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SUMMARY

Dynamic and inspiring researcher specialized in bio-nanotechnology and biomedical engineering, with a unique interdisciplinary background that combines a Bachelor's degree in Microbiology with a PhD in Electrical Engineering. I am deeply committed to fostering academic and personal growth in students, encouraging them to become lifelong learners and scholars. With a passion for bridging the gap between biology and engineering, I lead a cutting-edge multidisciplinary team focusing on molecular communication and optogenetics projects, utilizing my expertise in biology to innovate in engineering solutions. I have a proven track record of success in applied research, with numerous publications in prestigious journals and conferences. My commitment to education extends beyond research; I have supervised PhD and Master's students, helping them navigate their academic and professional journeys. As a guest lecturer and teaching assistant, I have honed my skills in creating engaging and challenging learning environments, aiming to inspire students not just in academics but also in their career aspirations. My involvement in the academic community and my efforts to integrate biological solutions with engineering challenges underscore my strong planning, organizational, multi-tasking, and leadership skills. I am motivated to continue contributing to the field of biology and biotechnology, nurturing the next generation of scientists and engineers.

EDUCATION

Ph.D. in Electrical Engineering   05/2017-12/2020

Faculty of Engineering, Université de Sherbrooke, Québec, Canada

Dissertation: Investigation Design and Evaluation of New Methods to Enhance the Performance of Nano-Communication Networks.

M.Eng. in Biomedical Electronics with Utmost distinction (Valedictorian)   09/2014-07/2016

Faculty of Technology, Université de Batna 2, Batna, Algeria

Field: Biosensors, Optics, Numerical Analysis, Semi-Conductors.

B.Eng. Medical Instrumentation, Rank 1/65   09/2011-07/2014

Faculty of Technology, Université de Batna 2, Batna, Algeria

Field: Medical Instrumentation, Signal Processing, Sensors.

B.Eng. Microbiology   09/2007-07/2011

Department of Microbiology, Université de Batna 2, Batna, Algeria
Field: Microbiology, Biochemistry.

PROFESSIONAL EXPERIENCE

Researcher   01/2021-Present

School of Electrical Engineering and Computer Science (SEECS), University of Ottawa, Canada
- Research topics:
  o Optogenetics in neuroscience.
  o Simulation and Evaluation of a Bio-inspired Nanogenerator for Medical Applications.
  o Design and evaluation of a receiver for wired nano-communication networks.

- Leading a team of skilled researchers in multidisciplinary projects that spans biology, optogenetics, neuroscience, electrical and computer engineering:
  - Fostering collaboration between experts in diverse fields to innovate at the intersection of biology and engineering.
  - Guiding project direction to ensure scientific rigor and impactful outcomes.
  - Promoting an inclusive and dynamic research environment conducive to learning and discovery.
- Conducting research in several groundbreaking projects on nano-communication systems monitoring nano-devices, and bio-inspired nanogenerators:
  - Designing and implementing experimental and theoretical frameworks to advance the understanding of optogenetics and nano-scale systems.
  - Publishing findings in high-impact journals and presenting at international conferences to disseminate research advancements.
- Advising and mentoring undergraduate and graduate students on their research works:
  - Providing academic guidance and research oversight to foster student growth and independence.
  - Tailoring mentorship to meet individual student needs and career aspirations.
  - Encouraging interdisciplinary learning and research to broaden students' academic and professional horizons.
- Writing proposals for funding requests:
  - Identifying and pursuing funding opportunities from government, private, and non-profit organizations.
  - Crafting compelling and persuasive proposals that clearly articulate the significance and innovation of the research projects.
  - Collaborating with institutional grant offices and research partners to maximize proposal success.

