Dr. Rami A. Wahsheh

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EDUCATION

- **Doctor of Philosophy (Ph.D.) in Microsystems Engineering**
  May 2010 (GPA: 4.0/4.0)
  Rochester Institute of Technology (RIT) in Rochester, New York, USA.
  Research Interests: Optical devices in systems including photonic crystals, nanoplasmonics, and optical couplers.
  Dissertation Title: "Nanophotonic and Nanoplasmonic Couplers: Analysis and Fabrication".
  Major Professor: Dr. Mustafa Abushagur.
- **Master of Science (M.S.) in Electrical Engineering**
  August 2002 (GPA: 3.97/4.0).
  University of Alabama in Huntsville (UAH) in Huntsville, Alabama, USA.
- **Bachelor of Science (B.S.) in Electrical Engineering**
  May 1996 (GPA: 3.58/4.0).
  Mutah University in Mutah, Karak, Jordan.

WORK HISTORY

- **Associate Professor, Communications Engineering Department and Electrical Engineering Department, Princess Sumaya University for Technology, Amman, Jordan** (May 9, 2022 – Present). I taught the following courses: Electric Circuits I, Analog Communications, Digital Communications (BSc. and MSc.), Signals and Systems, Electromagnetics I, Optical Electronics, Optical Communications (BSc. and MSc.), Electric Circuits Lab., Communications Lab., and Optical Communications Lab.
- **Assistant Professor, Communications Engineering Department and Electrical Engineering Department, Princess Sumaya University for Technology, Amman, Jordan** (September 2019 – May 2022). I taught the following courses: Electric Circuits I, Analog Communications, Digital Communications (BSc. and MSc.), Signals and Systems, Electromagnetics I, Optical Electronics, Optical Communications (BSc. and MSc.), Electric Circuits Lab., Communications Lab., and Optical Communications Lab.
- **Assistant Professor, Communications Engineering Department and Electrical Engineering Department, and acting Head of the Communications Engineering Department, Princess Sumaya University for Technology, Amman, Jordan** (September 2017 – September 2019). Member of the ABET accreditation committee (I prepared the Self Study Report for ABET), and hiring committee.
- **Vice Director of the Police Communications Department in addition to being the Chief of the Wireless Communications Branch, Military Rank: Colonel** (February 2016 – September 2017), Police Communications Department, Amman, Jordan. Supervising 13 engineers and 38 technicians. Supervising and instructing the work of maintaining repeaters, console stations, the Police "Amen" FM Radio stations, and jamming devices. Analyzing technical malfunctions and providing the necessary steps to prevent them. Performing wireless coverage tests. Second in command after the Director of the Police Communications Department (supervising 350 engineers and technicians).

