Curriculum Vitae

Mohammed Ahmed

Dr.Ing. in Computer and Systems Engineering
with focus on Robotic and Mechatronic Systems

PERSONAL INFORMATION

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EDUCATION

PhD in Control Engineering (Dr.Ing.) *(2015)* University of Bremen, Robotics Group, Bremen, Germany.
Titled: *"An Intelligent Architecture for Legged Robot Terrain Classification Using Proprioceptive and Exteroceptive Data"*

Master of Science (M.Sc.) in Computer & Control Engineering (2004) Faculty of Engineering, Zagazig University, Zagazig, Egypt.
Titled: *"Design of a Computer Algorithm for Fine–Tuning of Adaptive Controllers"*

Qualifying Examination of Master of Science in Computer & Control Engineering (1999) Faculty of Engineering, Zagazig University, Zagazig, Egypt.

Bachelor of Science (1998) Zagazig University, Zagazig, Egypt.
Major: Electronics and Communications Engineering.

Rank: First on graduation class (1st of 64).

Grade: Very Good with Honor. GPA: 83.02%, 3.3 (on 4.0 scale)

Certificate of High School (*Thanawiya Amma***)** (1993) Abo Kbier, Sharkia, Egypt.
School: Abo Kbier Secondary School for Boys

Branch: Scientific. GPA: 88.9%

Special Skills Subjects: *High-Level English Language (6/10), High-Level Mathematics (7.5/10).*

PROFESSIONAL EXPERIENCE

July 2018 – present : *Robotics System Engineer* – Airbus, Germany

Work includes (among others) manage, design, and implement automation projects with system elements such as lightweight positioner, lightweight end effector (driller, fastener, sealing/painting dispenser).

June 2015 – present : *Assistant Professor* – Computer and Systems Engineering Dept., Faculty of Engineering, Zagazig University

Work includes graduate and undergraduate student teaching, thesis and project supervision, grading, and lab supervision.

Worked as a *project leader* for:

- **Project: ZuKa** (`https://github.com/mnourgwad/zuka`)

    Deployment of industrial KUKA robot in CNC machining and visual servoing through Kinect interfacing on ROS

Application of the industrial robotic arm KR6 R900 sixx in 3D milling that includes developing post-processing tools to convert conventional G-Code into KUKA Robot Language (KRL) and use the robot for 2D drawing and 3D milling, and Implementation of two research applications related to visual servoing using Kinect interfacing on ROS to guide the robot with hand gestures and provide human-safe operating zone where the robot stops when a human approaches, which was made possible after developing an API to control the robot directly from any PC. Project won the first place of graduation projects

- **Project: ZagHexa** (`https://github.com/RoboZag/zagHexa`)

    Design, Construction and Control of a Hexapod Walking Robot

The robot is an integrated multi-legged walking robot based on ROS that employs novel and different walking patterns and is capable of basic mobility tasks such as walking forward, backward, rotating in place and raising or lowering the body height. The robot is teleoperated using hand-held devices such as a smart phone, tablet or a wireless joystick. Furthermore, it has its own navigation system and a camera for instant video recording and streaming. Project ranked first on robotics projects and third on all engineering disciplines on the 2017 Egyptian Engineering day.

- **Research Project: eSchool** *(Principle Investigator)* (`http://mis.zu.edu.eg/IEP`)

The project aims to develop, design, and implement a highly efficient web-based electronic system to fully automate the school administration and education processes. This project helps to achieve discipline in the school, develop the system of examinations and evaluation, registration and admission of students. The administration unit in the project aims to streamline all its subsystems and detailed steps into a single unit to facilitate and improve the overall process. Thus, optimizing use of human and material resources according to the needs of the schools, in order to ensure their accuracy, the continuous follow-up of the educational situation in the governorate, the knowledge of student discipline, the level of education of each school through follow-up and the results of the students.

- **Research Project: IMHOTEP–HyGrid** *(Co–Principle Investigator)*

Hydrogen Storage Technology for Emergence Green Solutions of Renewable Energy-Mix Grids (HyGrid)

This project focus is on the research of hydrogen storage technology for green solutions for renewable energy sources taking into account the development, management and utilization of primary energy resources policies and strategies for sustainable development. Through the project, exchange of experiences and practical knowledge with the French side aiming at building and developing specialized stuff capable not only of use but also of developing the basic science and knowledge of renewable energy and its adaptation and conversion of applications into new products.

