

October 2019

## HANY ELGALA

---

Assistant Professor, Dept. of Electrical & Computer Engineering <http://www.albany.edu/~HE895353/>

Director of the Signals and Networks Lab <https://www.albany.edu/sine/>

University at Albany – State University of New York,

1400 Washington Ave, LI-85, Albany, NY 12222

Tel (518) 442-2585 Email [helgala@albany.edu](mailto:helgala@albany.edu)

### Research Activities and Interests

#### *Wireless Technologies*

Visible light communications (VLC) and LiFi networks, heterogenous radio-optical systems, backscatter communication

#### *Machine learning in Communications and Networks*

Deep learning in PHY and lower MAC, reinforcement learning for resource allocation and handover, cognitive radio and security in IoT, physical-layer security

#### *Signal processing in Communications*

Security aware waveforms, multifunction modulation, IM/DD waveforms, OFDM, MIMO, NOMA, spatial modulation, non-linearity

#### *Testbeds & Software Defined Platforms*

CHRONOS-cloud based heterogenous RAN, CROWD- coexisting radio & optical small cells, LISA-light enabled systems & applications, FPGAs, SDR/USRP, RFSoc

### University Education

#### 09/06 – 03/10 *PhD in Electrical Engineering, Optical Wireless Communications*

Jacobs University, Bremen, Germany

*Thesis:* A Study on the Impact of Nonlinear Characteristics of LEDs on Optical OFDM

*Advisor:* Prof. Harald Haas, University of Edinburgh, Scotland

*Committee Members:* Dominic O'Brien, University of Oxford, UK and Werner Bergholz, Jacobs University, Germany

#### 09/01 – 06/03 *MSc in Electrical Engineering, Smart Systems*

Furtwangen University, Furtwangen, Germany

*Thesis:* Development of a Fluorescent Lamp Ballast Control Concept using FPGAs

#### 09/95 – 06/00 *BSc in Electrical Engineering, Communications and Electronics*

Ain-Shams University, Cairo, Egypt

*Graduation Project:* Programming for Semiconductors CAD Software

### Work Experience

#### 09/15 – present *Assistant Professor, University at Albany, Albany, NY, USA*

Department of Electrical and Computer Engineering

Director of the Signals and Networks Lab; SINE Lab <http://www.albany.edu/sine/>

#### 09/14 – 09/15 *Research Professor, Boston University, Boston, MA, USA*

Department of Electrical and Computer Engineering

Co-leader of the Multimedia Communications Lab (MCL)

Faculty Member and Communications Testbed Leader at the NSF Lighting Enabled Systems & Applications (LISA) Engineering Research Center (ERC) <https://lesa.rpi.edu/>

#### 09/14 – 12/14 *Lecturer (part-time), Boston University, Boston, MA, USA*

Department of Electrical and Computer Engineering

#### 09/12 – 09/14 *Senior Postdoctoral Associate, Boston University, Boston, MA, USA*

Department of Electrical and Computer Engineering

October 2019

- Mentor:* Prof. Thomas D. C. Little, Boston University
- 01/12 – 09/12 **Resident Supervisor (College 3), Jacobs University, Bremen, Germany**  
Living on Campus: Management of college employees, leadership during events and student conflict management.
- 03/10 – 08/12 **Postdoctoral Fellow, Jacobs University, Bremen, Germany**  
Co-leader of the Cellular and Wireless Communications (CWC) Lab  
*Advisor:* Prof. Harald Haas, University of Edinburgh, Scotland
- 09/03 – 12/11 **Resident Associate (College 3), Jacobs University, Bremen, Germany**  
Living on Campus: Implementation of college policies, serving as a point of contact for students, contribute actively to the intellectual, cultural, and social life of college and responding to emergency calls
- 09/06 – 03/10 **Research Associate (PhD student), Jacobs University, Bremen, Germany**
- 06/03 – 09/06 **Laboratory Engineer, Electrical Engineering, Jacobs University, Bremen, Germany**
- 09/02 – 06/03 **Early-Stage Researcher, Infineon Technologies (formerly Siemens Semiconductor), Munich, Germany**
- 01/01 – 09/01 **Satellite Control Engineer, Egyptian Satellite Co. NILESAT, Cairo, Egypt**
- 01/01 – 06/01 **Lecturer (part-time), Obour Institute for Engineering and Technology, Cairo, Egypt**
- 06/00 – 12/00 **GSM Service Engineer, Alcatel-Lucent, Cairo, Egypt**

### Awarded Grants and Funding

- 09/18 – 08/21 Co-PI, NSF: CISE Research Infrastructure (CRI) program: CRI: II-NEW: CHRONOS: A Cloud based Hybrid RF-Optical Network Over Synchronous Links, **\$765,999**.  
<https://www.albany.edu/chronos/>
- 09/16 – 09/19 PI, NSF: Network Technology and Systems (NeTS) program: small: collaborative research: " Coexistence of Directional Communications within 5G Networks: The Case of Visible Light Enhanced Small-Cells", **\$154,787**.  
<http://sites.bu.edu/mcl/projects/coexistence-in-5g-networks/>
- 08/16 – 08/18 PI, NSF: Engineering Research Center (ERC) For Lighting Enabled Systems & Applications (LISA) (formerly Smart Lighting): "Illumination, sensing and communication in orthogonal frequency-division multiplexing (OFDM) based visible light communication (VLC) systems", **\$89,307**. <https://lesa.rpi.edu/>
- 11/16 – 08/17 PI, New York State Contract: The Metropolitan Transportation Authority: "Intelligent Transportation based UWB Positioning and Connectivity", **\$80,969**.
- 01/12 – 06/12 Awarded, Bremen's Funding Program (BRUT): European Regional Development Fund (ERDF), Germany, **5,000 EUR**.