- **Assistant Professor, Communications Engineering Department, Princess Sumaya University for Technology, Amman, Jordan** (January 2012 – January 2016). I taught the following courses: Analog Communications, Digital Communications (BSc. and MSc.), Signals and Systems, Electromagnetics I, Optical Electronics, Optical Communications (MSc.), Communications Lab., and Optical Communications Lab.
- **Chief, Technical Studies and Training Section Division, Military Rank: Lieutenant-Colonel** (August 2011 – January 2012), Police Communications Department, Amman, Jordan. Supervised three branches: the Technical Studies Branch, the Documentation and Quality Assurance Branch, and the Training Branch. Designed and evaluated the telecommunication requirements for all PSD new building projects. Supervised the documentation process for all PSD sites. Organized all training courses held inside the department.
- **Chief, Wireless Communications Maintenance Division, Military Rank: Major** (July 2010 – August 2011), Police Communications Department, Amman, Jordan. Supervised 14 engineers and 15 technicians. Supervised and instructed the work of maintaining repeaters, consoles stations, the Police "Amen" FM Radio stations, and jamming devices. Analyzed technical malfunctions and provided the necessary steps to prevent them. Performed wireless coverage tests.
- **Research Assistant** (September 2006 – May 2010), Microsystems Engineering program, Rochester Institute of Technology, Rochester, New York, USA. Conducted research in optics. Designed, fabricated, and tested various optical couplers. Advisor: Dr. Mustafa Abushagur, Professor of Electrical Engineering and President of the Dubai campus of Rochester Institute of Technology.
- **Teaching Assistant** (March 2010 – May 2010), Department of Physics, Rochester Institute of Technology, Rochester, New York, USA. Helped students in a course titled "1017-241-01: Electronics for Technology Lab". Helped students run experiments that provide them with hands-on knowledge about electrical circuits such as current, voltage, ohm's law, series resistors, and parallel resistors.
- **Chief, PCMs and Multiplexers Division** (January 2004 – July 2006), Police Communications Department, Amman, Jordan. Supervised and instructed the work of maintaining PCMs and Multiplexers equipment and systems, including preparing and implementing the necessary work and time plans. Supervised and instructed the work of transmission lines connecting Multiplexers equipment with the Public Security Department headquarters. Analyzed technical malfunctions and provided the necessary steps to prevent them.
- **Research Assistant** (September 2002 – December 2003), Microsystems Engineering program, Rochester Institute of Technology, Rochester, New York. Worked on a project titled "Coupling Efficiency Between a Silica Waveguide and a Planar Photonic Crystal". Designed different structures to enhance the coupling efficiency between a silica waveguide and a planar photonic crystal waveguide by changing the size or the position of the inner taper crystals. Advisor: Dr. Mustafa Abushagur.
- **Research Assistant** (January 2001 – August 2002), Department of Electrical Engineering, University of Alabama in Huntsville, Alabama. Worked on a research project titled "Interferometric Fiber Optic Gyroscope". Designed and implemented a new model of interferometric fiber optics gyroscope which worked more effectively and with

less cost than the current interferometric fiber optics gyroscope that was available in the marketplace. Advisor: Dr. Mustafa Abushagur.

- **Wireless Communications Maintenance Engineer** (October 1996 – December 2000), Police Communications Department, Amman, Jordan. Supervised and instructed the work of maintaining repeaters and consoles stations.

PUBLICATIONS

JOURNALS

1. **Rami A. Wahsheh**, "Evaluation of the coupling characteristics of a sandwiched plasmonic waveguide between two dielectric waveguides using air-gap couplers to achieve high-performance optical interconnects," Optical Engineering, 61(10), 107111, October 2022. https://doi: 10.1117/1.OE.61.10.107111.
2. A. Y. Al-Zoubi, A. Tahat, **Rami A. Wahsheh**, M. Taha, L. Al-Tarawneh, and O. Hasan, "A bachelor degree program in IoT engineering: accreditation constraints and market demand," International Journal of Engineering Pedagogy (iJEP), vol. 12, no. 4, pp. pp. 17–34, Jul. 2022. https://doi.org/10.3991/ijep.v12i4.31429.
3. **Rami A. Wahsheh**, "Theoretical investigation of an air-slot mode-size matcher between dielectric and MDM plasmonic waveguides," International Journal of Optics, vol. 2021, December 2021, Article ID 1025374. https://doi.org/10.1155/2021/1025374
4. **Rami A. Wahsheh**, "Ultra-compact broadband 3-dB metal-dielectric-metal plasmonic power splitter," Journal of Modern Optics, vol. 68(3), February 2021, pp. 153-160. https://doi.org/10.1080/09500340.2021.1884299
5. **Rami A. Wahsheh**, "Mode coupling enhancement from dielectric to plasmonic waveguides," Optical Engineering, vol. 59(10), October 2020, pp. 107101. https://doi.org/10.1117/1.OE.59.10.107101
6. **Rami A. Wahsheh** and Mustafa A. G. Abushagur, "Experimental and theoretical investigations of an air-slot coupler between dielectric and plasmonic waveguides," Optics Express, vol. 24, April 2016, pp. 8237-8242.
7. **Rami A. Wahsheh** and Mustafa A. G. Abushagur, "Compact and ultra-low-loss planar photonic crystal taper," Microwave and Optical Technology Letters, vol. 52, June 2010, pp. 1454-1459.
8. Ruoxi Yang, **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Efficient light coupling between dielectric slot waveguide and plasmonic slot waveguide," Optics Letters, vol. 35, March 2010, pp. 649-651.
9. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Nanoplasmonic couplers and splitters," Optics Express, vol. 17, October 2009, pp. 19033-19040.
10. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Cross talk reduction in square cavities," IEEE Photonics Journal, vol. 1, September 2009, pp. 191-196.
11. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Nanoplasmonic directional couplers and Mach-Zehnder interferometers," Optics Communications, vol. 282, September 2009, pp. 4622-4626.