August 2010 – June 2015 : *Researcher* – DFKI Bremen, Robotics Innovation Center, Bremen, Germany

Work in the institute conduct research in intelligent, cognitively adequate robot systems as well as entire complex, integrated systems for a variety of applications, focusing on a rapid transfer of results of basic research into real-world applications and industry application-oriented projects in

the fields of underwater, space, logistics and production, Search and Rescue systems, security, and cognitive robotics.

with research interests in: modeling and simulation of robotic systems, controllers design and implementation of actuating systems

Activities within the DLR and ESA-funded project **SpaceClimber**

(A Semi-Autonomous Free-Climbing Robot for the Exploration of Crater Walls and Bottoms)

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http://robotik.dfki-
bremen.de/de/forschung/projekte/spaceclimber.html
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- Robot joint actuator: controller design, development and prototyping
- controller modelling and simulation (precise and real time).
- multi-body simulation
- Experiments (design, execution and evaluation)
- Development of technical content for project different technical reports.

Activities within the BMWi and DLR-funded project **Virtual Crater**

(Development of Virtual Simulation and Demonstration Environment for Planetary Exploration with Focus on Extraterrestrial Crater)

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http://robotik.dfki-bremen.de/en/research/projects/virtual-crater-
1.html
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- Robot joint actuators: modelling and simulation (precise and real time).
- Reference experiments for actuators: requirements analysis, conceptual design, implementation and performing the experiments.
- System identification for modelling and parameter tuning.
- Simulation models: testing and verification.
- System integration and testing with hardware/software in the loop vitrification.
- multi-body simulation

Other Local, BMVI and NOW GmbH, or EU -funded projects I worked intensively on:

ITEM (Innovative Technologies Electric Mobility)

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http://robotik.dfki-bremen.de/en/research/projects/item-
innovative-1.html
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FASTER (Forward Acquisition of Soil and Terrain data for Exploration Rover)

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http://robotik.dfki-bremen.de/en/research/projects/faster-1.html
https://www.faster-fp7-space.eu
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Additional Task

- Development of technical content for project proposals
- Supervising tutor and supporting tutor for undergraduate students working on final theses or student projects
- Support of various other mobile robot projects in the fields of simulation, construction and testing

August 2010 – June 2015 : *Instructor* – University of Bremen, Robotics Group, Bremen, Germany

Work included teaching, student project supervision, grading, and lab supervision.

Courses Taught

Robotics and Manipulation   Microcontrollers and Applications

Robotic Applications	System Identification
Introduction to Artificial Intelligence	Scripting and GUI programming in MATLAB
High Level Programming (C and C++).	Digital Control
Industrial Automation	

November 2008 – July 2010 : *Research Assistant* – DFKI Bremen, Robotics Innovation Center, Bremen, Germany

I worked within the projects: "SpaceClimber" and "Virtual Crater," Work includes:

- modeling and simulation of actuators
- system identification of different subsystems
- controllers design and implementation
- developing and implementing a co-simulation framework to integrate different tools used in robotics system design and simulation.

November 2006 - October 2008 : *Research Assistant* – Robotics Group at Jacobs University, Bremen, Germany

The research of the group focuses on Autonomous Systems from the development of embedded hardware over mechatronics and sensors to high-level software that deals with machine learning and multirobots cooperation to develop robotic systems that are used in various domains, the most important one being safety, security and rescue robots (SSRR).

April (21–25), 2008 : *RoboCup Rescue Agent Simulator Activities Responsible* – RoboCup German Open 2008, Hannover Fair, Hannover, Germany

Work includes:

- Management and organization of the event.
- Set up computers and networks and installing the operating systems and the packages to be used for the competition.
- Scoring and deciding the ranking of the teams.

January 2005 – November 2006 : *Assistant Lecturer* – Computer and Systems Engineering Dept., Faculty of Engineering, Zagazig University

Work included teaching, student project supervision, grading, and lab supervision.

December 2002–Present : *Freelance programmer*

Analyzing, designing, and writing software programs in Visual C++, Visual Basic, and C/C++ languages for remote/local database applications, call centers, and machine–computer interfaces.

December 2000 – December 2002 : *Automation Engineer* –CityPrint *(part-time)*, Cairo, Egypt.

CityPrint is a printing house working in the advertising, printing, and publishing of outdoor and indoor publicity materials

Work includes administration and management of CityPrint's LAN, maintenance of company PC's, design and implementation of software programs for Office and factory automation.

