**Prof. Zouhair Al-qudah**
**Computer Eng. Department**
**Al-Hussein Bin Talal University (AHU)**
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## Education

**PhD** Electrical Engineering, Southern Methodist University, **Texas, U.S.A.** May 2013
**GPA**: 3.89/4.0
**PhD Dissertation:** *Dirty Paper Coding and Interference Cancellation for Wireless Communications*.

**M.Sc.** Electrical Engineering, Kalmar University College, **Sweden.** Dec. 2006
**GPA**: 4.5/5.0
**Master Thesis:** *Performance of Multilevel Coded Modulation over AWGN and Multipath Fading Channels.*

**B.Sc.** Communication Engineering, Yarmouk University, Irbid, **Jordan**. Sep. 2002

## Employment History

| | |
|---|---|
| **Dec. 2021-Now** | **Professor**, **AHU**, Jordan. |
| Sep. 2017-Dec. 2021 | **Associate Professor**, **AHU**, Jordan. |
| **Sep. 2016-Sep.2017** | **Chairperson,** Electrical and Communication Engineering Dept., **AHU**. |
| Sep. 2013-Sep. 2017 | **Assistant Professor**, AHU, Jordan. |
| **Jan. 2010-Dec.2012** | **Teaching Assistant,** Southern Methodist University, Dallas, USA. |
| May.2012-Sep.2012 | **Internship** at Research In Motion (RIM), USA. |
| **Sep. 2007-Aug.2009** | **Full-Time Lecturer,** Yanbu College of Technology, Yanbu, Saudi Arabia |
| Mar.2007-Sep.2007 | **Full-Time Lecturer,** Al-Quds University College, Amman, Jordan. |
| **Sep.2002-Aug.2004** | **System and Maintenance Engineer**, Communication Directorate-Public Security, Amman, Jordan |
| Sep. 2001-Jan. 2002 | **Trainee Engineer,** Orange Company for Mobile Services, Amman, Jordan. |
| **Jun. 2001-Sep. 2001** | **Trainee Engineer,** Egyptian Company for Telephone Manufacturing, Cairo, Egypt. |

## Activities and Committees at AHU

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|---|---|
| Sep. 2019-Aug. 2020 | **Member**, AHU University Council. |
| Sep. 2015-Aug. 2018 & & Sep. 2021-Sep 2025. | **Member**, Faculty of Engineering Council. |
| 2018-Now | **Member**, Promotion Committee |
| Sep. 2021-Sep.2022 & Sep. 2025-Sep. 2026 | Scentific Committe, Faculty of Engineering. |
| Sep. 2015-Sep. 2016 | **Member,** Graduate Committee @ Computer Eng. Dept. |
| 2014-2017 | **Member**, selecting new Faculty Members |
| Sep. 2016-Sep.2017 | **Member**, AHU Courses Schedule |

## Current H index and Citations

- My current **ResearchGate** score is 134.3 and profile at : https://www.researchgate.net/profile/Zouhair_Al-Qudah
- My Scopus profile: https://www.scopus.com/authid/detail.uri?authorId=24823810200
- **Google Scholar** Account: https://scholar.google.com/citations?user=435RhOYAAAAJ&hl=en

My current research h-index is **10** and i10-index is **9** and my current total number of citations is **342,**

## Research Interests

| | |
|---|---|
| Network Information Theory | 4G/5G Wireless Communication networks |
| Error Control Coding | Cognitive Radio |
| Applied Mathematics and Optimizations | Signal Processing for Communications |

## Master's Theses Supervised:

- Dima Turki, "Transmission Startegies over a Brodcast Channel Aided by a Relay", Yarmouk University, Irbid-Jordan, Dec. 2019.
- M. Alrwashdeh " Capacity of Cascade Relay Channel with orthogonal components ", Yarmouk University, Irbid-Jordan, Jan. 2015.
- L. Al-Hawari, " Capacity of Parallel Relay Channel with orthogonal components ", Yarmouk University, Irbid-Jordan, Jan. 2015.

## Master's Theses Examined:

More than 10 master theses were examined at different universities in Jordan.

**Examples of Examined Master Theses:**

- "Jamming Aware Resource Allocation Framework for Improving Performance in NOMA Cognitive Radio-Based Networks", **Yarmouk University**, May, **2024**.
- "A Jamming-aware QoS-constrained Routing Algorithm for IOT Cognitive Radio Network with Parallel-transmission Capability", **Yarmouk University**, May. **2022**
- "Maximizing the Lifetime of Wireless Devices in Millimeter Wave Networks Using Multiple UAVs", **Yarmouk University**, Apr. **2021**.
- "Fuzzy Logic Approaches for Enhancing Energy Consumption in Wireless Sensor Networks", **The University of Jordan**, Apr. **2019**.