CONFERENCES

12. **Rami A. Wahsheh**, "Design and analysis of a novel plasmonic power splitter based on an air-slot coupler," 2022 IEEE 19th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET), Marietta, GA, USA, 2022, pp. 054-056, presented 21/12/2023, doi: 10.1109/HONET56683.2022.10019085.

13. **R. A. Wahsheh**, "Efficient and ultra-compact nanoplasmonic Mach-Zehnder interferometer design using air-gap couplers," in Frontiers in Optics and Laser Science Conference 2021, C. Mazzali, T. (T.-C.) Poon, R. Averitt, and R. Kaindl, eds., Technical Digest Series (Optica Publishing Group, 2021), paper JTu1A.124, Washington, DC United States, presented 2/11/2021, doi.org/10.1364/FIO.2021.JTu1A.124.
14. **Rami A. Wahsheh**, "Transmissivity assessment of a sandwiched MDM plasmonic waveguide between two dielectric waveguides," 2021 IEEE 18th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET), Karachi, Pakistan, 2021, pp. 163-166, presented 12/10/2021, doi: 10.1109/HONET53078.2021.9615401.
15. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Experimental investigation of a nanoplasmonic air-slot coupler toward dense optical integrated circuits," in Frontiers in Optics, OSA Technical Digest (CD) (Optical Society of America, 2015), paper FW3E.2.
16. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Ultra-compact integrated nanoplasmonic air-gap coupler," in Frontiers in Optics, OSA Technical Digest (CD) (Optical Society of America, 2014), paper FTh4E.5.
17. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Integrated nanoplasmonic splitter," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, December 2013, pp. 155-156.
18. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Nanoplasmonic air-slot coupler: design and fabrication," in Frontiers in Optics, OSA Technical Digest (CD) (Optical Society of America, 2012), paper FTh4A.
19. Zhaolin Lu, Ruoxi Yang, **Rami A. Wahsheh**, Mustafa A. G. Abushagur, "Nanoplasmonic couplers and modulators based on metal-insulator-metal structures," In Proceedings of SPIE - The International Society for Optical Engineering, vol. 7604, February 2010, pp. 760419.1-760419.8.
20. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Ultra-compact nanoplasmonic splitter," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, December 2009, pp. 179-181.
21. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Compact nanoplasmonic Mach-Zehnder interferometers," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, December 2009, pp. 182-183.
22. **Rami A. Wahsheh**, Zhaolin Lu, Jun Yang, and Mustafa A. G. Abushagur, "Silicon microring vertical coupler," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, December 2009, pp. 280-283.
23. **Rami A. Wahsheh**, Zhaolin Lu, and Mustafa A. G. Abushagur, "Efficient couplers and splitters from dielectric waveguides to plasmonic waveguides," in Frontiers in Optics, OSA Technical Digest (CD) (Optical Society of America, 2008), paper FThS4. http://www.opticsinfobase.org/abstract.cfm?URI=FiO-2008-FThS4
24. **Rami A. Wahsheh**, Zhaolin Lu, Stefan F. Preble, Mustafa A. G. Abushagur, "Cross talk reduction by photonic crystal cavities," in Frontiers in Optics, OSA Technical Digest (CD) (Optical Society of America), October 2008, pp. FThK3. http://www.opticsinfobase.org/abstract.cfm?URI=FiO-2008-FThK3

