

Abdullah M. Al-Refai, Ph.D.

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Summary:

Abdullah M. Al-Refai, Ph.D., is an Assistant Professor of Software Engineering at Princess Sumaya University for Technology (PSUT), Jordan, with over 12 years of combined academic, industrial, and research experience. Prior to joining academia, he worked as a Senior Controls Software Engineer at Fiat Chrysler Automobiles (now Stellantis), where he developed embedded control algorithms and on-board diagnostic software for automotive powertrain systems.

He earned his Ph.D. and M.S. in Computer Engineering from Oakland University, USA, and his B.Sc. in Computer Engineering from Yarmouk University, Jordan. His research focuses on artificial intelligence, machine learning, bioinformatics, software engineering, embedded systems, robotics, and lithium-ion battery modeling and charging optimization.

Dr. Al-Refai has authored numerous peer-reviewed journal and conference publications, participated in funded research projects, and actively collaborates on research in artificial intelligence, bioinformatics, and batteries.

Education

- **Oakland University**, Rochester Hills, MI, USA Jan, 2012 – April, 2018
Ph.D. in **Computer Engineering**
Dissertation: "Development of a Temperature and I-V Performance Model for Lithium-Ion Polymer Batteries"
- **Oakland University**, Rochester Hills, MI, USA Jan, 2010 – Dec, 2011
Master in **Computer Engineering**
- **Yarmouk University**, Irbid, Jordan Sep, 2005 – Dec, 2009
B.Sc. in **Computer Engineering**

Strengths:

- **Programming:** Matlab, Assembly, C/C++, Visual Basic, Java (Servlet, Apache Tomcat), C# (Windows Mobile 6 Professional), MySQL.

- **Microprocessors / Microcontrollers: Freescale:** HCS11 and HCS12, Microchip: dsPIC30F family, Cypress: PSoc, Microchip: dsPIC30F, and Intel: 8085, and 8086.
- **Communication Protocols:** SPI, SCI, I2C, TCP/IP, Zigbee, CAN, LIN and USB.
- **Software Tools:** Matlab Simulink, Matlab Targetlink, Matlab State flow, PSpice, Code Write, Freescale CodeWarrior, Cypress PSoC Programmer, Provotech., ETAS INCA, and ETAS EHOOKS.
- **Data Acquisition:** NI USB-6008 DAQ systems, I-Box.
- Strong logical and analytical skills.
- Outstanding written and verbal skills.
- Ability to work in a group environment.
- Understanding of essential automotive terms.
- Ability to work in a fast-paced environment.
- Strong background in mathematics and physics.

Academic and Industrial Experience:

Princess Sumaya University for Technology (PSUT), Amman, Jordan
Assistant Professor of Software Engineering

10/2020– present

Highlights:

- Joined Princess Sumaya University for Technology (PSUT) in October 2020 as an Assistant Professor of Software Engineering at the King Hussein School of Computing Sciences, contributing to teaching, research, and academic development.
- Teaching: Taught various Software Engineering classes such as Introduction to Software Engineering, System Analysis and Design, Introduction to Computer Science, and Structured Programming Lab.
- Research: Artificial Intelligence, Bioinformatics, Robotics, and Lithium-Ion Batteries Models.

Al-Ahliyya Amman University, Amman, Jordan
Assistant Professor of Computer Engineering

08/2019 – 08/2020

Highlights:

- Joined AAU as an Assistant Professor of Computer Engineering at the School of Engineering in August, 2019.
- Led the department's ABET accreditation committee, which planned to receive ABET accreditation for the Computer Engineering Program.
- Teaching: Taught various Computer Engineering classes such as Algorithms, Selected Topics in Computer Engineering (Arduino), Computer Skills (C++), Computer Organization and Design, and Technical Writing courses.
- Research: Artificial Intelligence, Robotics, and Lithium-Ion Batteries Models.

Fiat Chrysler Automobiles, Auburn Hills, MI
Senior Controls Software Engineer
On-Board Diagnostics Development Team

08/2016 – 08/2019

Highlights:

- He is working as a Senior Controls Software Engineer for the Powertrain Department as part of the On-Board diagnostics development team.
- His job responsibilities are analysing, designing, controlling, developing algorithms, and implementing software to meet high level/functional requirements within program timelines. He is also responsible for defining on-board diagnostics test procedures for all OBD fault codes of current/next-generation powertrains of FCA vehicles that must be verified per the California Air Resources Board OBD Regulations.
- Control algorithm development is done using Matlab-Simulink and rapid prototyping tools.
- Product software development tools that were used to design and implement a new OBD diagnostic:
 - Matlab-Simulink, Matlab-TargetLink, Data Dictionary, and Code Write.
- Programming languages were used to implement new features: C and C++.
- These tools are used to develop algorithms and follow its development through implementing production software, such as the development of all supporting documentation (including DFMEA, testing and validation reports) and calibration guides.
- This work is performed in the vehicle, dynamometer and/or simulator environments (Hardware in the Loop).
- He is the feature team leader for the following diagnostics:
 - Intelligent Battery Sensor Battery Temperature Rationality
 - Intelligent Battery Sensor Communications Diagnostics
 - Intelligent Battery Sensor State of Charge Rationality
 - Intelligent Battery Sensor Voltage and Current Diagnosis

Fiat Chrysler Automobiles, Auburn Hills, MI

04/2014 – 08/2016

Production Development Engineer

Sensor and Actuator Feature Team

Highlights:

- Responsible for analysing, designing, developing, and maintaining software of the sensors and actuators systems.
- Product development tools that were used to implement a new feature are:
 - Matlab-TargetLink, Data Dictionary, and Code Write.
- Programming languages were used to implement new feature: C and C++.
- Product diagnostic tools that were used to test new features are:
 - HIL, INCA, and NGC Tools.

Chrysler Lab at Oakland University, Rochester Hills MI

10/2012 –04/2014

Research Assistant

Fuel Economy Correlation Project

Highlights:

- Using Chrysler's HIL at Oakland University in a Fuel economy correlation project.
- Simulating FTP drive cycle (City cycle and highway) using HIL-Provetech software.
- Collecting experimental data from a vehicle.
- Analysing Simulation data for correlation with experimental vehicle data.

Highlights:

- Lab instructor of a course on Design and Analysis of Electromechanical Systems: Supervising the lab sessions, helping students with their projects, and participating in grading and evaluating the students.
- This course focused on designing, analysing, and testing electromechanical systems; statics, linear and rotational dynamics; introduction to microprocessors; team design project dealing with technical, economic, safety, environmental, and social aspects of a real-world engineering problem; written, oral, and visual communication, engineering ethics.

Study: Development of a Temperature and I-V Performance Model for Lithium-Ion Polymer Batteries Research

Highlights:

- The purpose of this study is to develop a combined battery model that incorporates cell voltage and temperature for more accurate/efficient charging of Li-Ion Polymer batteries.
- A dynamic programmable charger was designed to implement and evaluate different charging algorithms.
- The Constant Current-Constant Voltage, Multistage Constant Current, and Constant Current Pulse charging methods of Lithium-Ion Polymer batteries were implemented by using this charger for experimental studies and analysis.
- These three traditional charging methods were experimentally evaluated and compared.
- The Chen and Mora's model and Al Hallaj's model were implemented and experimentally evaluated for three different traditional charging models. In this work, these models were used in order to provide the temperature estimation of Lithium-Ion Polymer batteries during the battery charging cycle.
- This work developed a combined battery model of Lithium-Ion Polymer batteries that included most of the significant battery parameters such as
 - Cell Voltage
 - Cell Temperature
 - Charging Current
 - SOC
 - Battery impedance
- The combined model was implemented and experimentally evaluated for three different traditional charging models.
- This combined model is necessary to design more accurate and efficient charging techniques of Lithium-Ion Polymer batteries.
- This work is one of the first to study and provide a model for battery cell voltage and temperature based on using only charging current as input.

Continental Automotive Company, Auburn Hills MI
Electrical Engineering Internship

07/2011 – 01/2012

Highlights:

- Performing EMC tests and maintaining records of all the compliance testing
- Timely, accurate, and precise reporting of the data to the design teams.
- Communicating and interfacing with other associates and EMC experts while sharing information and experiences.
- Using CANoe and Engine simulator to perform EMC tests.
- Managing to upload project documents by using SharePoint.

Oakland University, Rochester Hills MI
Research Assistant
GPS Receiver and Antenna Testing Project

07/2012 –09/2012

Highlights:

- Testing different antenna types that were connected to various locations in a car. These antennas were connected to GPS receivers.
- Collecting experimental data from Mini-Van and Sedan cars.
- Recording the GPS data using the U-Center software.

Oakland University, Rochester Hills MI
Research Assistant
Ultra low RPM motor

01/2011 –07/2011

Highlights:

- Developing an ultra-low RPM motor using NiTiNol actuators to be used for cell culture cultivation in medical research labs. In order to generate rotation, the shrinking feature of NiTiNol wire was used.
- Attaching five of NiTiNol wires with the angle of 72° on a bearing on disc.
- Calculating the accurate timing and pulling force for each wire.
- Designing the PID control algorithm and implementing the code to rotate the motor in a uniform rotational speed.
- Controlling the system by using a Matlab-Simulink, NI DAQ, and Freescale HCS12 16 bit microcontroller.

