

## 2007 iNEER Award Nomination Dossier

### *Nominator Information:*

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### *Nominee Information:*

Name: Dr Syed Mahfuzul Aziz  
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*Category of Award: Achievement Award*

*Suggested Citation (15 words or less): For sustained commitment and outstanding contributions to Engineering Education through innovative strategies and international collaborations*

*Will Nominee Be Present at Awards Ceremony?: Yes (iCEER 2007, 2-7 December 2007, Melbourne, Australia)*

## *Summary of Accomplishments*

### **Overview**

In order to provide an inclusive learning environment for diverse groups of local and international students, and support them to develop as independent learners, effective problem solvers and critical thinkers, I have taken a series of Student-Centred Learning (SCL) initiatives. A key element of this has been the development of a new approach to *project-based learning* (PBL) methodology for advanced engineering courses, namely Computer Hardware Design (CHD) and VLSI (Very Large Scale Integrated circuit) Design. As opposed to using open ended projects right from the beginning, this new approach uses simple projects at the beginning using well *structured* guides so that learning of the design tools and the development of fundamental design concepts can occur simultaneously.

Other key initiatives I have taken include scaffolding of tasks from simple to complex throughout the study period, interactive lectures, provision for face-to-face feedback during practical sessions, and recently, the introduction of a student-centred learning workshop in order to better prepare students for independent learning. These sustained initiatives have resulted in significant improvements in rankings in course evaluations (using *course evaluation instrument - CEI*) and in *student evaluations of teaching* (SET), and have placed the abovementioned courses among the very top in the Division of IT, Engineering and the Environment (ITEE) of UniSA. In the last three years the rankings of all core questions in both evaluations (CEI and SET) were in the top quartile, among 216 and 146 courses respectively, in the Engineering and IT disciplines. The approach and resources I have developed have been adopted internationally. I have made sustained contributions in promoting international cooperation and received peer acknowledgement internationally, as for example, the following comment: “*We have greatly benefited from the structured project-based methodology and learning resources Mahfuz has developed...colleagues in universities across Bangladesh use these resources.*” Professor Harun-Ur Rashid, Bangladesh University of Engineering & Technology.

### **Sustained innovations in learning in engineering education**

Based on the research I have conducted and reflecting on the feedback I have received from students and colleagues, I have developed the *structured project-based approach*. It aims to encourage students to *learn by doing* simple early projects on their own using *step-by-step project guides*. This is the beginning of *independent learning*. At the end of each of these simple projects students learn how to use relevant Computer Aided Design (CAD) tools and have the satisfaction of successfully designing a system that performs useful functions. For students with less than the adequate level of background technical knowledge, the early projects are a way to revisit some of the fundamental concepts and principles thereby assisting them in covering any knowledge gap. These early projects gradually engage students with problem solving and critical thinking by scaffolding more complex tasks and by asking critical questions. This enables diverse student groups to adapt to the notion of independent learning. Students with a more advanced level of knowledge can progress through the projects at their own pace. The subsequent projects gradually increase in complexity (another level of scaffolding) requiring students to engage in deeper *problem solving* and *critical thinking*. The final capstone project requires students to apply their knowledge and skills to design a complex system using the latest industry technology. The project-based approach fosters *flexibility* (anytime anywhere) by using industry relevant CAD tools for which student versions are available at no cost (<[www.microwind.org](http://www.microwind.org)>; <[www.xilinx.com](http://www.xilinx.com)>). The overall student satisfaction with the above courses improved significantly over the last three years. In the course evaluations, 95% of the respondents were satisfied with the overall quality of the CHD course in 2005; the *satisfaction* with the VLSI course rose from 83% in 2005 to 100% in 2006.

In 2006, the effectiveness of the structured PBL approach was evaluated by the students using a *special online questionnaire* I had developed in consultation with UniSA’s learning advisers. 100% of the respondents said that they were able to *learn* circuit design techniques *on their own* by doing the projects using the project handouts, while 97% said that they were confident about doing projects similar to the capstone project *independently*. The following representative comment made by a student is evidence that the PBL approach fosters curiosity and independence:

- “*The project-based learning was very good, the first project had in depth instructions and it gradually backed off giving us time to adapt to the software and applying the theory.*”

I have contributed to the development of the students' *scholarly values* by providing empathic guidance. The undergraduate final year projects I have supervised since 2001 have led to the publication of *twelve refereed papers*. Seven students who completed Masters by course work programs under my guidance in the last three years have published *nine refereed papers*, that is, on average more than one refereed publication per Masters minor thesis. This is evidence of the *research skills* and *scholarly values* my students developed, both in the undergraduate as well as in the postgraduate course work programs.