### Teaching

*University at Albany, USA (2015 – present, 9 semesters)*

- Digital Systems (IECE 231), undergraduate students, fall 19.
- Digital Systems Lab (IECE 231), undergraduate students, fall 19.
- Signals & Systems (ICEN 340), undergraduate students, spring (16,18 & 19), fall 18.
- Optical Communications (ICEN 360), spring 17.
- Digital Logic Design (ICEN 340), undergraduate students, fall (15, 16 & 17).
- Independent Study & Research, 1-5 undergraduate student(s) per semester.
- Independent Study & Research, 1-2 MSc student(s) per semester.

October 2019

*Boston University, USA (2014, 1 semester)*

- Introduction to Computer Networking (EC441), undergraduate students, fall 14.

*Jacobs University, Germany (2003 – 2006, 7 semesters)*

- Signals & Systems Lab (300221) undergraduate students; 2 lectures, 10 tutorials and 10 experiments.
- Digital Signal Processing Lab (300221) undergraduate students; 2 lectures, 10 tutorials and 10 experiments.
- Electronics Lab (300222) undergraduate students; 2 lectures, 10 tutorials and 10 experiments.
- Guided Research in Electrical Engineering + Thesis (300342), 1-2 undergraduate students per semester.
- Guided Research in Electrical Engineering (300361), 1-2 undergraduate students per semester.

*Obour High Institute for Engineering and Technology, Egypt (2001, 1 semester)*

- Electronics Laboratory, undergraduate students, 4<sup>th</sup> year, 10 experiments.
- Physics, undergraduate students, 2<sup>nd</sup> year.
- C-programming, undergraduate students, 2<sup>nd</sup> year.

### **Outreach Activities**

- One-week Electrical and Computer Engineering session (Theme: IoT and embedded systems) to 18 high school girls with the Girls Inc. Eureka! Program and College of Arts & Sciences at the University at Albany, University at Albany, USA, summer 19. <http://girlsinccapitalregion.org/outreach-activities/eurekaatualbany/>
- One-day hands-on experience, Engineering and Science Experiments, at Hackett Middle School, University at Albany, USA, spring 2017.
- High school summer research internship (RISE): mentoring a high school student to conduct university-level research, Electrical Engineering; 6 weeks, Boston University, USA, summer 2014.
- Summer challenge, Electrical Engineering: teaching 20 high school students; 10 lectures, 1 tutorial and 8 experiments, 2 weeks, Boston University, USA, summer 2013.

### **Research Community Service and Leadership Positions**

*Editor*

- Editor for the [IEEE Transactions on Communications \(TCOM\)](#) for Optical Wireless Systems and Networks, 2017-present; **Impact Factor: 5.69**.
- Guest Editor for the [IEEE Transactions on Cognitive Communications and Networking](#), Special Issue: [Coexisting Radio and Optical Wireless Deployments](#), to be published Dec. 2019.
- Contributed to the [Best Reading in Optical Wireless Communications](#), the IEEE Communications Society (ComSoc).
- Guest Editor for the [IEEE Access](#), Special Issue: [Optical Wireless Technologies for 5G Communications and Beyond](#) 2017; **Impact Factor: 4.098**.

October 2019

*Session Chair*

- SpT2E, Digital Signal Processing 1 (on Tuesday, July 30, 10:30–12:30) and SpTh3E. Free-space Optics and Visible Light Communication (on Thursday, August 01, 2:00–4:00), SPPCom Oral, Signal Processing in Photonic Communications (SPPCom), at the Optics & Photonics Congress on Advanced Photonics, 28 July–1 August 2019, Burlingame, CA, USA.
- ONS-4 (Visible light communications II), on Wednesday Dec. 12, 2018 08:30 at the IEEE Global Communications Conference (Globecom 2018), 9–13 December 2018, Abu Dhabi, UAE.
- Access Networks and Free Space Communications, on Thursday, July 5, 2018 at the Optics & Photonics Congress on Advanced Photonics, 2–5 July 2018, Zurich, Switzerland.
- Track 4: Wireless Communications: Fundamentals & PHY (I) at the IEEE Consumer Communications & Networking Conference, 12–15 January 2018, Las Vegas, USA.
- The PHY sessions (PHY-02 and PHY-15) at the IEEE Wireless Communications and Networking Conference (WCNC 2015), March 09–12, 2015, New Orleans, LA, USA.

*Grant Reviewer*

- Fulbright, Senior Award 2020–2021, 2019, USA.
- National Science Foundation, CNS Core Medium Wireless Panel, 2019, USA.
- United Arab Emirates University (UAEU), 2017, UAE.
- Competitive Research Grants (CRG) program at King Abdullah University of Science and Technology (KAUST), 2016, Kingdom of Saudi Arabia.
- The Netherlands organization for scientific research (NWO), 2015, Netherlands.

*Organizer*

- Program Chair, Signal Processing in Photonic Communications (SPPCom), Advanced Photonics Congress, Mon, Jul 13, 2020 – Thu, Jul 16, Hotel Bonaventure Montréal, Montreal, Canada.
- Organizing the Coexisting Radio and Optical Wireless Deployments (CROWD 2018) workshop at the IEEE Wireless Communications and Networking Conference (WCNC 2019), 15–18 April 2019, Marrakech, Morocco.
- Chair of the wireless optical networks (WON) symposium at the 14th International Wireless Communications and Mobile Computing Conference (IWCMC 2018), Limassol, Cyprus, June 25 – 29, 2018.