Work also includes maintaining, operating, and designing Arabic enabled software drivers for large scale computer–operated printing machines

July 1998- January 2005 : *Instructor* – Computer and Systems Engineering Dept., Faculty of Engineering, Zagazig University, Egypt.

Work included student exercises and problems solving assisting, student project preparation, grading, and lab supervision.

May 1998 – October 2000 : *Automation Engineer* – Nagar Spare Parts Imports, Abo Kbier, Egypt.

Nagar is a private company working in importing, genuine Japanese car spare parts.

Work includes maintenance of company PC's, design and implementation of software programs for work automation

September 1997 – May 1998 : *Team Leader* – Graduation Project, Zagazig University, Egypt

"Design and implementation of a computer network of automated intelligent meters."

The aim of the project was to build a network for centralized readings, collecting of conventional house–electric utility meters over power mains lines. This has been implemented using appropriate mixed digital/analog circuits, computer interfacing and software to manage the network and to maintain the subscribers database, and finally designing of the billing system.

COURSES TAUGHT

Computer Architecture.	Intel® 8088, 80x86 assembly programming
Computer Communication.	Structural Programming with C-Language
System Programming (C language).	Object Oriented Programming with C++
High Level Programming (C and C++).	Digital Electronic Devices and Circuits
Relational Database, Analysis and Design	Digital Logic Design and Applications
Automatic Control Engineering	Electrical Measurements
Control Theory Analysis and Design	Microprocessor Applications
Computer Control of Machines and Processes	Applied Programming (in Visual Basic & MATLAB)
Process Control	Introduction to Robotics
Discrete and Digital Control System	Mechatronic System Design
Actuators and Drives	Industrial Automation Systems

SPECIAL SKILLS

Skill	Relative grade	Skill	Relative grade
▪ Programming in C, C++	Excellent	▪ macOS, Linux (Ubuntu, Suse)	Good
▪ MATLAB/Simulink Programming	Excellent	▪ Working with measurement technologies (e.g. dSpace)	Very Good
▪ Intel® 80x86 assembly Programming	Excellent	▪ Working within Solidworks	Very Good
▪ Programming in C#, Java, Python	Good	▪ Database design (mySQL, SQLite, Access, ...)	Very Good
▪ Programming in Visual C++	Very Good	▪ Computer Networking	Very Good
▪ VBA/API programming	Very Good	▪ Writing in *LaTeX*	Excellent
▪ Programming in Visual Basic	Excellent	▪ Communication skills	Excellent
▪ MATLAB/Simulink	Excellent	▪ Reading and Research	Excellent
▪ Qt and MATLAB GUI Design	Excellent	▪ Team work	Excellent
▪ Programming and development in Robotic platforms: Robotics Operating System (**ROS**) and Robotics Toolbox (**RTB**)	Very Good		
▪ Windows and MS-Office Suit (Word, Excel, PowerPoint, …)	Excellent		

Familiar with Software, hardware, thinking, mental games, and with excellent skills in communicating and working with others.

LANGUAGES

	Speaking	Writing	Understanding
▪ **Arabic**	Mother tongue	Mother tongue	Mother tongue
▪ **English**	Very Good	Excellent	Excellent
▪ **German**	Good	Good	Very Good
▪ **French**	Fair	Fair	Fair

PROFESSIONAL MEMBERSHIPS

- Institute of Electrical and Electronics Engineers (IEEE) student member since 1998.
- International Society for Terrain-Vehicle Systems (ISTVS) member since 2009
- Member of the Egyptian Engineering Syndicate (Electrical Branch).
- Member of the Union University Science Clubs.
- Member of City of Abo Kbier Cultural Palace.

MEMBERSHIPS AND COMMUNITY ACTIVITIES

- **Member, Management and steering of Examination Activities (Control) Committee,** Student affairs vice dean bureau, Faculty of Engineering, Zagazig University. The committee task is to automate management and steering of the examination activities by developing software programs and designing student and faculty database, and suggesting methods for managing the workflow.

- **Co-Founder, IEEE Zagazig Student Branch,** Faculty of Engineering, Zagazig University. The branch aims at informing the students with the latest innovations in engineering and at helping, them build good practical experience side by side with their academic study.

- **Supervisor, junior students` projects (basic electronics and digital logic) and senior students` graduation projects**, Computer and Systems Engineering Dept., Zagazig University, 1998-present.