Oakland University, Rochester Hills MI
Research Assistant
Feedback Control of a Rotary Driven Inverted Pendulum

03/2011 - 04/ 2011

Highlights:

- The objective of this project was to show that rotary encoders can be used as feedback sensors in a microcomputer-based control system to effectively balance the Pendulum in an upright position.
- Modeling and simulation with visualization of pendulum arms running in Simulink were used to design and test state space control before demonstrating it on a physical setup.
- Controlling balance in anti-sway position.

Oakland University, Rochester Hills MI

03/2011 - 04/ 2011

Research Assistant

Graceful Degradation in Faulty System using checkpoints

Highlights:

- The goal of this project was to demonstrate how a graceful degradation of multiple microcontrollers can be achieved.
- This project had four HCS12 microcontrollers that were connected on CAN bus network. The first microcontroller's duty was to perform critical tasks while the second microcontroller's job was non-critical. The third microcontroller's job was to store received check points, whereas the fourth microcontroller was connected to RC car lids.
- This project established how a graceful degradation can be achieved by stopping the non-critical task and running the critical task when a fault happens to the critical task executing microcontroller.
- Checkpointing allows resuming (not starting from scratch) the execution of the critical task by rolling back to a known valid state.

Petra Solar Company Lab at University of Central Florida, Orlando FL

06/2009 - 12/2009

Programming Engineer Internship

Sun Wave System Installation Tool Developed software

Highlights:

- Sun Wave System Installation tool was developed for handheld application that collects information about Sun wave System Installations, such as GPS information, pole ID, installation date and operator.
- The collected data can be synchronized, either online or offline to a Central Database Server.
- This data server is an essential resource for technical and management usage.

Yarmouk University, Irbid, Jordan

02/2009 -

05/2009

Undergrad Final Project

Estimation of Damaged Isolation Using Image

Highlights:

- Estimation of Damaged Isolation Using Image Processing was the final graduation project.
- The objective of this project was to determine the amount of damage that happened to the fiber optic insulators by using image processing field.

Invited Talks:

- Emerging Tech and How the 4th Industrial Revolution Will Impact the Future of Work, JobStack_, Princess Sumaya University of Technology, Amman, Jordan, 2022. LinkedIn Post.

Volunteering & Community Engagement:

- **Advisor and Club Leader:** Served as advisor and responsible for the Student Software Engineering Club, overseeing its activities and initiatives.
- **Organizer of Academic Events:** Coordinated seminars and scientific meetings between industry companies and the university to foster collaboration and knowledge exchange.
- **Committee Leadership and Membership:** Acted as chair or member of several administrative and scientific committees within the Software Engineering Department, including:
 - Scientific Committee
 - Quality Assurance & Accreditation Committee
 - Graduation Projects & Field Training Committee
 - Competitions & Activities Committee
 - Website Committee
 - University Proficiency Exam Committee
 - Social Activities Committee
 - Libraries Committee

Grants:

- (CO-PI) Ministry of Higher Education, Scientific Research and Innovation Support Fund (SRISF), 51,325 JD (~72350 USD) for 2 years, 2022. Project Title: “Embedding-based deep learning models for heterogeneous multisource health data fusion”.

Publications:

Journal Paper

- **Al-Refai, A.**, Altamimi, A., Elnaggar, A & Alkhateeb, A. (2026). Machine learning for time-series genomics: Advances, challenges, and future directions. International Journal of Data and Network Science, 10(3), 1049-1060.
- Alsoud, A., Ali, M., **Al-Refai, A.**, Petronijevic, I., Maletic, S., Mohammed, Y., Eliášová, P., Mousa, M., Knápek, A., Maršálek, R., & Sobola, D. (2026). Enhanced Na⁺ Transport and Dielectric Performance of PVDF/Zelite Composites for Solid-State Sodium Battery Electrolytes. Journal of Alloys and Compounds, 1067, 188219.
- **Al-Refai, A.**, Al-Hammouri, M. F., Vamsi, B., & Al Bataineh, A. (2026). RNAFoldDiff-Based Sequence-Aware Graph Diffusion for Accurate RNA 3D Structure Prediction. Algorithms, 19(5), 381
- Al Bataineh, A., Vamsi, B., & **Al-Refai, A.** (2025). Predicting Diabetic Distress and Emotional Burden in Type-2 Diabetes Using Explainable AI. IEEE Access, Volume 13, 109484
- Al-refai, G., Elmoaqt, H., **Al-Refai, A.**, Alzu'bi, A., Al-Hadhrani, T., Alkhateeb, A. (2025). Two-stage object detection in low-light environments using deep learning image enhancement. PeerJ Computer Science, Volume 11, e2799