*Technical Program Committee*

- The OSA Signal Processing in Photonics Communications (SPPCom) at the Optics & Photonics Congress on Advanced Photonics, 29 July – 01 August 2019, Burlingame, CA, USA.
- The International Workshop on 5G and Beyond for Industrial Internet (5G-I2net 2018) collocated with IEEE International Conference on Industrial Internet (ICII), 21–23 October 2018, Bellevue, WA, USA.
- The OSA Signal Processing in Photonics Communications (SPPCom) at the Optics & Photonics Congress on Advanced Photonics, 2–5 July 2018, Zurich, Switzerland.
- The Optical Wireless Communication Workshop at the IEEE Global Communications Conference (GLOBECOM 2015), December 6, 2015, in San Diego, California, USA.
- The Optical Networks and Systems Symposium at the IEEE Global Communications Conference (GLOBECOM 2015), Dec. 6–10, 2015, San Diego, CA, USA.
- The workshop on Visible Light Communications and Networking at the IEEE International Conference on Communications (ICC 2015), June 8–12, 2015, London, UK.

October 2019

- The IEEE Vehicular Technology Conference (VTC2015-Spring), May 11–14, 2015, Glasgow, Scotland.
- The IEEE Wireless Communications Journal special issue on Visible Light Communications, Publication Date: April 2015.
- The IEEE Workshop on Optical Wireless Communications (OWC 2014), co-located with the IEEE GLOBECOM 2014, December 8–12, 2014, Austin Texas, USA.
- The IEEE Conference on Wireless Communications and Signal Processing (WCSP 2014) & Optical Wireless Communications Symposium, October 23–25, 2014, Hefei, China.
- The IEEE Region 10 Symposium TENSYP 2014, April 14-16, 2014, Kuala Lumpur, Malaysia.
- The IEEE Workshop on Optical Wireless Communications (OWC 2013), co-located with the IEEE GLOBECOM 2013, December 9–13, 2013, Atlanta GA, USA.
- The International Conference on Connected Vehicles & Expo (ICCVE 2013), December 2–6, 2013, Las Vegas CA, USA.
- The IEEE International Conference on Photonics (ICP 2013), October 28–30, 2013, Melaka, Malaysia.
- The International Workshop on Fiber Optics in Access Networks (FOAN 2013), September 11–12, 2013, Almaty, Kazakhstan.
- The IEEE Workshop on Optical Wireless Communications (OWC 2012), co-located with the IEEE GLOBECOM 2012, December 3–7, 2012, Anaheim CA, USA.

#### *Technical reviewer*

- **IEEE:** Journal of Lightwave Technology (JLT), Journal of Optical Communications and Networking (JOCN), Photonics Journal, Photonics Technology Letters, Communications Letters, Transactions on Communications, Transactions on Signal Processing, Wireless Communications Magazine, Several International Conferences including GLOBECOM, ICC, PIMRC and VTC.
- **OSA:** Optics Express, Optics Letters, Chinese Optics Letters
- **The Royal Society Philosophical:** Transactions A, Journal
- **IET:** Communications
- **Elsevier:** Digital Signal Processing, Optics Communications
- **EURASIP:** Journal on Advances in Signal Processing

#### **University Service**

##### *University at Albany, USA*

- 2019 – present ECE Graduate Admission Committee Member
- 2018 – present ECE Doctoral Qualifying Examination (DQE) Committee Member
- 2017 – present University at Albany Faculty Advisory Committee for International Education
- 2015 – present ECE Graduate Curriculum Committee Member /Chair
- 2019 College Commencement Speaker Committee Member
- 2017 University at Albany Undergraduate Research Fall Fair
- 2017 College Teaching Assistant Guidelines Committee Member
- 2015 & 2016 University Faculty Research Award Program (FRAP)-A Funding Review Committee Member
- 2016 ECE Department Chair Search Committee Member
- 2016 Computer Engineering (CE) Administrative Manager Search Committee Member
- 2015 Representing the CE at the fall open house
- 2015 CE Open-Rank Faculty Search Committee Member

October 2019

*Jacobs University, Germany*

- 2010 – 2012 Member of the university works council "Betriebsrat" and the executive committee "Betriebsausschuss", 2010 – 2012
- 2005 – 2009 Safety representative; School of Engineering and Science
- 2003 – 2012 Activity coordinator of different communities and clubs; sports, culture, awards and events
- 2010 – 2012 University Food Committee

**Oral Presentations**

*Invited Talks*

- "Visible Light-Based Backscatter Communication.", the European Conference on Optical Communication (ECOC), Optical Wireless Communication workshop, 17–21 September 2017, Göteborg, Sweden.
- "Flavors of optical OFDM and their dimming compatibility.", the International Conference on Information Optics and Photonics (CIOP 2016), workshop on Visible Light Communications, 17–20 July 2016, Shanghai, China.
- "Get Connected Through Light.", Helen and John C. Hartmann Department of Electrical & Computer Engineering Seminar, New Jersey Institute of Technology (NJIT), April 13, 2016, Newark, NJ, USA.
- "Coexistence of Wi-Fi and Li-Fi Toward 5G.", IEEE Wireless Communications and Networking Conference (WCNC 2016), workshop on Optical Wireless Communications 3–6 April 2016, Doha, Qatar.
- "Lighting in the Information Age.", SSL Ecosystem 2014, September 22–24, 2014, Cambridge, MA, USA.
- "High-Speed Wireless Networking Using Indoor LED Lighting.", Department of Electrical and Computer Engineering Seminar, Boston University, November 13, 2013, Boston, MA, USA.
- "Wireless Communications Potential of Solid-State Lighting: Visible-Light Communications.", the Advanced Energy Conference (AEC 2014), April 30, 2013, New York, NY, USA.
- "A Visible Approach to the Spectrum Crunch.", Department of Electrical Engineering and Computer Science Colloquium, Tufts University, February 5, 2013 Medford, MA, USA.