## Teaching Experience.

During my teaching career, I have taught the following courses at the undergraduate and graduate levels

**Graduate Courses**

- **Introduction to Stochastic Process**
- Modeling of Renewable Energy Systems
- **Linear Optimizations.**
- Wireless Networks.

**Undergraduate Courses**

- **Mobile Communications.**
- Satellite Communications.
- **Digital Signal Processing**
- Digital Communications.
- **Analog Communications.**
- Probability and Random Process.
- **Signals and Systems.**
- **Computer Networks.**
- Wireless Networks.
- **Digital Logic**
- Automatic Control Theory
- **Measurements and Instruments.**
- Electronics I
- **Electrical Circuits II**
- Electrical Circuits I

**Graduate Projects:** (More than 60 students have been successfully supervised.)

Examples of graduate projects are**:**

- **IOT based Intelligent Gas Leakage Detector Using Arduino.**
- Smart Sensing for a safer Tomorrow.
- **Rotating Solar Inverter Project using Microcontroller**
- Power Factor Improvement Using Capacitor Bank.
- **5G: Principles and Applications.**
- Performance of Adaptive modulations over 4G Wireless Communications.

## Honors and Awards

- A scholarship to peruse Ph.D. degrees at SMU, USA, 2009-2013.
- A Scholarship to peruse Master degree from Kalmar University, Aug. 2005-Nov.2006, Sweden .
- Jordan-Army Scholarship with full tuition waiver for the undergraduate studies Sep. 1997-Aug. 2002.

## Professional Reviewing Services:

- **Reviewer** for IEEE Journal on Selected Areas in Information Theory
- **Reviewer** for IEEE Wireless Communication Magazine
- **Reviewer** for IET Communications
- **Reviewer** for International Journal of Communication Systems
- **Reviewer** for Transactions on Emerging Telecommunications Technologies
- **Reviewer** for Advances in Electrical and Electronic Engineering
- **Reviewer** for IEEE Transactions on Communication Systems
- **Reviewer** for Physical Communications
- **Reviewer** for Electronic Letters

## Publications:

### Journal Articles

*J37* ***(Q1)*** M. A. Bataineh, D. Turki**,** and **Z. Al-Qudah**, " Two-Relay Decode-and-Forward for the Degraded Broadcast Channel: Achievable Rate Region with Orthogonal Channel Components", **IEEE Open Journal of the Communications Society**, Vol. 7, 2026.

*J36* ***(Q1)*** M. Z. Ahmed, M. A. Bataineh and **Z. Al-Qudah**, "A Clearance-Ratio Framework for Predicting Nonlinearity in MEMS Capacitive Pressure Sensors,", **IEEE Access**, Vol. 14, 2026.

*J35* ***(Q1)*** Mohd H.S. Alrashdan **, Z. Al-qudah,** M. Al Bataineh**, "**Enhancing impedance control in microstrip lines using the Taguchi approach **". Journal of King Saud University – Engineering Sciences,** Vol. 37, 2025.

*J34* ***(Q1)*** Mohd H.S. Alrashdan , ***Z. Al-qudah****, M. Al Bataineh, "*Microstrip patch antenna directivity optimization via Taguchi method*".* **Ain Shams Engineering Journal**, *Vol. 15, Iss. 9,****2024***.

*J33* ***(Q1)*** M. Al Bataineh, D. Abu Abdoun, H. Alnuaimi, Z.Al-qudah, Z. Albataineh, and M.Ahmad, "Head Impact Detection Using Machine Learning Algorithms", ***IEEE Access,*** **2024,** 12, pp. 4938–4947.

*J32* ***(Q1)*** M. Al Bataineh, **Z. Al-qudah**, A. Abdrabou, and A. Sandokah, "Geometric Probability Analysis of Meeting Probability and Intersection Duration for Triple Event Concurrency". **Mathematics**, Vol. 11, Iss. 12, **2023**.

*J31* ***(Q1)*** **Z. Al-qudah,** W. Abu Shehab, K. Darabkh, A. Musa, "The road to achieve the capacity of the three-way degraded broadcast channel", **Journal of the Franklin Institue,** Vol. 360, Iss.10, Jul. 2023.