- **Mentor of the Zagazig RoboCon Team** for the contest held in the years 2004 and 2005 in Cairo, Egypt, RoboCon is an annual robot contest for university, college and polytechnic students to design a robot under a given set of rules to achieve a specified task. Zagazig team achieved the best idea award in 2004 and the best design award in 2005.

AWARDS RECEIVED

- Award of Excellence, Egyptian Engineering Syndicate, Egypt, 2017. (Excellence in engineering education)
- 1st Place at Robotics Projects, Egyptian Engineering Day 2017. (best graduation project mentor)
- 3rd Place at Engineering Graduation Projects, Egyptian Engineering Day 2017. (best graduation project mentor)
- Best in Class Mobility, as a member of the team Jacobs Robotics, RoboCup German Open 2008.
- 1st Place at the RoboRescue Simulation League (Agent), RoboCup German Open 2008.
- 1st Place, as a member of the team Jacobs Robotics, RoboCup German Open 2007.
- Certificate of Appreciation for individual contributions, Zagazig University 25th anniversary, Egypt, 2002
- Certificate of Appreciation, Electronics and Telecommunications Engineering   Dept., Zagazig University, Egypt, 1999. (Highest GPA in graduate level courses).

- Certificate of Appreciation, Ministry of Education, Egypt, 1990.(ranked 7th Sharkia Governorate-wide in Preparatory School Graduates)
- Certificate of Appreciation, Dean's Honors Roll, Faculty of Engineering, Zagazig University, Egypt,1998. (ranked first of graduating class).
- Award of Excellence for best Graduation Project, Union of Student Science Clubs, Zagazig University, Egypt,1998.

PUBLICATIONS *(recent)*

- Ahmed M (2014), *"Robot Walking Pattern and Actuators Control for Power Optimization"*, In Proceedings of the 14th International Conference on New Actuators (ACTUATOR-18); International Conference and Exhibition on New Actuators and Drive Systems. Bremen, Germany, June 25--27, 2018. MESSE BREMEN, WFB Wirtschaftsförderung Bremen, Germany.
- Ahmed M, Ebrahim MA, Ramadand HS and Becherif M (2015), *"Optimal genetic-sliding mode control of VSC-HVDC transmission systems"*, Energy Procedia., April 17-20, 2015. Vol. 69.
- Ahmed M (2014), *"Car of the Future: Innovative Technologies in Electromobility for development, design, and construction of smart cars"*, Talk presented at HANNOVER MESSE 2014, Forum Robotics, Automation & Vision. April 10, 2014.
- Ahmed M and Babu A (2014), *"Autonomous Steering Controller for Path Following"*, In Proceedings of the RIC Project Day Workgroups "Framework & Standardization" and "Manipulation & Control". RIC Project Day, June 19, Bremen, Germany., 6, 2014. Vol. 14-05, pp. 118-119. Selbstverlag.
- Ahmed M, Benitez LV and Kirchner F (2010), *"Accurate Identification and Simulation of Brushless DC Drive Actuating System for High Performance Applications"*, In The 4th Int'l Industrial Control & Automation Technology Exhibition and Conference. Automation Technology Egypt 2010 (Automation -2010), May 10-12, Cairo, Egypt. Automation 2010.
- Ahmed M, Eich M and Bernhard F (2014), *"Design and Control of MIRA: a Lightweight Climbing Robot for Ship Inspection"*, In World Symposium on Mechatronics Engineering & Applied Physics (WSMEAP2014). International Conference on Mechatronics Engineering (ICME-2014). Sousse, Tunisia, 18—20, June 2014, Vol. 55, pp. 128-135. http://www.scipress.com/ILCPA.55.128.
- Ahmed M and Kirchner F (2014), *"Design and Implementation of a Long Range Visual Terrain Classifier for Legged Robots"*, In World Symposium on Computer Applications & Research WSCAR' 2014, International Conference on Signal Processing and Remote Sensing (ICSPRS2014). Sousse, Tunisia, 18-20 January, 2014. , pp. 117-122. IEEE.
- Ahmed M and Kirchner F (2009), *"A Simulation Environment to Be Utilised in the Design and Test Process of the HEVs and EVs BLDC Drive and Its Control"*, In 11th European Regional Conference of the International Society of Terrain-Vehicle Systems (ISTVS-09). Bremen, Germany, October 2009. ISTVS'09.
- Ahmed M, Oekermann C and Kirchner F (2014), *"Cosimulation Environment for Mechanical Design Optimization with Evolutionary Algorithms"*, In World Symposium on Computer Applications & Research WSCAR' 2014, International Conference on Artificial Intelligence (ICAI' 2014). Sousse, Tunisia, 18-20 January, 2014. , pp. 21-26. IEEE.
- Ahmed M, Quack L, Langosz M and Yoo Y-H (2011), *"Development of a Real and Simulation Testbed for Legged Robot Soil Interaction"*, In International Conference of the International Society for Terrain-Vehicle Systems, (ISTVS-11). Blacksburg, Virginia, USA, 18-22.9, 2011. , pp. 110-116. ISTVS2011.
- Ahmed M, Sonsalla R and Kirchner F (2014), *"Autonomous Path Tracking Steering Controller for Extraterrestrial Terrain Exploration Rover"*, In 40th COSPAR Scientific Assembly. Moscow, Russian Federation, August 2--10, 2014. cosmos.