*Conference/Workshop Papers*

- The OSA Advanced Photonics Congress 2019, SpT2E: Digital Signal Processing 1, Signal Processing in Photonic Communications (SPPCom), Tuesday, July 30, 11:30–11:45, Burlingame, CA, USA.
- The IEEE Global Communications Conference (Globecom 2018), ONS-2: Optical Network Architectures, Tuesday, Dec. 11, 8:30–10:00, Abu Dhabi, UAE.
- The WCNC 2015, New Orleans, USA. The IEEE Wireless Communications & Networking Conference (WCNC 2015), March 9–12, New Orleans, Louisiana, 2015.
- The Asilomar Conference on Signals, Systems, and Computers, Nov. 03–06, 2014, Pacific Grove, CA, USA.
- The 2019 Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2019), 8–11 September 2019 at the Istanbul Congress Center (ICC) in the heart of Istanbul, Turkey.
- The New England Workshop on Software Defined Radio (NEWSDR 14), Boston, USA.
- The Optical Fiber Communication Conference and Exposition (OFC 2014), March 9–13 2014, San Francisco, California, USA.

October 2019

- The Personal, Indoor and Mobile Radio Conference (PIMRC 2010), September 26–29 2010, Istanbul, Turkey.
- The Wireless and Optical Communications Networks (WOCN 2009), April 28–29, 2009, Cairo, Egypt.
- The Vehicular Technology Conference (VTC 2007), April 22–25, 2007, Dublin, Ireland.

#### *Tutorials*

- "Visible Light Communications and Networking", IEEE Wireless Communications and Networking Conference (WCNC), 3–6 April 2016, Doha, Qatar.

#### **Industrial Projects and Research Centers**

- 09/12 – present Lighting Enabled Systems & Applications (LISA) (formerly Smart Lighting) Engineering Research Center (ERC), National Science Foundation (NSF), USA
- 11/16 – 08/17 Intelligent Transportation based UWB Positioning and Connectivity, Metropolitan Transportation Authority, New York State
- 06/09 – 08/12 Lufo 2nd Call (SINTEG), Federal Ministry of Economics and Technology (BMWi), Germany
- 09/07 – 06/09 Optical Cabin Communication Network (OPTIKOM), Airbus, Germany

#### **Consulting Experience**

- 06/13 – 06/14 Paxeramed Corp, Newton, MA, USA
- 03/12 – 03/13 University of Tabuk, Tabuk, Kingdom of Saudi Arabia

#### **Skills**

- Languages English (fluent) German (excellent command) Arabic (fluent)
- Programming Matlab, VHDL, C and Python
- Software Matlab/Simulink, Xilinx ISE, Altera Quartus, Texas Instruments CCStudio, Agilent ADS, Modelsim, OrCAD PCB design/PSpice/Eagle
- Hardware Ettus Research USRP2 SDR, Xilinx/Altera FPGAs (Spartan/Cyclone/Stratix), Texas Instruments DSPs (C6711/13), LPKF ProtoMat circuit board plotter and several Electronic-bench Instruments
- Clean-room Class 100 wetbench, mask aligner, optical microscope, profilometer and spin coater

#### **Professional Training, Workshops and Certificates**

- 7/16/10 – 7/19/10 Project Management Workshop, German Project Management Association, Bremen, Germany.
- 8/18/09 – 8/22/09 Lighting Design Workshop, ERCO GmbH, Lüdenscheid, Germany.
- 05/09 Osram's Professional Training on Lighting Control, Lübeck, Germany.
- 09/05 – 10/05 Clean-room Training, Jacobs University, Bremen, Germany.
- 05/05/04 Texas Instruments DSP workshop, Krefeld, Germany.
- 02/01 – 04/01 Satellite Communications, NILESAT Training Center, Cairo, Egypt.
- 06/00 – 09/00 GSM Systems, Alcatel Training Center, Cairo, Egypt.
- 06/99 – 09/99 Telephone Networks, Seavin Co.: contractor engineering for the US air force in Egypt.
- 06/98 – 09/98 Computer Networks, Egypt Air: the Egyptian flag carrier airline.

October 2019

- 06/97 – 09/97 Control Rooms, Cairo Metro: the Egyptian railway authority.

### Scholarship

- 09/06 – 03/10 Dean's Scholarship, Jacobs University.
- 09/01 – 06/03 International Graduate Students Scholarship, Furtwangen University.

### Demonstration

- The "Tech, Drugs, and Rock n' Roll (TDRR)" networking event, July 15, 2014, Boston, USA  
<http://www.bu.edu/otd/about/tech-drugs-and-rock-n-roll/tdrr-2014/>
- The Congress Centre in Bremen, Highlights of Physics, October 6 – 10, 2006, Bremen, Germany  
<http://www.physik-highlights.de>
- Demonstrated VLC at the House of Science in Bremen, Information Night, June 14, 2006, Bremen, Germany <http://www.hausderwissenschaft.de>

### Memberships

OSA, 2014 – to date, IEEE, 2006 – to date, SPIE, 2010 – 2011

### List of Publications 4545 citations (Google Scholar)

#### *Book Chapter*

1. Optical Wireless Communications - An Emerging Technology, Chapter 18: Dimming and Modulation for VLC-Enabled Lighting, International Publishing, 2016.  
Editors: Murat Uysal Carlo Capsoni Zabih Ghassemlooy Anthony Boucouvalas Eszter Udvary,  
Authors: Ali Mirvakili Hany Elgala Thomas D. C. Little Valencia J. Koomson, Springer  
<http://www.springer.com/us/book/9783319302003>