*J30* ***(Q2)*** Mohd H.S. Alrashdan, M.Alnaanah, **Z. Al-qudah,** Amir Abu-Al-Aish, "T-Shape MEMS PMPG design at low frequency range using Taguchi Method", Microsystem Technologies, Vol. 29, Mar. 2023.

*J29* ***(Q1)*** K. Darabkh , J. Zomot , **Z. Al-qudah,** A. Khalifeh, "Impairments-Aware Time Slot Allocation Model for Energy-constrained Multi-Hop Clustered IoT Nodes Considering TDMA and DSSS MAC Protocols", **Journal of Industrial Information Integration,** ***Elseiver***, Vol. 25, Jan. 2022.

*J28* ***(Q2)*** **Z. Al-qudah,** Mohd H.S. Alrashdan, and Khalid A. Darabkh "On the Capacity Region of the Multiple Access Half-Duplex Relay Channel", **Int'l J. of Communication Systems** (IJCS), Vol.34, Iss.17, Nov.2021.

*J27* ***(Q1)*** **Z. Al-qudah,** A. Ababneh, "Broadcast Diamond Channel: Transmission Strategies and Bounds", **Journal of the Franklin Institue,** Vol.358, Iss.3, Feb. 2021.

*J26* ***(Q2)*** **Z. Al-qudah,** M. Al Bataineh and A. Musa, "A Novel Multiple Access Diamond Channel Model", **Int'l J. of Communication Systems** (IJCS), Vol.33, Iss.17, Oct. 2020.

*J25* ***(Q2)*** **Z. Al-qudah,** K. Darabkh "Achievable Rates of Gaussian Cognitive Interference Channel with Common Interference", **IET Communications,** Vol.14, Iss.16, Oct. 2020.

*J24* ***(Q2)*** **Z. Al-qudah,** A. Alqudah**,** K. Darabkh "Transmission over Gaussian MIMO half-duplex relay channel ", **Physical Communication,** Vol.40, Jun. 2020.

*J23* ***(Q2)*** K. Darabkh , J. Zomot , **Z. Al-qudah,** "EDB-CHS-BOF: Energy and Distance Based Cluster Head Selection with Balanced Objective Function Protocol", **IET Communications,** Vol.13, Iss.19, Nov. 2019.

*J22* ***(Q2)*** **Z. Al-qudah** and A. Musa," On the Capacity of the State-dependent Interference Relay Channel", **Int'l J of Communication Systems** (IJCS), Vol.32, Iss.14, Sep. 2019.

*J21* ***(Q2)*** W. Al-sawalmeh, **Z. Al-qudah,** and K. Darabkh, **"**Multiple Access Relay Channel: Achievable Rates over Orthogonal Channels", **Int'l J. of Electronics and Communications (AEU)**, *Elseiver*, **Vol.109,** Sep. 2019.

*J20* ***(Q1)*** K. Darabkh, S. Odetallah, **Z. Al-qudah**, A. Khalifeh, and M.Shurman, "Energy-Aware and Density-Based Clustering and Relaying Protocol (EA-DB-CRP) for gathering data in wireless sensor networks", **Applied Soft Computing Journal**, **Vol.80**, Jul. 2019.

*J19* ***(Q1)*** **Z. Al-qudah** and D. Rajan**,"** An Achievable Region for the Cognitive Interference Relay Channel**", IEEE Transactions on Cognitive Communications and Networking,** Vol.4, Iss.4, Dec. 2018.

*J18* ***(Q2)*** M. Al-Jaafreh and **Z. Al-qudah, "** Transmission Rates over State-Dependent Diamond Channel**", IET Communications,** Vol.12, Iss.4, Mar. 2018.

*J17* ***(Q2)*** **Z. Al-qudah**, L. Al-Hawary, M. Alrwashdeh, and M.Al Bataineh," Parallel Relay Network with Orthogonal Components: Capacity and Power Allocation", **Wireless Personal Communications (Springer)**, Vol.96, Iss.3, Oct. 2017.

*J16* ***(Q2)*** **Z. Al-qudah**, and M. Al Bataineh, "Allocation of Resources for the Gaussian Multiple Access Channel with Practical Partial Cooperation", **Int'l J. of Electronics and Communications (AEU),** Elseiver**,** Vol.74, Apr. 2017.

*J15* ***(Q2)*** M. Al Bataineh and **Z. Al-qudah**, "A Novel Gene Identification Algorithm with Bayesian Classification", **Biomedical Signal Processing and Control, *Elseiver,*** Vol.31, Jan. 2017.