25. **Rami A. Wahsheh**, Zhaolin Lu, Mustafa A. G. Abushagur, and Stefan F. Preble, "Ultra low cross talk in crossed strip waveguides with the assistance of a photonic crystal cavity," In Proceedings of SPIE - The International Society for Optical Engineering, vol. 7056, August 2008, pp. 70560E.1-70560E.8.
26. **Rami A. Wahsheh** and Mustafa A. G. Abushagur, "The effect of changing the position of the inner taper crystals on the coupling efficiency between a silica waveguide and a planar photonic crystal," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, November 2007, pp. 1-5.
27. **Rami A. Wahsheh**, Mustafa A. G. Abushagur, and Zhaolin Lu, "A method for cross talk reduction in crossed strip waveguides," International Symposium on High Capacity Optical Networks and Enabling Technologies, HONET, November 2007, pp. 1-4.
28. Mustafa A. G. Abushagur and **Rami A. Wahsheh**, "Radii changing effect on the coupling efficiency between a silica waveguide and a planar photonic crystal," In Proceedings of SPIE - The International Society for Optical Engineering, vol. 5510, October 2004, pp. 71-77.
29. Mustafa A. G. Abushagur and **Rami A. Wahsheh**, "Highly efficient optical coupler using hybrid photonic crystal structures," In Proceedings of SPIE - The International Society for Optical Engineering, vol. 5510, October 2004, pp. 68-70.

COURSES I TAUGHT AT PSUT

- Electromagnetics I (B.S.)
- Electric Circuits I (B.S.)
- Optical Electronics (B.S.)
- Optical Communications (B.S. and M.S.)
- Analog Communications (B.S.)
- Signals and Systems (B.S.)
- Digital Communications (B.S. and M.S.)
- Electric Circuits Lab. (B.S.)
- Communications Lab. (B.S.)
- Optical Communications Lab. (B.S.)

HONORS

- Received an "Outstanding Researcher in Microsystems Engineering" from Venus International Foundation - 2022. is conferred for a remarkable Researcher/ Faculty Member for the exceptional contribution to fundamental discoveries, new theories, or insights. The Research Awards 2022 (is part of Venus International Science and Technology Awards - VISTA is convened by the Centre for Advanced Research and Design (CARD) of Venus International Foundation (VIF). The VISTA 2022 judging is a peer review process. 10/June/2022
- I won the third prize in the courses competition of the International Institute of Online Education (IIOE). The number of participants in this prestigious competition was more than 210 from 45 countries around the world. I was among 16 people from 9 countries who won the competition. The competition aims to provide global higher education instructors with an opportunity to showcase their knowledge and skills in teaching and commitment to learning pedagogy by using course content and teaching methods that are high quality, original, interactive, and creative. IIOE is an initiative proposed by the

International Centre for Higher Education Innovation (ICHEI) under the auspices of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). 12/Jan/2022

- Received a financial reward in the teaching field incentives for my teaching excellence from Princess Sumaya University for Technology, Amman, Jordan. 17/March/2021
- Received an "Outstanding Faculty in Microsystems Engineering" from Venus International Foundation - 2020. This award is conferred for a remarkable Faculty Member who have track record of teaching excellence, contribution to theoretical or applied research, service to students and related communities, and productivity over the course of career. The Faculty Awards 2020 (is part of Venus International Science and Technology Awards - VISTA is convened by the Centre for Advanced Research and Design (CARD) of Venus International Foundation (VIF). The VISTA 2020 judging is a peer review process. 11/December/2020
- The graduation project that I supervised during the academic year 2017/2018, received the first prize in the Jordan Engineers Association 2018 graduation and industrial projects competition - the electrical engineering track for the graduation project titled: Design and Simulation of a Fast Open-Route System for Emergency Services. 20/April/2019
- Received the prestigious Jordanian Fulbright Foreign Student Scholarship (July 2006 – July 2008). This scholarship is intended for a 2-year full-time study towards a Master's or PhD degrees in the United States.
- Top of my Bachelor's class of 1996 out of 310 students at Mutah University. Due to achieving the highest GPA of the 1996 class among all majors at the whole university, I received the most honored university prizes which the late King Hussein of Jordan gave to me in person. His Majesty awarded me four royal prizes: 1) an honors sword, 2) a royal watch, 3) King Hussein's royal medal of first degree, and 4) a royal pistol. The first two prizes were awarded during the graduation ceremony while the other two were awarded at His Majesty's Basman Palace in Amman, Jordan. 1/June/1996 and 6/June/1996
- Participated in the Foreign Academy Exchange Program (FAEP) which was hosted by the U.S. Military Academy (West Point) because I ranked top of my class for three consecutive years at Mutah University. FAEP hosted cadets from all over the world. The 10-day visit from July 30 to August 8, 1995 had a full itinerary that included visits to the White House in Washington, D.C. and New York City, New York. The visit gave me an opportunity to interact with cadets in a cultural exchange of values and experience life at West Point and in the United States. 8/August/1995
- Spring 2002 Graduate Dean's List at the University of Alabama in Huntsville, Alabama.