#### *Online Article*

1. Elgala, Hany. "Visible Light Communication." Access Science, McGraw-Hill Education, 2017.  
<https://www.accessscience.com/content/visible-light-communication/733950>

#### *Journal, Magazine and Letter*

1. S Almajali, I Dhiah el Diehn, HB Salameh, M Ayyash, H Elgala. "A distributed multi-layer MEC-cloud architecture for processing large scale IoT-based multimedia applications.", the Journal of Multimedia Tools and Applications, Springer, Volume 78, Issue 17, pp 24617–24638, 2019.
2. Michael Rahaim, Iman Abdalla, Moussa Ayyash, Hany Elgala, Abdallah Khreishah, Thomas DC Little. "Welcome to the CROWD: Design Decisions for Coexisting Radio and Optical Wireless Deployments.", the IEEE Network - The Magazine of Global Internet working, Volume: 33, Issue: 5, pp 174 – 182, 2019.
3. Al-Khori, J., Nauryzbayev, G., Abdallah, M.M. and Hamdi, M., 2019. Joint beamforming design and power minimization for friendly jamming relaying hybrid RF/VLC systems. IEEE Photonics Journal, 11(2), pp.1-18, 2019.
4. Khreishah, A., Shao, S., Gharaibeh, A., Ayyash, M., Elgala, H. and Ansari, N., 2018. A hybrid RF-VLC system for energy efficient wireless access. IEEE Transactions on Green Communications and Networking, 2(4), pp.932-944, 2018.



5. Salameh, H.A.B., Almajali, S., Ayyash, M. and Elgala, H., 2018. Spectrum assignment in cognitive radio networks for internet-of-things delay-sensitive applications under jamming attacks. *IEEE Internet of Things Journal*, 5(3), pp.1904-1913, 2018.
6. Shao, Sihua, Abdallah Khreishah, and Hany Elgala. "Pixelated VLC-backscattering for self-charging indoor IoT devices." *IEEE Photonics Technology Letters* 29, no. 2 (2017): 177-180.
7. Ayyash, Moussa, Hany Elgala, Abdallah Khreishah, Volker Jungnickel, Thomas Little, Sihua Shao, Michael Rahaim, Dominic Schulz, Jonas Hilt, and Ronald Freund. "Coexistence of WiFi and LiFi toward 5G: Concepts, opportunities, and challenges." *IEEE Communications Magazine* 54, no. 2 (2016): 64-71.
8. Shao, Sihua, Abdallah Khreishah, Moussa Ayyash, Michael B. Rahaim, Hany Elgala, Volker Jungnickel, Dominic Schulz, Thomas DC Little, Jonas Hilt, and Ronald Freund. "Design and analysis of a visible-light-communication enhanced WiFi system." *Journal of Optical Communications and Networking* 7, no. 10 (2015): 960-973.
9. Gancarz, John E., Hany Elgala, and Thomas DC Little. "Overlapping PPM for band-limited visible light communication and dimming." *Journal of Solid-State Lighting* 2, no. 1 (2015): 3.
10. Hany Elgala and Thomas D. C. Little, "Polar-Based OFDM and SC-FDE Links towards Energy-Efficient Gbps Transmission under IM-DD Optical System Constraints", *OSA/IEEE Journal of Optical Communications and Networking (JOCN)*, special issue based on the OFC/NFOEC 2014 Conference [invited].
11. P. Butala, H. Elgala and T.D.C. Little, "Sample Indexed Spatial Orthogonal Frequency Division Multiplexing", *Chinese Optics Letters*, Volume 12 Issue 9, 2014.
12. John Gancarz, Hany Elgala and Thomas D. C. Little, "Impact of Lighting Requirements on VLC Systems", *IEEE Communications Magazine*, Visible Light Communications: The Road to Standardization and Commercialization, Vol. 51, Issue 12, pp. 34-41, December 2013.
13. Hany Elgala and Thomas D. C. Little, "Reverse Polarity Optical-OFDM (RPO-OFDM): Dimming Compatible OFDM for Gigabit VLC Links", *OSA Optics Express*, Vol. 21, Issue 20, pp. 24288-24299, October 2013.
14. R. Mesleh, H. Elgala and H. Haas, "LED Nonlinearity Mitigation Techniques in Optical Wireless OFDM Communication Systems", *IEEE/OSA Journal of Optical Communications and Networking*, Vol. 4, Issue 11, pp. 865-875, November 2012.
15. H. Elgala, R. Mesleh and H. Haas, "Indoor Optical Wireless Communication: Potential and State-of-the-Art", *IEEE Communication Magazine*, September 2011.
16. R. Mesleh, H. Elgala, and H. Haas, "On the Performance of Different OFDM Based Optical Wireless Communication Systems", *IEEE/OSA Journal of Optical Communications and Networking*, Vol. 3, No. 9, September 2011.
17. R. Mesleh, H. Elgala and H. Haas, "Optical Spatial Modulation", *IEEE/OSA Journal of Optical Communications and Networking*, Vol. 3, Issue: 3, pp: 234-244, 2011.
18. R. Mesleh, H. Elgala, R. Mehmood and H. Haas, "Performance of Optical Spatial Modulation with Transmitters-Receiver Alignment", *IEEE Communication Letters*, Vol. 15, Issue: 1, pp: 1089-7798, November 18, 2010.
19. H. Elgala, R. Mesleh and H. Haas, "An LED Model for Intensity-Modulated Optical Communication Systems", *IEEE Photonics Letter*, Vol. 22, Issue: 11, pp: 835-837, June 2010.
20. H. Elgala, R. Mesleh and H. Haas, "Indoor Broadcasting via White LEDs and OFDM", *IEEE Transactions on Consumer Electronics*, Vol. 55, No. 3, pp: 1127-1134, August 2009.
21. H. Elgala, R. Mesleh and H. Haas, "Non-linearity Effects and Predistortion in Optical OFDM Wireless Transmission Using LEDs", *International Journal of Ultra Wideband Communications and Systems (IJUWBCS)*, Vol. 1, No. 2, pp: 143-150, October 2009 [invited].