J14 ***(Q2)*** **Z. Al-qudah,"** Achievable Rates of a State-Dependent Relay Channel with Orthogonal Components", **IET Communications,** Vol.10, Iss.16, Nov. 2016.

J13 ***(Q2)*** M. Al Bataineh, **Z. Al-qudah**, and A. Alzaban "A Novel Iterative Sequential Monte Carlo Algorithm for Motif Discovery"**, IET Signal Processing**, Vol.10, Iss.5, Jul. 2016.

J12 ***(Q2)*** **Z. Al-qudah**, M. Alrwashdeh, L. Al-Hawary, and M.Al Bataineh "On the Capacity of a Relay Network With Orthogonal Components", **Int'l J. of Electronics and Communications (AEU),** *Elseiver*, Vol.70, May 2016.

J11 ***(Q2)*** **Z. Al-qudah** "Achievable rates of Gaussian two-way relay channel with orthogonal components and partial decoding at relay", **Electronic Letters**, Vol.52, Iss.3, Feb. 2016.

J10 ***(Q2)*** **Z. Al-qudah** "Orthogonal Space Time Block Coding over Dirty Paper Channel: outage Capacity Analysis", **Physical Communication**, *Elsevier*, Vol. 15, Jun.2015.

J9 ***(Q2)*** **Z. Al-qudah**, and M. Al Bataineh, " Cognitive Interference Channel: Achievable Rate Region and Power Allocation", **IET Communications**, Vol.9, Iss.2, Jan. 2015.

J8 ***(Q1)*** **Z. Al-qudah** and D. Rajan "Dirty paper coding for cognitive Z-channel: Performance Results*",* **IEEE Transaction on Wireless Communication**, Vol.12, Iss.12, Dec. 2013.

**And also** (***Q3 & Q4*** )

J7 ***(Q3)*** A. Ababneh and **Z. Al-qudah** "Distributed Anchor Activation Schemes for RSS Localization", **International Journal of Sensor Networks** , Vol.39, Iss.3, Jul. 2022.

J6 ***(Q3)*** **Z. Al-qudah,** K. Darabkh **"**A Simple Encoding Scheme to Achieve the Capacity of Half-Duplex Relay Channel", **Advances in Electrical and Electronic Engineering** (AEEE), Vol.20, Iss.1, Mar. 2022.

J5 ***(Q3)*** **Z. Al-qudah "**Gaussian MIMO Relay Channel with Orthogonal Channel Components", **Journal of Electrical Engineering**, Vol.71, Iss.3, Jun. 2020.

J4 M. Al Bataineh and **Z. Al-qudah**," Bayesian Classification of Ribosome Binding Sites in Prokaryotic Genome Sequences: A Communications Theory Approach", **International Journal of Bioscience, Biochemistry and Bioinformatics** vol.7, No.3, 2017.

J3 ***(Q4)*** W. Abu Shehab and **Z. Al-qudah, "**Singular Value Decomposition: Principles and Applications in Multiple Input Multiple Output Communication system", **Int. J. of Computer Networks & Communications**, Vol.9, No.1, Jan 2017.

J2 ***(Q3)*** **Z. Al-qudah** and W. Abu Shehab, "Two-Way Multiple Relays Channel: Achievable Rate Region and Optimal Resources "**Advances in Electrical and Electronic Engineering** (AEEE), Vol.14, Iss.3, Sep. 2016.

J1 ***(Q3)*** **Z. Al-qudah** "Achievable Rates of Gaussian Broadcast Channel with Interference", **Journal of Communications** (JCM), Vol. 9, Iss 4, Apr. 2014.

**Conference Papers**

C3 K. Darabkh, S. Odetallah, **Z. Al-qudah**, and A. Khalifeh "A New Density-Based Relaying Protocol for Wireless Sensor Networks", 14th International Wireless Communications & Mobile Computing Conference (**IWCMC-2018**), Cyprus.

C2 Z. Al-qudah and D. Rajan "MIMO Dirty paper coding: System Design and Implementation", IEEE Int. Conf. on Computing, Networking and Communications **(ICNC 2012),** Hawaii, USA.

C1 Z. Al-qudah, "Multilevel Coded Modulation for Multipath Rayleigh fading channel", IEEE Int. Conf. on Computer and Communication Engineering, (**ICCCE-2008**), Kula Lumpur, Malaysia