I strongly believe that learning activities including lectures must be interactive where students have adequate opportunities for engagement. I have successfully used the following *active learning* strategies for engaging, inspiring and motivating students: interactive lecturing style, student participation during lectures through various tasks, very short quiz during lecture, summarizing key concepts on each topic as it is covered, group-activity based tutorial sessions and *face to face continuous assessment* of the student projects with provision for immediate *hands on feedback* on their designs. Students have found these strategies and the presentation style very helpful, as is evident from the representative comments below.

- “Lecturer does an excellent job of conveying information across in an easy to understand manner.”
- “Mahfuz would constantly involve the class by asking questions throughout lectures.”

My contributions in developing *online resources* for learning and in fostering the *development of graduate qualities* were recognized through UniSA Supported Teacher Awards in 2000 and 2001. To provide students flexible opportunities for learning and self-assessment, in 2002 I developed *interactive online quizzes* (accessible at <<http://people.unisa.edu.au/Mahfuz.Aziz>>) for the course *Principles of Computer Systems*, using UniSA's online learning environment, *UniSAnet*. In the evaluation of the quizzes using a *specially developed questionnaire*, majority of the respondents said that they had found the quizzes useful for testing their learning and for focusing on important topics. In one colleague's view, “Your online quizzes are great. I would like to implement similar quizzes in my courses.” Terry Keen, Lecturer in Civil Aviation, UniSA.

### **Collaborative development of curricula and resources with international adoption**

The constant evolution of ultra small VLSI technologies (“nanometer technologies”) has led to continuing changes in the theory and practice of integrated circuit (IC) design. I introduced a couple of user friendly CAD tools, namely Dsch and Microwind (<[www.microwind.org](http://www.microwind.org)>) for learning IC design using the latest industry technologies. I have developed effective *collaboration with the developer of the tools*, Professor Etienne Sicard of the National Institute of Applied Science (INSA) France, to *develop resources for supporting project-based learning* in VLSI Design. Based on the feedback I have provided, Prof Sicard enhanced the tools on a number of occasions. Among the notable recognitions in this area, my contribution has been acknowledged by Prof Sicard through the award of a *beta tester* status for both the tools. The following comment made by a student speaks of the quality of the VLSI course:

- “Gives the students a very good exposure to the up to date CMOS technology. It's a specialist course.”

I have made sustained efforts to develop *practical project guides* to support the structured project-based learning approach. The capstone project guide for the VLSI course has appeared as a chapter in a recent textbook. “This chapter would not have been possible without the able assistance and guidance of Dr Mahfuz Aziz.” Professor Etienne Sicard and Dr Sonia Bendhia, INSA Toulouse, France. These resources are now being used in universities in many countries including Singapore, Malaysia, India and Bangladesh. The *coherent project guides* have supported students in progressing from simple to complex tasks in a self learning manner. In one student's opinion: “Quality of practical handouts are great. Material covered is highly relevant and useful. Teaching is of an exceptionally high quality.”

### **International collaboration and cooperation**

As stated above, I have been collaborating with INSA Toulouse, France since the mid-nineties for the development of latest semiconductor technology models, tools and resources to support continuing advancement in electronic and computer engineering education internationally. Among other universities in Bangladesh, I have developed collaborative agreement with the American International University Bangladesh (AIUB) and supported this university in effective delivery of advanced engineering courses using the latest technology, tools and learning resources. Recently Professor Sicard (France) and I have agreed to assist University Technology Mara in Malaysia in their endeavor to enhance the teaching

program in microelectronics through the provision of tools, learning resources and guidance. Since 2000, I have been developing credit assessment frameworks and articulation arrangements for graduates of many polytechnic institutes in Singapore, Malaysia, Hong Kong, India and Sri Lanka to enter Bachelor of Engineering programs in UniSA. In 2003, I developed a credit assessment framework and articulation agreement for Diploma students from Indo-Australia Institute of Technology & Management (India), allowing them to enter the Bachelor of Engineering programs in UniSA on completion of their Diploma.

### **Contributions to the international engineering education community**

I have actively contributed to national and international conferences and workshops on Engineering Education. I have published consistently, eighteen *refereed papers* on learning and teaching in the last four years, including contributions to the archival book volumes entitled *World Innovations in Engineering Education* (USA) (<[www.ineer.org](http://www.ineer.org)>). I have regularly reviewed scholarly papers for these annual volumes since 2003. Since 2006, I have been a member of the *International Committee* of the *International Conference on Education* (<[www.iadat.org](http://www.iadat.org)>). I accepted an invitation to join the *Scientific Committee* of the *International Conference on Engineering Education* to be held in Portugal later this year (<[icee2007.dei.uc.pt](http://icee2007.dei.uc.pt)>) and reviewed papers for this conference.