Teaching Assistant   09/2017-12/2019
Faculty of Engineering, University of Sherbrooke, Quebec, Canada

Courses
- Programmable logic and interfaces, GEL-442
- Multiplexing and Switching System, GIF-660
- Communication Networks and Protocols, GIF-332
- Operating systems, GIF-320
- Introduction to networks and protocols, GEL-641
- Communication Networks and Protocols, GIF-331

Teaching Resources
- Software: MATLAB, Vivado Design Suite, ModelSim, Arduino IDE, Raspberry Pi OS, Wireshark, GNS3, Cisco Packet Tracer, s-3 or OPNET, VMware Workstation, SNMP Software.
- Tools: Moodle, Zoom, Microsoft Teams, FPGA development boards, Digital oscilloscopes, Logic analyzers, Network routers and switches, Multiplexing equipment, Network cables and connectors.

Main Lab Skills
- Designing and simulating digital circuits, programming Field-Programmable Gate Arrays (FPGAs), interfacing microcontrollers with various sensors and actuators.
- Setting up and configuring multiplexers and switches, analyzing and implementing time-division and frequency-division multiplexing schemes, understanding switching architectures and algorithms.
- Foundational skills in protocol analysis, basic network design, and understanding the roles of various network devices and their protocols.
- Basic network configuration, understanding of OSI and TCP/IP models, fundamental protocols (IP, TCP, UDP, ICMP), simple network troubleshooting.
- Analyzing network protocols (TCP/IP, UDP, etc.), setting up routing and switching configurations, understanding network topologies, configuring network devices and software-defined networking components.

- Operating system installation and configuration, managing processes and memory, file system management, scripting and automation, understanding system calls and kernel architecture.

Microbiologist   11/2012-03/2017

Clinic Les Rosiers, Microbiological and Biochemical Analysis, Batna-Algeria
- Conducted comprehensive microbiological and biochemical analyses in a clinical setting:
    o Cultured and identified bacterial and fungal pathogens from various clinical specimens.
    o Performed sensitivity testing to guide antimicrobial therapy.
    o Utilized advanced biochemical assays to diagnose metabolic and infectious diseases.
- Managed laboratory operations and ensured quality control:
    o Maintained strict adherence to laboratory safety protocols and procedures.
    o Implemented quality control measures to ensure accuracy and reliability of test results.
    o Oversaw the calibration and maintenance of laboratory equipment.
- Contributed to the development and optimization of laboratory testing procedures:
    o Collaborated with senior microbiologists to refine testing techniques for enhanced efficiency and accuracy.
    o Participated in the evaluation and introduction of new testing methodologies.
- Provided critical support in the diagnosis and treatment of patients:
    o Compiled and interpreted test results to assist healthcare professionals in patient management.
    o Communicated effectively with medical staff to clarify orders and discuss laboratory findings.
    o Contributed to patient care teams by offering insights on microbiological and biochemical test results.

Teacher   11/2015-03/2017

Private School Dar El-ilm, High school level, Batna, Algeria
- Taught courses/Labs (30h/45h),15 to 18 hours of teaching each semester.
- Developed course syllabus to meet accreditation standards.
- Prepared course and lab materials, Prepared and graded exams and homework.
- Provide bi-weekly progress reports to assess the students' progress.
- Delivered workshops activities and events designed to help students
- Courses:
    o Nature and life sciences
    o Mathematics
    o Chemistry
    o Physics

Professional services

Supervision
- Arash Azarnoush, Ph.D. candidate
    o School of Electrical Engineering and Computer Science, University of Ottawa
    o Dissertation: "Design of a bio-inspired luminescence system for optogenetics application".
- Eslin Üstün Karatop, Ph.D. candidate
    o School of Electrical Engineering and Computer Science, University of Ottawa
    o Dissertation: "Ultrasound-Induced Bioluminescent Neurostimulation Efficacy at the Nano Scale: Experimental Study".
- Maria Khan, Master student
    o School of Electrical Engineering and Computer Science, University of Ottawa
    o Project title: "Design and Implementation of a Simulation Framework for Bio-Neural Dust System".
- Ghazal Asemian, Master student
    o School of Electrical Engineering and Computer Science, University of Ottawa
    o Project title: "Simulation of Channelrhodopsins for Optogenetics Applications".
- Gabriel Lévesque, Undergraduate student
    o School of Electrical Engineering and Computer Science, University of Ottawa
    o Project title: "Design and Implementation of a Simulation Framework for Bio-Neural Dust

