

# CURRICULUM VITAE

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**Mohamed M. Eljhani, Ph.D.**

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## COVER LETTER

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Dear All Concerned,

Experienced faculty member with a demonstrated history of working in the higher education for more than 10 years both in the academics and industries. I have published several research journals papers in the area of high-level synthesis of advanced digital systems, and digital integrated circuit design with Field-Programmable Gate Arrays (FPGA) using Hardware Description Language. Now I am teaching several Computer Engineering courses at University of Tripoli. I have strong education professional with a doctor of philosophy focused in Computer Engineering from Florida Institute of Technology, a Master's of Science (M.Sc.) focused in Computer Sciences from Florida Institute of Technology, and a Master's of Science (M.Sc.) focused in Computer Engineering from Beijing University of Aeronautics & Astronautics.

More than 10 years of industry experience as a computer engineer have provided me with a broad view on problems solving that is very useful in assisting students with projects and assignments. In addition, I had more than 10 years of teaching experience as a faculty in several institutions in Libya. This experience provided me with the confidence so now I am capable of teaching a variety of computer engineering courses and supervising graduate / undergraduate students in their research projects. Through this experience I have developed excellent communication, problem solving and organizational skills.

I believe that my academic training and my engineering experience prepared me to be an effective researcher and faculty member. My doctoral dissertation topic relates to designing and implementing Front-end of Wake-Up-Word Speech Recognition System (WUW-SR) on FPGA. The developed work relates to a new front-end paradigm named WUW-SR. The State-of-the-art WUW-SR enables users to activate systems (e.g., handheld devices) with speech command (e.g., Wake-Up-Word) instead of using other paradigms for activation (e.g., push to talk).

Sincerely,

## CURRICULUM VITAE

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### KEY SKILLS

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- Full time faculty member at department of Computer Engineering, University of Tripoli
- Head of study and examinations department at college of engineering, University of Tripoli
- Head of information systems and technology department at American University of Libya
- B.Eng., M.Sc., Ph.D. in Computer Engineering
- M.Sc. in Computer Science
- Experienced faculty member with more than 10 years teaching different Computer Engineering courses.
- More than 10 years of industry experience as a Computer Engineer
- Published number of journal research papers
- Working on finalizing a book publication
- The ability to maintain high standards of achievement, behavior, discipline and punctuality amongst students

### EDUCATION QUALIFICATION

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- 1. Florida Institute of Technology (Melbourne, Florida)**  
Doctorate of Philosophy in Computer Engineering (February 2015)
  - Emphasis on Speech Recognition, Digital Signal Processing, Embedded Systems & FPGA Design
  - Dissertation: Front-end of Wake-Up-Word Speech Recognition System Design on FPGA
  - Major GPA: 3.80/4.00
- 2. Florida Institute of Technology (Melbourne, Florida)**  
Master of Science in Computer Science–Computer Information Systems (July 2014)
  - Emphasis on Computer Programming, Computer Hardware Organization, Operating Systems, and Component Engineering
  - Major GPA: 3.85/4.00
- 3. Beijing University of Aeronautics and Astronautics (Beijing, China)**  
Master of Science in Computer Engineering (Dec 2004)
  - Major GPA: 3.90/4.00

## TEACHING EXPERTISE

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**Jan 2005 - Jun 2008** Responsible for teaching a number of courses in Computer Engineering at undergraduate level (University of Tripoli).

### Courses taught:

- FPGA design methodology & Verilog Hardware Description Language
- Computer Organization & Computer Architecture
- Intel & Motorola Microprocessors with Assembly Language
- Digital Design

## RESEARCH & PUBLICATIONS

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In my Ph.D. research we designed and implemented new efficient hardware architecture for Front-end of Wake-Up-Word Speech Recognition System (WUW-SR) on FPGA. WUW-SR presents new solution by allow users to activate handheld devices with speech commands instead of “push to talk” as is presently done.

- **Front-end of Wake-Up-Word Speech Recognition System Design on FPGA**
  - Journal of Telecommunications System & Management (JTSM) - July 2013  
<http://dx.doi.org/10.4172/2167-0919.1000108>
- **Wake-Up-Word Feature Extraction on FPGA**
  - World Journal of Engineering and Technology (WJET) - Feb 2014  
<http://www.scirp.org/journal/WJET/>
- **Voice Activity Decoder of Wake-Up-Word Speech Recognition on FPGA**
  - International Journal of Engineering Research and Applications (IJERA) – Dec 2014  
<http://www.ijera.com> Int. Journal of Engineering Research and Application ISSN: 2248-9622, Vol. 4, Issue 12(Part 3), December 2014, pp.160-168
- **Reduced Instruction Set Computer Design on FPGA**
- **Working on the book “Development of Embedded Wake-Up-Word Speech Recognition System”**(In finalizing process)

## ENGINEERING EXPERIENCE

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**Aug 1993 – Feb 2002** I have worked as a Computer Engineer for the Electronics Research & Development Center (Tripoli, Libya).

- Developed On-board Computer / Hardware and Software (as a team work)
- Designed and Implemented number of RISCs and Microcontrollers

- Involved in many Hardware and Software aspects of computing, from design of individual Microprocessors to Analog and Digital Circuits Design
- Wrote number of Software and Firmware for Embedded Systems

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## **RESEARCH STATEMENT**

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### **RESEARCH INTEREST**

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Interested in research in Artificial intelligence with focus on human-computer interaction, there are many challenges faced by researchers in this active field. Collaborating with researches in other disciplines to develop and enhance the existing theoretical and algorithmic frameworks is of my interest. As Computer Engineering and Computer Science graduate interested in investigating various theories and their applications to real world problems that involve; Complex Digital System Design on FPGA, Speech Recognition Design, and its numerous applications that lay in the intersection of science and engineering.