ACTIVITIES

- Installed equipment for the Jordanian police force that worked under the supervision of the United Nations force in Haiti (October 24, 2004 – November 9, 2004). Installed UHF repeaters and HF devices to enable the police force to have efficient communication methods.
- Member of Microes Soccer team at Rochester Institute of Technology, Rochester, New York.
- Member of Jordan Engineers Association, Jordan.
- Member of Optica (Formerly Optical Society of America (OSA)).

TRAINING COURSES

- Huawei HCIA-5G Online Training (June 21- 24/2020).
- Level 1 Seminar for Telecom Engineering (Theoretical and Practical Training) (12/2019). ETCOM Company, Um-Uthainah, Amman, Jordan.
- Alcatel Synchronous Digital Hierarchy (SDH) (October 2005 - November 2005). Alcatel Inc. in Orleans, France.
- Cisco Certified Network Associate (CCNA) (May 16, 2005 - September 16, 2005). Mesbar Telecommunications Systems in Amman, Jordan.
- Omniplexers (E1) (August 15, 2000 - August 17, 2000). Bayly Communications Inc. in Ontario, Canada.
- Took the following courses at the Police Communications Department in Amman, Jordan: Walky-Talky Devices (VISAR, MT200 from Motorola) (October 3, 2004 - October 7, 2004); Long Distance Communication Devices (RF2302 from Harris) (September 25, 2004 - September 29, 2004); Selta Exchange (August 6, 2004 - August 20, 2004); Principles of Microwave and Fiber Optics (June 27, 1998 - July 3, 1998); High Frequency Communication Devices (July 19, 1997 - July 24, 1997); Speakers and Television Devices (July 12, 1997 - July 17, 1997); Rectifiers (April 26, 1997 - April 30, 1997); NorStar Exchange (December 14, 1996 - December 21, 1996); Conventional Wireless Communication Systems (November 2, 1996 - November 16, 1996).

COMPUTER SKILLS

- FDTD simulation software: RSOFT, Lumerical, EMPhotonics, Optiwave.
- Computer programming: FORTRAN and Basic.

EQUIPMENT

Used the following equipment in the fabrication and testing of nanophotonic and plasmonic devices in the Cornell Nanofabrication Facility (CNF) at Cornell University in Ithaca, New York and in the Semiconductor and Microsystems Fabrication Laboratory (SMFL) at Rochester Institute of Technology in Rochester, New York:

- **Lithography**: Electron beam Leica VB6, LEO electron beam, Canon stepper, GCA stepper, and Suss MA150 contact aligner.
- **Resist spinners**: CEE 100 hand spinner, SCS P6700 spinner, and SVG 88 coat/develop track.
- **Scanning electron microscope**: Zeiss Supra SEM, Zeiss Ultra SEM, and LEO SEM.
- **Dry etch**: PlasmaTherm 770, Drytek 482 Quad etcher, and Branson model 3200.
- **Wet etch**: RCA general clean, buffered oxide etch, and gold etch.
- **Furnace processing**: Bruce furnace to grow oxide.
- **Thin film deposition**: CVC SC4500 combination thermal/e-gun evaporator and ASM LPCVD.
- **Packaging and miscellaneous processing**: KS 775 and 7100 wafer dicing saw and allied multiprep techprep grinder / polisher polishing system.
- **Optical testing**: Built an optical test system that uses the following devices: tunable laser sources, polarization controller, optical waveguides, tapered micro-lens fibers, optical alignment systems, translational, infrared cameras, infrared detectors, optical power meter, and optical spectrum analyzers.

SERVE as a REVIEWER at:

- Journal of Nanophotonics.
- Optical Engineering.
- Photonics Journal.
- Optics, Photonics, and Applied Sciences (MDPI).
- 2022 IEEE 19th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET).
- 2021 IEEE 18th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET).