6- "A Secure Mobile Agent Generator (SMAG) and its Implementation", the ACI Journal, Volume 4, Number 1, 2005.
- 7- "A Suggested Framework for Arabic Morphological Analysis: A Sliding Window Asymmetric Matching Algorithm and its Implication" accepted for publication in the Egyptian Informatics Journal, Cairo University, Vol 9, No 1, June 2008.
- 8- "Trusted Mobile Shoppers (TMS): A Mobile Agent Model to Build E-Commerce Systems" to appear in ACI journal, volume 3, Number 1.
- 9- "A Genetic Voting (GENEVO) Algorithm for Optical Character Recognition: An Intelligent Voting Codebook Approach",
- 10- "An LVQ Connectionist Solution to the Non-Determinacy Problem in Arabic Morphological Analysis: A Learning Hybrid Algorithm", Journal of Natural Language Engineering, (JNLE), 8-1, University of Cambridge, 2002.
- 11- "ServiceBase: A Distributed Framework for Building Virtual Collaboration Environments and Mobile Agents", in the proceedings of the Parallel and Distributed Systems Conference (PDCS2000), Las Vegas, USA, August 2000.
- 12- "Automatic Code page Detection and Conversion in Internet Applications", Gulf Internet 99 Symposium, Dhahran, Sept. 1999.
- 13- "On The Morphological Entropy of Arabic" Accepted for publication in the ECS Journal, Egypt, 2001.

- 14- "Contrast Vectors Neural Network (CVNN): A Highly Robust Speaker-Independent Model for Spoken Word Classification" to appear.
- 15- "NeuroMorph: A Connectionist MLP Engine for Arabic Morphological Analysis" Egyptian Informatics Journal, University of Cairo, Egypt, Vol 3, June 2002..
- 16- "Building a Continuous Speaker-Independent Arabic Speech Recognition System: Patching and Taming the HTK". under review.
- 17- Al-Mishkat: An Arabic Morphological Internet Search Engine and its Implementation", Gulf Internet 99 Symposium, Dhahran, Sept. 1999.
- 18- "Arabic Text Segmentation: A Comparative Study of Existing Algorithms and a Suggested Parallel Algorithm", Journal of Mathematical Modeling and Scientific Computing, Boston, USA, 1996.
- 19- "An Object-Oriented Grammar-Independent Parallel Parsing Engine and its Implications" To appear in the Journal of Linguistic Communication, Morocco, 2001.
- 20- "Talkalam: A Connectionist Speaker Independent Speech Recognition System for Isolated Arabic Words" To appear in the Journal of Linguistic Communications, Morocco, 2001.
- 21- "On the Pragmatics of Arabic Speech Synthesis and Analysis", the first workshop on computer and information systems, KFUPM, Dhahran, June, 1996.
- 22- "An Adaptive Object-oriented Client-Server Model for Natural Language Processing Systems" the first workshop on computer and information systems, KFUPM, Dhahran, June 1996.
- 23- "The Learning Capabilities of Sunbla: A Parallel Object Oriented Model for Designing Application Generators", The 14th National Computer Conference, Riyadh, April 1995.
- 24- "A Connectionist Approach to Arabic Morphological Analysis", The international Conference on Distributed Systems, Kuwait University, Kuwait, March 1995.
- 25- "Sunbla: An Intermediate Step in A Gradual Promotion Model For the Development of Natural Arabic Programming Systems", Vol 23, the Arabian Journal for Science and Engineering, KFUPM, Dhahran, KSA, July 1994.
- 26- " Arabic Software: the State of the Art", Second Arabization Symposium, 10, 1994, KSU.
- 27- " Designing an Open Programming Language: A fine grained distributed model for designing adaptive compilers", The Conference on Optimization and Parallel Processing, Al-Ain University, UAE, May, 1994.
- 28- "Imposing an FP Layer on a RISC machine", to appear in the Journal of King Saud University, Volume 6, Engineering Sciences(2), 1994.
- 29- Estimating Computer Performance Metrics when the Service and Interarrival Times are of the Truncated Normal Type", Computers and Mathematics with Applications, An international Journal, Volume 23, Number 10, May 1992, USA.
- 27- "Arabic Dictionary Compression Using An Invertible Integer Transformation and a Bitmap Representation", Journal of King Saud University, Volume 4, Engineering Sciences(1), 1412H(1992).
- 28- "An Algebraic Algorithm for Arabic Morphological Analysis", The Arabian Journal for Science & Engineering, Volume 16, Number 4B, October 1991, Dhahran, KSA.

- 29- " A Natural Arabic Interface to Ms-Dos", in the proceedings of the 12th National Computer Conference, Riyadh, 1411H.
- 30- "Some Practical Results for Non-Exponential Models of Computer Performance Analysis", Arab Gulf J. Scient. Res., Math. A7(1),1989.
- 31- "Implementation Hints for the Arabization of Programming Languages" The first Arabization Symposium, KSU, CCIS, April 1987.
- 32- " Efficient Algorithms for Basic System Arabization" The first Arabization Symposium, KSU, CCIS, April 1987.
- 33- " Towards an Advanced Arabic Programming Language: The Sina Programming Language" The 9th National Computer Conference, Riyadh, Saudi Arabia, September, 1986.
- 34- "A Maximum Entropy Analysis of the M/G/1 and G/M/1 Queuing Systems at Equilibrium", Acta Informatica Journal, USA, 1983.
- 35- "A Maximum Entropy Analysis of General Queuing Networks", Proceedings of the 8th conference of the German OR society, 1982.

Books:

- “Building a Distributed Arabic Collaboration Environment” Accepted for publication by KACST Directory of Research and Grants, 2001.
- “The essentials of programming using C++”, (in Arabic), published by the Open University, Khartoum, Sudan. (2004) (Part 1 and Part 2)

Draft Books:

The following draft books have been used informally to teach some of the courses in the department of computer science, CCIS, KSU:

- 1- “Systems Programming using C”, 1994: This is a very comprehensive book that covers both high and low level programming in C with applications to systems programming. The book is informally available in many centers in Riyadh.
- 2- “The Essentials of Pascal Programming”, 1998 (in Arabic). This is a classical text on Pascal programming. The book has now been published by Al-Alamia company for its Diploma students.
- 3- “C++ Programming” Part1 and Part2, Published and adopted by Sudan Open University.