### **Influence and Recognition**

I have sustained the initiatives on innovative approaches to Project-Based Learning methodology for many years, starting in the mid nineties, leading to the development of the structured project-based approach and the associated learning resources. As a consequence of these developments, the courses I teach are now ranked in the very top among the courses in UniSA's Division of ITEE. Student performance (grades) has improved as a result of these initiatives. In 2006, there were no failures in the VLSI course, and nearly 65% of the students achieved a grade of C or better compared to 42% in 2005. The overall pass rate in the CHD course increased from 80% in 2004 to 89% in 2005. These initiatives and achievements were recognised through a *UniSA Teaching Grant* in 2005 and *three Teaching Awards in 2006*, namely *UniSA Teaching Excellence Award*, *UniSA Citation* and *UniSA Supported Teacher Award*. This year, I have been nominated by UniSA for the prestigious Carrick Citation Award for outstanding contributions to student learning, an Australian national level teaching award. The results are expected very soon.

In 2001, my initiatives on Project-Based Learning and Peer Learning were recognised in the ICT Education (ICT-Ed) project (<<http://cerg.infotech.monash.edu.au/icted/mcparticipants.html>>), funded by the Department of Education of Australia. This was incorporated in the final report submitted to the Australian Government. "*Inspired by the effectiveness of the PBL approach, we have introduced this approach in the course Introduction to Electrical Engineering.*" Professor Andrew Nafalski, School of Electrical and Information Engineering, UniSA. The Dean of Teaching and Learning in UniSA's Division of ITEE has expressed keen interest in the broader applicability of the structured PBL approach in related disciplines. At his invitation, I have joined a specialist group to oversee a *Divisional Project on Improving Program Distinctiveness*. Under the leadership of the Dean (T&L), I have been working in a group since 2005 on a project on *Mapping Program Outcomes with Course Objectives*.

My *collaborative work* with Prof Sicard of France has led to many enhancements of the design tools including the incorporation of the latest semiconductor technologies. The tools and the *software application notes we have developed* (<<http://intrade.insa-toulouse.fr/~etienne/microwind/65nm.pdf>>) are used in 500 educational institutions worldwide. The French Organisation for National Coordination of Microelectronics Training (CNFM: <[http://www.cnfm.fr/Version\\_anglaise/HOMEPAGE.htm](http://www.cnfm.fr/Version_anglaise/HOMEPAGE.htm)>) accepted a presentation on our work in its *Pedagogical Days in November 2006*. The continuing *development of the design tools* and the learning resources are allowing the students to keep themselves abreast with the latest technology and design practices. Colleagues around the world have acknowledged my contribution in the field, as is evident from the following comment upon reviewing a book titled *Semiconductor Modeling*: "*Dr. Aziz proved to be an outstanding reviewer in terms of the depth of his knowledge of semiconductor modelling. His suggestions were invaluable in furthering the book's goals.*" Roy Leventhal (co-author), Leventhal Design and Communications, USA.

## Letters of Support



Prof. Etienne SICARD  
INSA, Dept of Electrical and Computer Engineering  
135 Av de Rangueil,  
31077 Toulouse – France

Toulouse, Friday 6 July 2007

### REFERENCE FOR DR SYED MAHFUZUL AZIZ

It is a great pleasure to support the nomination of Dr Syed Mahfuzul Aziz for the *iNEER Achievement Award*. I have been closely involved with the developments Mahfuz has done in learning and teaching in microelectronics and hardware design over a number of years. We have been collaborating since 1996 when he introduced the design tools called MICROWIND and DSCH for teaching Integrated Circuit (IC) design. Rapid advances in IC technology in the past decade have inspired continuing enhancements of these design tools. Mahfuz and his students have made significant contributions to these developments by providing critical feedback on the tools and associated designs. The queries and feedback I have received from his students over the years are indications of the strong interest and motivation he has been able to create among them. I am convinced that Mahfuz's high interpersonal skills, enthusiasm and support for the students have been very valuable in this regard.