1. Autoencoder Model for OFDM-based Optical Wireless Communication is published in the Signal Processing in Photonic Communications Conference Proceedings, Optical Society of America (OSA) Technical Digest, paper SpT2E.3, Aug. 2019.
2. Deep Learning Based Optical Camera Communications is published in the Signal Processing in Photonic Communications Conference Proceedings, Optical Society of America (OSA) Technical Digest, paper SpTh3E.2, Aug. 2019.
3. S. Almajali, H. B. Salameh, M. Ayyash and H. Elgala, "Extending NS3 to Simulate Cognitive Radio Wireless Networks in a Jammed Environment," *2019 Sixth International Conference on Software Defined Systems (SDS)*, Rome, Italy, pp. 118-122, 2019.
4. Optimizing Handover Parameters by Q-learning for Context-aware Heterogeneous RF-VLC Networks is presented as a poster at the IEEE International Conference on Computer Communications (INFOCOM 2019).
5. Hussein, Ahmed F., Hany Elgala, and Thomas DC Little. "Evolution of Multi-Tier Transmission Towards 5G Li-Fi Networks." In 2018 IEEE Global Communications Conference (GLOBECOM), pp. 1-7. IEEE, 2018.
6. M. Careem, M. Khadr, A. F. Hussien, D. Saha, H. Elgala and A. Dutta, "CHRONOS: A Cloud based Hybrid RF-Optical Network Over Synchronous Links," *2018 IEEE 5G World Forum (5GWF)*, Silicon Valley, CA, pp. 351-356, 2018.
7. Li, Zhouchi, Sihua Shao, Abdallah Khreishah, Moussa Ayyash, Iman Abdalla, Hany Elgala, Michael Rahaim, and Thomas Little. "Design and Implementation of a Hybrid RF-VLC System with Bandwidth Aggregation." In 2018 14th International Wireless Communications & Mobile Computing Conference (IWCMC), pp. 194-200. IEEE, 2018.
8. Naurzybayev, Galymzhan, Mohamed Abdallah, and Hany Elgala. "On the performance of NOMA-enabled spectrally and energy efficient OFDM (SEE-OFDM) for indoor visible light communications." In 2018 IEEE 87th Vehicular Technology Conference (VTC Spring), pp. 1-5. IEEE, 2018.
9. Salameh, Haythem Bany, Sufyan Almajali, Moussa Ayyash, and Hany Elgala. "Securing delay-sensitive cognitive radio IoT communications under reactive jamming attacks: Spectrum assignment perspective." In 2018 Fifth International Conference on Software Defined Systems (SDS), pp. 20-24. IEEE, 2018.
10. Almajali, Sufyan, Haythem Bany Salameh, Moussa Ayyash, and Hany Elgala. "A framework for efficient and secured mobility of IoT devices in mobile edge computing." In 2018 Third International Conference on Fog and Mobile Edge Computing (FMEC), pp. 58-62. IEEE, 2018.
11. Zhang, Zhenyu, Anas Chaaban, Chao Shen, Hany Elgala, Tien Khee Ng, Boon S. Ooi, and Mohamed-Slim Alouini. "Worst-case residual clipping noise power model for bit loading in LACO-OFDM." In LIFI Congress (GLC), 2018 Global, pp. 1-6. IEEE, 2018.
12. Hussein, Ahmed F., and Hany Elgala. "Lightweight multi-carrier modulation for IoT." In *Broadband Access Communication Technologies XII*, vol. 10559, p. 105590W. International Society for Optics and Photonics, 2018.
13. Hussein, Ahmed F., Hany Elgala, and Thomas DC Little. "Visible light communications: Toward multi-service waveforms." In *Consumer Communications & Networking Conference (CCNC)*, 2018 15th IEEE Annual, pp. 1-6. IEEE, 2018.
14. Salameh, Haythem Bany, Sufyan Almajali, Moussa Ayyash, and Hany Elgala. "Security-aware channel assignment in IoT-based cognitive radio networks for time-critical applications." In *Software Defined Systems (SDS)*, 2017 Fourth International Conference on, pp. 43-47. IEEE, 2017.
15. Rahaim, Michael, Thomas DC Little, Hany Elgala, and Siddhartan Govindasamy. "An Ultra-Dense IoT Architecture using Hybrid CSMA with Sector Based Scheduling (CSMA/SS) via Visible Light Communications." In *Proceedings of the 2017 International Conference on Embedded Wireless Systems and Networks*, pp. 335-336. Junction Publishing, 2017.