- Ahmed M and Yüksel M (2013), *"Autonomous Path Tracking Steering Controller for EO Smart Connecting Car"*, In Proceeding of the World Congress on Multimedia and Computer Science 2013. International Conference on Intelligent Automation and Robotics (ICIAR-13). Hammamet, Tunisia, October, 2013. , pp. 45-50. IEEE.
- Ahmed M and Yoo Y-H (2010), *"Measurement and Control of the Contact Forces between Walking Robot legs and its Environment"*, In Proceedings of the Joint 9th Asia-Pacific ISTVS Conference and Annual Meeting of Japanese Society for Terramechanics. Sapporo, Japan, 27--30.09., 2010. ISTVS2010.
- Ahmed M, Yoo Y-H and Kirchner F (2010), *"A Co-simulation Framework for Design, Test and Parameter Optimization of Robotic Systems"*, In ISR / ROBOTIK 2010. The joint conference of the 41st International Symposium on Robotics and the 6th German Conference on Robotics (ISR/ROBOTIK-2010), June 7-9, Munich, Germany. ISR/ROBOTIK2010.
- Birnschein T, Kirchner F, Ahmed M, Yueksel M, Yoo Y-H, Oekermann C, Girault B, Kroffke S and Gruenwald D (2014), *"Enhancing Mobility using Innovative Technologies and Highly Flexible Autonomous Vehicles"*, In 18th International Forum on Advanced Microsystems for Automotive Applications (AMAA 2014): Smart Systems for Safe, Clean, and Automated Vehicles. Berlin, Germany, 23-24, June 2014.
- Langosz M, Ahmed M, Quack L and Yoo Y-H (2011), *"Modeling of Leg Soil Interaction using Genetic Algorithms"*, In International Conference of the International Society for Terrain-Vehicle Systems, (ISTVS-11)., 18-22.9, 2011. , pp. 110-116. ISTVS2011.
- Sonsalla R, Ahmed M, Fritsche M, Akpo JB and Vögele T (2014), *"Scout Rover Applications for Forward Acqusition of Soil and Terrain Data"*, In Proceedings of European Planetary Science Congress (EPSC-2014). Cascais, Portugal, Portugal, Sep 7--9, 2014. Vol. 9 EPSC.
- Yüksel M, Oekermann C, Girault B and Ahmed M (2014), *"Using Industrial Actuators for Rapid Development of Electric Car Applications"*, In Proceedings of the 14th International Conference on New Actuators (ACTUATOR-14); 8th International Exhibition on Smart Actuators and Drive Systems. Bremen, Germany, July 23--25, 2014. MESSE BREMEN, WFB Wirtschaftsförderung Bremen, Germany.
- Yüksel M, Ahmed M, Girault B, Birnschein T and Kirchner F (2014), *"A Framework for Design, Test, and Validation of Electric Car Modules"*, In Advanced Microsystems for Automotive Applications 2014, pp. 245-254. Springer International Publishing.
- Yoo Y-H, Ahmed M, Bartsch S and Kirchner F (2010), *"Realistic Simulation of Extraterrestrial Legged Robot in Trade-off between Accuracy and Simulation Time"*, In Proceeding of the 35th Annual Conference of the IEEE Industrial Electronics Society (IECON-2010). Glendale, AZ, USA, November 2010.
- Yoo Y-H, Ahmed M, Roemmermann M and Kirchner F (2009), *"A simulation-based design of extraterrestrial six-legged robot system"*, In 2009 35th Annual Conference of IEEE Industrial Electronics. Porto, Portugal, pp. 2181-2186. IEEE.