While Computer Aided Design (CAD) tools have been used in learning for many years, their sophistication may obscure the underlying circuit design principles. To address this as well as the diversity of students' backgrounds, Mahfuz has used innovative strategies for implementing a project-based learning (PBL) methodology through scaffolding of tasks, from simple to complex. This is also a very useful way of supporting students in developing independent learning ability. The structured project guides he has developed are of very high quality and are extremely useful for reinforcing the theoretical concepts through the development of contemporary circuit design skills. These project guides are used by colleagues in many countries. Mahfuz has made significant contribution towards the development of a processor design guide, which has appeared as a chapter in our textbook titled "Advanced CMOS Cell Design" this year. Recently, a faculty member at the University Technology Mara in Malaysia has spoken highly of the usefulness of the project guides and the structured methodology pioneered by Mahfuz. He has contributed enormously to our ongoing collaborative research on the development and incorporation of the latest semiconductor technology models into the MICROWIND tool. The educational users of this tool in more than 500 institutions around the world are benefiting directly from these contributions. The software application notes we have co-authored provide faculty members and students very intuitive introduction to the latest technologies through practical examples. Mahfuz has been playing a proactive role in these developments. I highly value his contribution and guidance for continuing developments in teaching and learning.

Mahfuz has consistently reflected on his teaching and adopted scholarly approaches to evaluate the strategies he has used. I have found these evaluation schemes very useful. The developments of curricula and resources he has carried out have been backed up by sustained scholarly research as evident from his publications. He has consistently received high commendation from the students for his innovative teaching strategies, enthusiasm and support. He has also received the University's top teaching awards. His exemplary accomplishments in promoting international cooperation make him an ideal candidate for the *iNEER Achievement Award*. I recommend him very strongly for the award.

Etienne Sicard  
Professor



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# AIUB

## AMERICAN INTERNATIONAL UNIVERSITY- BANGLADESH

### LETTER OF SUPPORT FOR DR SYED MAHFUZUL AZIZ

Dr. Syed Mahfuzul Aziz is currently the Program Director of Computer Systems Engineering at the University of South Australia (UniSA). I have known him as a pioneer of VLSI (Very Large Scale Integration) Design teaching in Bangladesh. He introduced the first ever VLSI course at postgraduate level in Bangladesh in the mid nineties while teaching in Bangladesh University of Engineering and Technology (BUET), the premier technological university in the country. He played a pioneering role in modernizing the entire undergraduate and postgraduate course curriculum in BUET during the mid to late nineties. He secured grants of nearly US \$100,000.00 to develop a VLSI Laboratory equipped with most modern computers computer network and software tools. As a Professor of Electrical and Electronic Engineering he introduced a VLSI Design course at the undergraduate level for the first time in 1998 and developed a highly practical approach to teaching. I had the opportunity to visit the newly developed laboratory in 1999 when he introduced me to the laboratory resources, the CAD tools used for teaching through his European collaboration, and the teaching methodologies and resources he had developed. I was impressed by his leadership, commitment to quality teaching and his innovative thinking for developing teaching and learning strategies.

His colleagues in Bangladesh regard him very highly for his exemplary contribution in teaching and learning in Bangladesh for more than a decade since the mid eighties. He inspired and assisted many of his former colleagues in BUET in taking teaching and research roles in rapidly advancing technology areas such as VLSI Design, Digital Logic Design and Computer Architecture. Through his dynamic leadership he and his colleagues assisted many other universities in Bangladesh to establish VLSI and related teaching programmes. This assistance is continuing to this day. As the Organizing Secretary of the first International Conference on Computer and Information Technology (ICCIT), held in Bangladesh in 1998, he set a very high standard in the overall conference organization, paper review and publication of the proceedings. Over the last ten years the conference has grown into one of the most widely participated and highest ranking annual conference of its kind in Bangladesh, accepting only 26% of the submitted papers in the 2006 conference. Dr Aziz has rendered his expert services every year as a member of the International Program Committee of the conference since 1998. He has also served on various committees and as reviewers of many international conferences including IEEE ICIS 2007, ICEE 2007, IADAT 2006, SPIE 2005, and IEEE TENCON 2004.

Dr Aziz moved to Australia in 1999 where he immediately started making his mark as an excellent and passionate teacher and researcher. He earned UniSA supported teacher awards in 2001 and 2002, and recently in 2006. The students' evaluation ranking of his teaching has been at the top of UniSA courses. It is befitting that he was awarded the two topmost UniSA teaching awards in 2006 for his outstanding contribution, scholarly approaches, international recognition and collaboration. I am also very pleased to know that Dr Aziz has been nominated by UniSA for the prestigious Australian National level teaching award (Carrick

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# AIUB

## AMERICAN INTERNATIONAL UNIVERSITY- BANGLADESH

Citation Award 2007) through a rigorous and competitive internal selection process. Through his initiative the American International University-Bangladesh entered into a collaborative agreement in teaching and research with the University of South Australia. Dr Aziz was a Visiting Professor in our university for a semester during 2003-04 and taught a couple of courses. The students in both courses spoke very highly of his communication skills and the project-based learning method he used. Our teaching staff benefited enormously from his teaching methods and the resources he developed. Some of the teaching resources he has developed in collaboration with French colleagues are being used in many institutions around the world including Bangladesh.

Dr Aziz has developed strong links with industry and led many industry sponsored projects to successful completion. In 1996 he was honoured by the University of Texas at Austin through the award of Visiting Scholar status, where he contributed in a high tech US industry (Crystal Semiconductor Corporation) project in advanced VLSI Design. He has published many refereed papers based on his research in VLSI, Computer Architecture and Communication, as well as Engineering Education. As a consequence of his excellent research he has been awarded the Supported Researcher status by the University of South Australia for five consecutive years (2002-2006). As recognition of his outstanding contribution to the profession the Institute of Electrical and Electronic Engineers Inc. (IEEE) elevated him to the Senior Member grade in 2002, a status achieved by only 7% members of the world's largest technical professional association. His contributions in teaching and learning span nearly two decades, have earned him wide recognition within Australia and beyond, and have influenced colleagues internationally in enhancing teaching programs through the use of innovative strategies and resources. I therefore recommend Dr Aziz very strongly for the iNEER achievement award and wish him every success.

**DR. CARMEN Z. LAMAGNA**

Vice Chancellor

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**Support for iNEER Achievement Award – Dr Syed Mahfuzul Aziz**

I am delighted to support the nomination of Dr SM (Mahfuz) Aziz for an iNEER Achievement Award. Through enhancements of design tools, changes to the learning environment, and a fresh, stimulating teaching methodology, coupled with a quiet yet infectious enthusiasm, Mahfuz has had a profound impact on the teaching of electronic circuit design concepts and practice both locally and internationally.

Designing complex microelectronic integrated circuits (ICs) requires considerable creativity and innovation while adhering to carefully developed guidelines. It relies on a disciplined, systematic and rigorous approach to ensure that the final product meets the exacting specifications for the circuit's intended function and purpose. These features and philosophy must be an integral part of any education program in this area. While a suite of design tools for implementing and validating the design process is essential for students' attainment of critical design concepts, skills and capabilities, three further key ingredients are needed for students to become confident, proficient and adaptable designers – an effective and intuitive design interface, a structured learning environment with real projects on which to practise, and expert guidance and mentoring. Mahfuz has taken up the challenge of providing these and succeeded superbly.

Collaborating closely with the developers in France, Mahfuz has contributed to the development of a software design interface that significantly enhances the capability, usability and productivity of their design tools. His remarkable software application note is liberating students at over 500 educational institutions world-wide from the tedious detail so that they may experience the sheer joy of creating something new.

Project-oriented problem-based learning is paramount to understanding the science, and acquiring the art, of IC design. Mahfuz has introduced structured projects of increasing complexity that enable students to systematically develop and demonstrate skill, self-confidence and flair in using sophisticated design tools. His learning methodology incorporates both formative and summative assessments that assist with thinking and problem solving skills, and pave the way for graduates' life-long learning in a rapidly changing field.

Recognising that students in his courses come from diverse educational, experiential and cultural backgrounds, Mahfuz has adapted his teaching methods to maximise both group and individual learning outcomes. Students have greatly appreciated the effort and thoughtfulness that has gone into the preparation of the resource materials and learning tasks. His dual role as teacher and Program Director, and his gentle interpersonal approach, have enabled him to rapidly appraise students' current knowledge and understanding, assist them in formulating study plans, and deliver effective mentoring and support.

The two principle courses that Mahfuz teaches have undergone a transformation, with increasing student enrolments, and a marked increase in student learning and satisfaction, as seen in the outstanding results from his Course Evaluation Instrument (CEI) and Student Evaluation of Teaching (SET) questionnaires. The success of his problem-based student centred learning approach has influenced his colleagues to follow a similar path. My colleague Brenton Dansie (ITEE Dean, Teaching and Learning) has stated "Whilst excellent student outcomes and levels of satisfaction are fundamental aspects of good teaching, the University also places great value on teachers who engage in the scholarship of teaching. It is very clear from his application that this is important to Mahfuz. His approach is one of critical reflection on his teaching using various theoretical insights which leads to the development and testing of new ideas". Published internationally, Mahfuz' educational support materials and approach have been widely acclaimed and adopted.

Design is at the pinnacle of creative engineering activity, and the best designers will learn from the most inspirational teachers. In the area of electronic circuit design, and with applicability to the teaching of design generally, Mahfuz has successfully addressed three important issues - effective tools and design interfaces, a stimulating project-oriented environment, and inspirational teaching - that critically affect the learning process and are leading to excellent student outcomes. His outstanding leadership and contributions to undergraduate and postgraduate student learning strongly warrant the award of an iNEER Achievement to Dr Aziz.

Andrew Downing  
Professor and Head of School  
5 July, 2007

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## *Curriculum Vitae*

### **Syed Mahfuzul AZIZ**

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#### **Academic qualifications**

**2002:** *Graduate Certificate* in Higher Education, Queensland University of Technology (QUT)

**1993:** *Ph.D.* in Electronic Engineering, University of Kent at Canterbury, UK

**1986:** *M.Sc.* in Electrical & Electronic Eng., Bangladesh University of Eng. & Tech. (BUET)

**1984:** *B.Sc.* in Electrical & Electronic Eng., Bangladesh University of Eng. & Tech. (BUET)

#### **Employment (full-time)**

**1999 - Present:** *Program Director* and *Senior Lecturer*, Computer Systems Engineering (CSE), School of Electrical & Information Engineering (EIE), University of South Australia (UniSA)

**1998 - 1999:** (15 months) *Professor*, Department of Electrical and Electronic Engineering (EEE), Bangladesh University of Engineering & Technology (BUET)

**1995 - 1998:** (3 years) *Associate Professor*, Department of EEE, BUET

**1986 - 1995:** (9 years) *Lecturer* and *Assistant Professor*, EEE, BUET (was on study leave 1989-1993)

**1985 - 1986:** (18 months) *Assistant Engineer (Research)*, Institute of Electronics, Bangladesh Atomic Energy Commission

#### **Employment (part-time)**

**1997 - 1999:** *Visiting Faculty*, Computer Science Department, North South University, Dhaka.

**1990 - 1993:** *Casual Academic*, Electronic Engineering Laboratory, University of Kent, UK

#### **Industry experience**

**1996:** *Crystal Semiconductor Corporation*, Austin, Texas, USA. Worked on advanced VLSI (Very Large Scale Integrated) circuit Design.

**2000 - 2007:** Supervised projects sponsored by Motorola Australia Software Centre, SAAB Systems Pty Ltd, and Defence Science & Technology Organisation (DSTO).

#### **Professional awards and scholarships**

**1998:** *Certificate of Excellent Achievement* in *Network/Internet System Development*, Centre of the International Co-operation for Computerisation (CICC), Japan

**1996:** *Visiting Scholar*, University of Texas at Austin, USA

**1989-1993:** *Commonwealth Academic Staff Scholar*, UK

#### **Research awards**

**2002-2006:** UniSA *Supported Researcher Award* (5 awards) for strong overall research performance

#### **Teaching awards**

**2007:** Nominated by UniSA for the *Carrick Citation Award* for outstanding contributions to student learning. This is an Australian national level award. Winners will be announced in July 2007.

**2006:** UniSA Teaching Excellence Award

**2006:** UniSA Citations for outstanding contributions to student learning

**2006:** *UniSA Supported Teacher Award*, for outstanding teaching performance based on 2005 Student Evaluation of Teaching (SET)

**2001:** *UniSA Supported Teacher Award for excellence (through competitive selection process)*

**2000:** *UniSA Supported Teacher Award for excellence (through competitive selection process)*

#### **Innovations and initiatives in teaching and learning**

- Nearly two decades of experience in university teaching, course coordination, student project/thesis supervision, academic administration, curriculum development, articulation and accreditation.

- 2000:** Developed complete *online learning resources* for the course Computer Hardware Design
- 2001:** Developed complete online learning resources for the course VLSI Design
- 2002:** Developed *interactive online quizzes* for the course Principles of Computer Systems
- 2001-Present:** Developed *structured project-based learning* strategies and resources for the courses *Computer Hardware Design* and *VLSI Design*
- 2001-Present:** Introduced *face-to-face continuous assessment of projects* in order to improve assessment outcomes and provide critical *timely feedback*
- 2006:** Introduced *student-centred learning workshop* to assist students in developing *independent learning, problem solving* and *critical thinking* skills in the VLSI Design course
- 2001-Present:** Systematically *developed* the *Digital Electronics Laboratory* to provide learning support for many of the school's courses. The lab is now one of the most modern laboratories with the latest industry relevant hardware platforms and software tools
- 2001-Present:** Provided empathic guidance to undergraduate final year project students and the students of Masters by course work programs, leading to *eighteen refereed publications*
- 1998 - 1999:** Secured a grant of approximately A\$150,000.00 for establishing a *VLSI teaching program* in the EEE Department of BUET, including the establishment of a modern *VLSI Design Laboratory*, the first laboratory of its kind in Bangladesh.

### Student experience

Course Evaluation: Consistently high levels of student satisfaction with the overall quality of the courses taught in the last three years. Close to 100% of the respondents has been satisfied with the quality of the courses. For all courses taught in the last three years (2005-2007), all ten questions in the course evaluation instrument (CEI) achieved rankings in the top quartile among 216 courses in the Engineering and IT disciplines at UniSA.

Student Evaluation of Teaching (SET): More than 90% of the respondents satisfied with the teaching in all courses for three years in a row (2005-2007). Rankings of all ten (SET) questions were in the top quartile among 140 courses in the Engineering and IT disciplines.

### Accomplishments in International Cooperation in Engineering Education

- **1996 - Current:** Established effective collaboration with the National Institute of Applied Science (INSA) Toulouse, **France** leading to contributions in the following areas:
  - provide critical feedbacks on the design tools for continuing enhancements.
  - development of support for latest semiconductor technologies into the Computer Aided Design (CAD) tool *Microwind*, used for VLSI teaching ([www.microwind.org](http://www.microwind.org))
  - development of software application notes for the latest technology updates (<<http://intra.insa-toulouse.fr/~etienne/microwind/65nm.pdf>>)
  - development of learning materials to support project-based learning
  - the **above resources are used** for teaching VLSI Design **in more than 500 institutions worldwide**, including North America, Europe, Asia and the Pacific.
  - collaborative scholarly publications including contribution to a *textbook* published by *McGraw Hill Publishers* in 2007.
- **2002 - Current:** Developed international agreement with American International University **Bangladesh**. Provide guidance and learning resources for supporting and enhancing teaching in advanced engineering courses.
- **2006 - Current:** Collaboration with Monash University, Australia on innovative use of *online technology for learning*.
- **2007- Current:** Three party agreement to support University Technology Mara (UiTM), **Malaysia** to develop a microelectronics teaching program. Supporting the teaching of advanced circuit design courses at UiTM with the project-based learning resources and tools developed in collaboration with INSA, Toulouse, France.
- **2000 – Current:** Established articulation arrangements for graduates of many polytechnic institutes in Singapore, Malaysia, Hong Kong, India and Sri Lanka to enter Bachelor of Engineering programs at UniSA.

### **Curriculum development and academic leadership**

- As program director of the Computer Systems Engineering (CSE) discipline, I have been providing academic leadership for *development of curricula* at both *program and course levels* since joining UniSA in 1999. During **1999–2000**, I played a leading role in redeveloping the school's engineering programs and designed curricula for a number of courses. I also played a proactive role in the successful accreditation of the engineering programs of the School of EIE in 2001 and 2005.
- As Program Director, I have been advising and supporting students on all aspects of their learning and progress, administering academic review, preparing annual program reports, monitoring provisions for assessment feedback within the program.
- In 2001, I developed the first ever *pathway* for holders of Advanced Diploma in Electronics from Australian institutes of Technical And Further Education (TAFE) to enter the Bachelor of Engineering programs in UniSA. This was endorsed by the Division of IT, Engineering and the Environment (ITEE) of UniSA as a model for development of articulation arrangements across the Division. In 2003, I developed the second *articulation arrangement* for holders of Advanced Diploma in Computer Systems Engineering. Program Directors across the School of EIE have been using these articulation documents for assessing TAFE graduates' applications for credit. These articulation arrangements have also led to **university pathways for Indian students** holding Advanced Diploma.
- **1993-1999**: Established the first ever VLSI teaching and research program in Bangladesh while working at Bangladesh University of Engineering and Technology (BUET). Developed modern laboratory and project-based learning resources and provided training to junior colleagues. Assisted many universities in Bangladesh to establish VLSI teaching programs through technology transfer and lecturer training programs. These institutions include American International University Bangladesh, Dhaka University, North South University, Ahsanullah Engineering University. Still supporting these universities in enhancing their teaching programs in line with industry trends internationally.

### **Recognition and influence**

- The learning resources I have developed in collaboration with INSA, Toulouse, France are used in more than 500 institutions worldwide.
- *Beta tester* for the integrated circuit design tools *Microwind* and *Dsch* developed at the National Institute of Applied Science (INSA), Toulouse, France.
- At the invitation of the Dean (Teaching and Learning) of the Division of ITEE, joined a specialist group in 2006 to oversee a *Divisional Project on Improving Program Distinctiveness*.
- Reviewed scholarly papers for the annual iNEER book volumes *World Innovations in Engineering Education* (2003-2006).
- Member of the *International Committee of the International Conference on Education* since 2006. (<[www.iadat.org](http://www.iadat.org)>).

### **Teaching and academic infrastructure grants:**

**2005:** A\$1500, *UniSA Teaching Grant* for developing learning resources to support student-centred learning in VLSI Design.

**2003 - 2007:** US \$43,798, *Xilinx University Program*, programmable hardware platforms and software tools for supporting project-based learning in Computer Hardware Design

**2002:** A\$2,500.00, *Mitsubishi Electric Australia* academic equipment grant for teaching/projects in microcontrollers.

**2001:** A\$90,860.00, *Sun Microsystems Academic Infrastructure Grant* to establish high performance computing facility to support teaching/research programs in Computer Aided Design (CAD).

**1998 - 1999:** A\$150,000.00 for establishing a modern *VLSI Design Laboratory* in BUET

### **Research funding**

**2000-2006:** Received nearly A\$250,000 in research funding. This includes \$197,000 from Australian Defence Science and Technology Organisation (DSTO) for research on Modelling Avionics Mission Systems (jointly with Professor Jonathan Billington).

### Research collaboration

- **Since 2004:** Leading three collaborative industry research projects with the Centre for Advanced Manufacturing and Research (CAMR): (1) wireless power transmission for endoscopic capsules, (2) tracking system for endoscopic capsules, (3) micromachined drug delivery device. These projects have collaborations with Women's and Children's Hospital and Queen Elizabeth Hospital in Adelaide.
- **2005-2007:** Associate Supervisor of postgraduate research projects at the Institute of Telecommunication Research on the development of high speed satellite modems, funded by the Australian Research Council and international industry partner from the Netherlands.
- **Since July 2006:** Leading a collaborative project with IMVS and CAMR in the area of Biomedical Instrumentation using novel techniques for diagnosis of spinal chord injuries.

### Professional Membership

- *Member*, Australasian Association for Engineering Education (AaeE)
- *Senior Member*, *Inst. of Electrical & Electronic Engineers (IEEE)*
- *Member*, Engineers Australia
- *Member*, Association of Overseas Technical Scholarships (AOTS), Japan

## Publications in Teaching and Learning since 2003

### Book Chapters and Journals

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15. Aziz, S. M. (2004). Project-based Active Learning in an Industry Relevant Course. In *Proc. Int. Conf. Eng. Education and Research (iCEER)* (pp. 31-38). Olomouc, Czech Republic: iNEER.
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## Publications in discipline area

### Refereed Papers (Journals and refereed conference proceedings)

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21. S. M. Aziz and J. Tran, "Modeling for performance: SystemC model of a communication bus in a distributed network", Proc. of International Conf. on Information & Communication Technology (ICICT 2007), Dhaka, 7-9 March 2007, pp. 231-234.
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26. N. A. Abdul Samad, T. Vaithianathan and S. M. Aziz, "Design of a Wireless Receiver to Supply Power for Biomedical Applications," Proc. of the *IEEE Asia Pacific Conf. on Circuits & Systems*, Singapore, 4-7 Dec. 2006, pp. 675-678.
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29. Rajavadivel Chinnapichappan and S. M. Aziz, "A Bus Level SystemC Model for Evaluation of Avionics Mission System Data Bus", *Proc. IEEE Region 10 Conference: TENCON'05*, Melbourne, 21-24 November 2005.
30. S. M. Aziz and Balachander Ramamurthy, "Design and FPGA Implementation of an Efficient 2-D DWT Processor," *Proc. IFIP International Conference on Very Large Scale Integration System-on-Chip (IFIP VLSI-SoC 2005)*, 17-19 October 2005, Perth, Western Australia, pp. 498-503.
31. H. Nguyen, S. M. Aziz and Trent Ryan "An Efficient Low Bandwidth Communication Protocol for Remote Control Applications", *Proc. IEEE International Conf. TENCON 2004*, Thailand, 21-24 November 2004.
32. Balachander Ramamurthy and S. M. Aziz, "An efficient architecture for a 2-D DWT processor", *Proc. International Conf. on Electrical and Computer Engineering (ICECE 2004)*, Dhaka, 28-30 December 2004, pp. 414-417.
33. S. M. Aziz, Hoang Nguyen, Jarred Biddell and Andrew Brine, "An Efficient Scalable System for Remote Control of Distributed Devices", *Proc. Int. Conf. on Electrical and Computer Engineering*, Dhaka, 28-30 Dec. 2004, pp. 230-233.
34. Joarder Kamruzzaman and S. M. Aziz, "Improved Machine Recognition for Bangla Characters", *Proc. Int. Conf. on Electrical and Computer Engineering*, Dhaka, 28-30 December 2004, pp. 557-560.
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49. J. Kamruzzaman, Y. Kumagai and S. M. Aziz, "A Neural Network Based Character Recognition System Using Double Back Propagation," *Malaysian Journal of Computer Science*, Vol. 11, No. 1, pp. 58-64, June 1998.
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