16. Mazahir, Sana, Anas Chaaban, Hany Elgala, and Mohamed-Slim Alouini. "Effective information rates of single-carrier and multi-carrier modulation schemes for bandwidth constrained IM/DD systems." In Communications (ICC), 2017 IEEE International Conference on, pp. 1-6. IEEE, 2017.
17. Hussein, Ahmed F., Hany Elgala, Bassem Fahs, and Mona M. Hella. "Experimental investigation of DCO-OFDM adaptive loading using Si PN-based receiver." In Wireless and Optical Communication Conference (WOCC), 2017 26th, pp. 1-5. IEEE, 2017.
18. Ali, Ramy E., and Hany Elgala. "Energy efficient LED layout optimization for near-uniform illumination." In Fifteenth International Conference on Solid State Lighting and LED-based Illumination Systems, vol. 9954, p. 995406. International Society for Optics and Photonics, 2016.
19. Mirvakili, Ali, Hany Elgala, Thomas DC Little, and Valencia J. Koomson. "Dimming and Modulation for VLC-Enabled Lighting." In Optical Wireless Communications, pp. 409-430. Springer International Publishing, 2016.
20. P. M. Butala, H. Elgala and T. D. C. Little, "Performance of Color Shift Keying under Non-Linear System Model and Illumination Constraints," 2015 IEEE Globecom Workshops (GC Wkshps), San Diego, CA, 2015, pp. 1-7.
21. Lam, Emily, Sarah Kate Wilson, Hany Elgala, and Thomas DC Little. "Spectrally and energy efficient OFDM (SEE-OFDM) for intensity modulated optical wireless systems." arXiv preprint arXiv:1510.08172 (2015).
22. Mirvakili, Ali, Valencia J. Koomson, Michael Rahaim, Hany Elgala, and Thomas DC Little. "Wireless access test-bed through visible light and dimming compatible OFDM." In Wireless Communications and Networking Conference (WCNC), 2015 IEEE, pp. 2268-2272. IEEE, 2015.
23. Elgala, Hany, Sarah Kate Wilson, and Thomas DC Little. "Optical polar OFDM: On the effect of time-domain power allocation under power and dynamic-range constraints." In Wireless Communications and Networking Conference (WCNC), 2015 IEEE, pp. 31-35. IEEE, 2015.
24. Butala, Pankil M., Hany Elgala, Thomas DC Little, and Payman Zarkesh-Ha. "Multi-wavelength visible light communication system design." In Globecom Workshops (GC Wkshps), 2014, pp. 530-535. IEEE, 2014.
25. Little, Thomas DC, and Hany Elgala. "Adaptation of OFDM under visible light communications and illumination constraints." In Signals, Systems and Computers, 2014 48th Asilomar Conference on, pp. 1739-1744. IEEE, 2014.
26. Shao, Sihua, Abdallah Khreishah, Michael B. Rahaim, Hany Elgala, Moussa Ayyash, Thomas DC Little, and Jie Wu. "An indoor hybrid WiFi-VLC internet access system." In Mobile Ad Hoc and Sensor Systems (MASS), 2014 IEEE 11th International Conference on, pp. 569-574. IEEE, 2014.
27. Elgala, Hany, and Thomas DC Little. "SEE-OFDM: Spectral and energy efficient OFDM for optical IM/DD systems." In Personal, Indoor, and Mobile Radio Communication (PIMRC), 2014 IEEE 25th Annual International Symposium on, pp. 851-855. IEEE, 2014.
28. Butala, Pankil M., Hany Elgala, and Thomas DC Little. "Performance of optical spatial modulation and spatial multiplexing with imaging receiver." In Wireless Communications and Networking Conference (WCNC), 2014 IEEE, pp. 394-399. IEEE, 2014.
29. Elgala, Hany, and Thomas DC Little. "P-OFDM: spectrally efficient unipolar OFDM." In Optical Fiber Communication Conference, pp. Th3G-7. Optical Society of America, 2014.
30. Butala, Pankil M., Hany Elgala, and Thomas DC Little. "SVD-VLC: A novel capacity maximizing VLC MIMO system architecture under illumination constraints." In Globecom Workshops (GC Wkshps), 2013 IEEE, pp. 1087-1092. IEEE, 2013.
31. Mesleh, Raed, Hany Elgala, and Thomas DC Little. "On the performance degradation of optical wireless OFDM communication systems due to changes in the LED junction temperature." In Telecommunications (ICT), 2013 20th International Conference on, pp. 1-5. IEEE, 2013.