### **BACKGROUND AND CURRENT RESEARCH**

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I believe that my academic training with my working experience as a computer engineer prepare me to be an effective researcher. My research work was conducted under the direction of Dr. Veton Z. Kepuska, and looks at design and implements a Front-end of Wake-Up-Word Speech Recognition System (WUW\_SR) on FPGA. In our research, we developed a new front-end paradigm on FPGA that presently is not widely recognized. The state-of-the-art WUW\_SR system is based on three different sets of features: Mel-frequency Cepstral Coefficients (MFCC), Linear Predictive Coding Coefficients (LPC), and Enhanced Mel-frequency Cepstral Coefficients (ENH-MFCC). These features were needed to improve the accuracy of the system by combining the individual scores. Those scores were obtained with corresponding Hidden Markov Models (HMMs) as back-end stage of the WUW-SR. Presented experimental design and implementation of a novel architecture of a real time feature extraction processor that generates those features simultaneously was the topic of my dissertation. The WUW\_SR is designed and implemented in Altera DSP development kit with Cyclone III FPGA as a portable system acting as a processor that is capable of computing three different sets of feature at very fast rate. It is cost effective solution that consumes very little power, and it is not limited by having to operate on a general-purpose computer. This solution hence, is suitable to be used on any portable device.

### **INCORPORATING RESEARCH AND TEACHING**

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As a faculty member I want to incorporate my research into teaching to enhance the existing courses and to develop new classes. I believe combining research and teaching will improve both.

## **CONCLUSION**

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In my Ph.D. research, the efficient hardware architecture and implementation of front-end of WUW-SR has been presented. We have described relevant parts of front-end from theory to hardware design. These designs were implemented on FPGA, and the results of these implementations which included comparing them with software equivalents have been presented in number of publications that were listed above. The computational complexity and memory requirement of these sets of feature algorithms is analyzed in detail. The presented solution is very efficient as disused in papers. The most important characteristic of a WUW-SR system is that it should guarantee virtually 100% correct rejection of non-WUW out of vocabulary words while maintaining correct acceptance rate of 99.9% or higher for in vocabulary words.

## **STATEMENT OF TEACHING PHILOSOPHY**

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### **OVERVIEW**

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Teaching and advising students is about making students to continue to love learning, which is one of my primary motivations for pursuing an academic career. My background and experience provide the expertise needed for teaching courses at both graduate and undergraduate level. Furthermore, helping students to establish their own research goals and pursue lifelong learning is of special interest to me. I have mentored undergraduate students from different universities in the past. They varied in background, motivation, initial skillfulness, and personality and I enjoyed finding the best way to guide each individual student to achieve his/her individual academic goals.

I started my carrier as instructor on January 2005 as a faculty of the University of Tripoli where I was engaged as instructor in several computer engineering courses. Academia provides an opportunity to combine research and teaching in a way not possible in any other setting. I have been fortunate to teach students there, including the development of new FPGA design course. I believe that an important characteristic of effective teaching at the college level is the use of research results to enhance the student learning experience.

Computer engineering is my primary research area. My focus is on researching useful teaching techniques to advising and curriculum development for improving my content delivery. I will use this experience to continuously work on improving my teaching approach.

### **TEACHING PHILOSOPHY**

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Computer engineering is a collection of theoretical studies, experimental methods, and engineering design. My teaching philosophy focuses on giving students the first hand experience on all three aspects, with an emphasis on engineering design. Besides learning fundamentals from

lectures, students will continue improving their skills through designing, implementing, and experimenting with their own systems to solve real-world problems.

In particular, I usually encourage students to start from implementation of an existing approach and finish with new design and implementation approach. Once the student has gained confidence and familiarity on the problem, with guidance, they can identify the limitation of the existing approaches and develop new ideas to improve them. In classroom, practical experience is also the key to deliver new knowledge.

Rather than abstract concepts, I find that most students are more interested in real-world problems and solutions. This immediately narrows the gap between the audience and the topic.

### **STATEMENT OF TEACHING PHILOSOPHY (CONTINUED)**

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Another important part of my teaching philosophy is to encourage students to develop their communication skills. I encourage students to collaborate with each other in group projects. They are also encouraged to communicate with me through all means: e-mail, phone, office hours, etc. In my experience, communication is the key to a student's success. Finally, I encourage students to think widely about the problem and apply their accumulated knowledge to solving it.

Computer engineering is a fast moving and ever-changing discipline. A student's vision should not be limited to a specific approach. I feel strongly that students should understand the big picture; identifying what is the key issue of the problem that they are trying to solve, what kind of research is required, experiment with various approaches, and picking the most suitable solution, not necessarily the best solution.

Specifically, I encourage students to learn most recent topics in computer design, such as: Complex Digital System Design, FPGA Design, etc. I feel that these topics are more attractive to students and can inspire great startup ideas, thus they will be an important component of my teaching philosophy. I have been studying and working in multiple research groups and learned the advantages of each. I will create a friendly and productive atmosphere in my future group. Students will be encouraged to communicate and collaborate in projects. Many of undergraduate students I have supervised are graduated and some of them are pursuing a graduate degree.

### **COURSES TO TEACH**

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#### **1. Courses I am prepared to teach**

- FPGA Design & Verilog Hardware Description Language
- Embedded Systems
- Digital Systems Design
- Computer Architecture
- Computer Organization
- Microprocessors Design

## CONCLUSION

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I believe that teaching in general will significantly contribute to both my research and professional development. I am confident that my academic, industrial and teaching background will enable me to teach various courses in your department. I look forward to expanding my teaching and mentoring abilities and working with other faculty members to make sure that the overall curriculum is up-to-date and prepares students appropriately for their careers and future research goals.

## CONTACT REFERENCES

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