- Alghanim, F., Al-Hurani, I., Qattous, H., **Al-Refai, A.**, Batiha, O., Alkhateeb, A., & Ikki, S. (2024). Machine Learning Model for Multiomics Biomarkers Identification for Menopause Status in Breast Cancer. *Algorithms*, Volume 17, 13
- Ammar, A., Abran, A., Qasaimeh, M., Ahmad, A., & **Al-Refai, A.** (2023). Analysis of the Scale Types and Measurement Units in Enterprise Architecture (EA) Measurement. *Interdisciplinary Journal of Information, Knowledge, and Management*, Volume 18, 321–352
- **Al-Refai, A.**, Alkhateeb, A., & Dalala, Z. M. (2022). Enhancing the LCO 18,650 Battery Charging/Discharging Using Temperature and Electrical Based Model. *Batteries*, 8(11), 199.
- Mohammad Alhaj, Mohammad Hassan and **Abdullah Al-Refai**, “A New Approach for Multi-Level Evaluation of Strategic Educational Goals” *International Journal of Advanced Computer Science and Applications(IJACSA)*, 11(3), 2020
- **Abdullah Al-Refai**, Rami Abou-Sleiman, and Osamah A. Rawashdeh, “An Experimental Survey of Li-Ion Battery Charging Methods”, *SAE International Journal of Alternative Powertrains*, August 21, 2015

Conference Paper

- Alshomali, L., Khorma, R., **Al-Refai, A.**, & Alkhateeb, A. (2023, December). Establishing a correlation of clinical characteristics with the level of tumor mutation burden in urothelial bladder carcinoma. In 2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM) (pp. 3998-4001). IEEE.
- Asad, M., **Al-Refai, A.**, Shattal, S. A., & Alkhateeb, A. (2023, December). The Epidemiology and Trends of Cancer in Jordan, 2012–2018. In 2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM) (pp. 4865-4867). IEEE.
- Alkhateeb, A., ElKarami, B., Qattous, H., **Al-Refai, A.**, AlAfeshat, N., Shahrrava, B., & Azzeh, M. (2022, December). Multi-omics data integration model based on isomap and convolutional neural network. In 2022 21st IEEE international conference on machine learning and applications (ICMLA) (pp. 1381-1385). IEEE.
- Saif, A., Al-Kilani, H., Qasaimeh, M., & **Al-Refai, A.** (2021, April). Analysis of Android applications permissions. In *International Conference on Data Science, E-learning and Information Systems 2021* (pp. 243-249).
- Abousleiman, R., **Al-Refai, A.**, & Rawashdeh, O. (2013). Charge capacity versus charge time in CC-CV and pulse charging of Li-ion batteries. *SAE Technical Paper 2013-01-1546*.
- **Al-Refai, A.**, AbouSleiman, R., & Rawashdeh, O. A. (2012, July). A programmable charger for monitoring and control of multi-cell lithium-ion batteries. In 2012 IEEE National Aerospace and Electronics Conference (NAECON) (pp. 68-74). IEEE.

Book Chapter

- Mohammad Asad, **Abdullah Al-Refai**, Saqr Abushattal, Abedalrhman Alkhateeb, "Navigating Cancer Epidemiology: The Power of Digitalization and Visualization in Jordan, 2012–2018," in *Convergence of Digitalization, Innovation, and Sustainable Development in Business*, 1st ed. Hershey, PA, USA: IGI Global, 2024

Conference Poster

- **A. Refai**, M. Rawashdeh, O. Rawashdeh, J. Woolsey, A. Qatu, "Development of a Radial Nitinol Motor" 2011 ASEE North-Central & Illinois-Indiana Section Conference, Central Michigan University Mt. Pleasant, MI, USA, April 12, 2011.

Awards:

- The Provost's Graduate Student Research Award, Oakland University, 2011.
- A medal for academic excellence in the undergraduate studies from Yarmouk University, 2005.

Additional Information:

- Software Engineering Club Advisor, PSUT, Amman, 2026.
- Green skills for a green economy - An introduction to environmental sustainability Training, Deloitte, Amman, 2024.
- President of the Aerial Systems Club at Oakland University, where his team designed and developed a Quadrotor Unmanned Aerial Vehicle (UAV), which successfully competed at the CARD Collegiate Aerial Robotics Demonstration Competition, St. Louis, MO April, 2011. He was placed the 2nd and won the "Aerial Vehicle Innovative Design Award".
- MCSA Internationally certified.