32. Mesleh, Raed, Hany Elgala, and Thomas Little. "A novel method to mitigate LED nonlinearity distortions in optical wireless OFDM systems." In Optical Fiber Communication Conference, pp. JW2A-69. Optical Society of America, 2013.
33. Stefan, Irina, Hany Elgala, and Harald Haas. "Study of dimming and LED nonlinearity for ACO-OFDM based VLC systems." In Wireless Communications and Networking Conference (WCNC), 2012 IEEE, pp. 990-994. IEEE, 2012.
34. Mesleh, Raed, Hany Elgala, and Harald Haas. "Performance analysis of indoor OFDM optical wireless communication systems." In Wireless Communications and Networking Conference (WCNC), 2012 IEEE, pp. 1005-1010. IEEE, 2012.
35. Ghimire, Birendra, Irina Stefan, Hany Elgala, and Harald Haas. "Time and frequency synchronisation in optical wireless OFDM networks." In Personal Indoor and Mobile Radio Communications (PIMRC), 2011 IEEE 22nd International Symposium on, pp. 819-823. IEEE, 2011.
36. Mesleh, Raed, Hany Elgala, Marwan Hammouda, Irina Stefan, and Harald Haas. "Optical spatial modulation with transmitter-receiver alignments." In Networks and Optical Communications (NOC), 2011 16th European Conference on, pp. 1-4. IEEE, 2011.
37. Stefan, Irina, Hany Elgala, Raed Mesleh, Dominic O'Brien, and Harald Haas. "Optical wireless OFDM system on FPGA: Study of LED nonlinearity effects." In Vehicular Technology Conference (VTC Spring), 2011 IEEE 73rd, pp. 1-5. IEEE, 2011.
38. Mesleh, Raed, Hany Elgala, and Harald Haas. "On the performance of coded optical spatial modulation." In Personal Indoor and Mobile Radio Communications (PIMRC), 2010 IEEE 21st International Symposium on, pp. 820-824. IEEE, 2010.
39. Elgala, Hany, Raed Mesleh, and Harald Haas. "Impact of LED nonlinearities on optical wireless OFDM systems." In Personal Indoor and Mobile Radio Communications (PIMRC), 2010 IEEE 21st International Symposium on, pp. 634-638. IEEE, 2010.
40. Mesleh, Raed, Hany Elgala, and Harald Haas. "An overview of indoor OFDM/DMT optical wireless communication systems." In Communication Systems Networks and Digital Signal Processing (CSNDSP), 2010 7th International Symposium on, pp. 566-570. IEEE, 2010.
41. Mesleh, Raed, Rashid Mehmood, Hany Elgala, and Harald Haas. "Indoor MIMO optical wireless communication using spatial modulation." In Communications (ICC), 2010 IEEE International Conference on, pp. 1-5. IEEE, 2010.
42. Elgala, Hany, Raed Mesleh, and Harald Haas. "Predistortion in optical wireless transmission using OFDM." In Hybrid Intelligent Systems, 2009. HIS'09. Ninth International Conference on, vol. 2, pp. 184-189. IEEE, 2009.
43. Elgala, H., R. Mesleh, and H. Haas. "Practical considerations for indoor wireless optical system implementation using OFDM." In Telecommunications, 2009. ConTEL 2009. 10th International Conference on, pp. 25-29. IEEE, 2009.
44. Elgala, Hany, Raed Mesleh, and Harald Haas. "A study of LED nonlinearity effects on optical wireless transmission using OFDM." In Wireless and Optical Communications Networks, 2009. WOCN'09. IFIP International Conference on, pp. 1-5. IEEE, 2009.
45. Elgala, Hany, Raed Mesleh, Harald Haas, and Bogdan Pricope. "OFDM visible light wireless communication based on white LEDs." In Vehicular Technology Conference, 2007. VTC2007-Spring. IEEE 65th, pp. 2185-2189. IEEE, 2007.
46. Afgani, M. Z., H. Haas, H. Elgala, and D. Knipp. "BVisible light communication using OFDM,[in Proc. 2nd Int." In Conf. TRIDENTCOM, p. 134. 2006.
47. Afgani, Mostafa Z., Harald Haas, Hany Elgala, and Dietmar Knipp. "Visible light communication using OFDM." In Testbeds and Research Infrastructures for the Development of Networks and Communities, 2006. TRIDENTCOM 2006. 2nd International Conference on, pp. 6-pp. IEEE, 2006.

October 2019

## Patents

1. Hany Elgala and Thomas D. C. Little, "Optical orthogonal frequency division multiplexing (O-OFDM) system with pulse-width modulation (PWM) dimming", US 9621268 B2
2. Hany Elgala and Thomas D. C. Little, "System and Method For Embedding Phase and Amplitude Into a Real-Valued Unipolar Signal", US 20170070298 A
3. Hany Elgala, "Barcode, Sende- und Empfangssignalfolge sowie Kommunikationsvorrichtung", "Barcode, Transmitter-Receiver Signals and Communication Chain", DE 102013101275 A1
4. H. Elgala and R. Mesleh, "Nonlinearity Compensation in Optical Communication Systems via Alternative Signal Clipping and a Multiple LED Transmitter", WO/2011/082713
5. Harald Haas, Raed Mesled and Hany Elgala, "Transmitter for Optical Data Transfer having a Non-Linear Light Source and Associated Receiver", WO/2011/003393
6. Harald Haas, Erhard Bassow, Hany Elgala and Raed Mesleh, "Optical Free Space Data Transmission", WO/2009/132877

## PhD Thesis Committee member

- 2015 Michael Rahaim, Boston University
- 2017 Sihua Shao, New Jersey Institute of Technology

## Student Supervision

### *PhD*

1. Ahmed Hussein, University at Albany, 2016 – present  
Multi-Service Modulation in Heterogeneous Radio-Optical Networks
2. Monette Khadr, University at Albany, 2017 – present  
Security-Aware Modulation and Multiple input/multiple output (MIMO) Techniques
3. Michael Rahaim, Boston University, 2012–2015  
Coexistence of Radio-Optical Networks
4. Yuting Zhang, University at Albany, 2014 – 2015  
Activity Recognition in Smart Rooms
5. Pankil Butala, University at Albany, 2013 – 2015  
MIMO techniques in Visible Light Communications
6. Irina Stefan, Jacobs University, 2010-2013  
Multi-User Access and Link Adaptation for Indoor Optical Wireless Communication Systems
7. Crisanto Quintana Sánchez (Exchange Student), Jacobs University, Fall Semester, 2010  
Experimental Measurements for Hard-/Soft-Decoded Optical OFDM

### *MSc*

1. Priti Pachpande, University at Albany, 2017 – 2019  
Machine Learning in Communications/OFDM
2. Emily Lam, Boston University, 2014 – 2015  
Spectral and energy efficient optical OFDM formats
3. John Gancarz, Thesis, Boston University, 2013  
Energy efficiency and light quality control in VLC systems
4. Svilen Dimitrov, Thesis, Jacobs University, 2009  
SINR and path-loss modeling of a cellular optical wireless system in aircraft cabin
5. Dipesh Mistry, thesis, Jacobs University, 2009  
Development of algorithms for Ethernet communication between Altera FPGA and user PC

October 2019

6. Mihai Voica, thesis, Jacobs University, 2009  
Graphical user interface development using Altera NIOS II tool and Sharp C