System".
- Maja Witter, Undergraduate student
  o School of Electrical Engineering and Computer Science, University of Ottawa
  o Project title: "Design and Implementation of a Simulation Framework for Bio-Neural Dust System".
- Hans Barrera, Undergraduate student
  o School of Electrical Engineering and Computer Science, University of Ottawa
  o Project title: "Design and Implementation of a Simulation Framework for Bio-Neural Dust System".
- Biswadeep Chakraborty, Undergraduate student
  o Faculté du Génie, Université de Sherbrooke
  o Essay: "Molecular Communication".

Journal reviewer services
- IEEE Transactions on Molecular, Biological, and Multi-Scale Communications
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on NanoBioscience
- IEEE Communications Letters
- Nano Communication Networks
- MDPI Sensors

Member of (Conference) Technical Program Committees
- IEEE International Conference on Communications (ICC,) 2019
- IEEE Global Communications Conference (GLOBECOM), 2019
- IEEE Wireless Communications and Networking Conference (WCNC), 2019
- IEEE Wireless Communications and Mobile Computing Conference (IWCMC), 2019
- IEEE Wireless Communications and Mobile Computing Conference (IWCMC), 2018

HONOURS, AWARDS, FELLOWSHIPS

-	1st Prize, Engineering and Computer Science Poster Competition (IEEE Category)	2024
-	2nd, Engineering and Computer Science Poster Competition (Photonics Category)	2024
-	EUREKA Scholarship, University of Sherbrooke	2019
-	PhD tuition waiver scholarship, Government of Quebec	2017
-	Excellent Student Award, Faculty of Technology, Université de Batna 2	2016
-	Excellent Student Award, Faculty of Technology, Université de Batna 2	2014

OTHER INVOLVEMENTS

- OPTICA guest speaker. Selected invited talks in OPTICA Events
  o "From Past to Future: Exploring the Evolution and Potential of Biomedical Imaging and Sensing Applications", Algonquin College Student Chapter, 2023
  o "Bridging Times: The Advancement and Future Horizons of Biomedical Imaging and Sensors", Algonquin College Student Chapter, 2024

- Organizer and instructor for Active learning in Biomedical engineering workshops for secondary school students and undergraduate students.

- Participated/ing in the organization of Expo-Science Sherbrooke, contributing to a science fair that encourages and showcases the scientific inquiry and projects of students aged 6 to 20 from the Estrie region.
  o Engaged in the facilitation and support of this event, part of the wider Expo-sciences Hydro-Québec series, emphasizing hands-on science and technology education through active learning methodologies.

- Co-founder of Association Seeking Knowledge in Batna, Algeria, promoting the value of books and the habit of daily reading.

- o Organize and lead engaging activities for students to foster a love of learning and literature.
- o Provide supplemental tutoring for pupils and students, enhancing their academic skills and knowledge.

RESEARCH EXPERIENCE

- Applied research:
  - o Enhancement of nanonetwork efficiency and throughput for medical applications through innovative electron-based communication systems utilizing bi-globular protein polymers.
  - o Development of a groundbreaking actin-based wired nanosystem achieving megabits per second throughput, significantly advancing nanoparticle communication technology.
  - o Design and assessment of a novel bio-optical receiver for wired nano-communication systems, capable of transforming electron pulses into bioluminescent light pulses, enhancing information extraction efficiency.
  - o Introduction of bio-inspired nanogenerators and optical brain interfaces for potential management and treatment of neurological disorders, leveraging advancements in optogenetics.
  - o Implementation of optical technology and genetic engineering for high-resolution study and imaging of neural circuits, addressing challenges in neurostimulation and biocompatibility.

- Multidisciplinary Collaborators
  - o 5G/6G Network Communication: S. Cherkaoui, Polytechnique de Montréal, Montréal, Québec, Canada
  - o Molecular/Nano Communication: D. Makrakis, University of Ottawa, Ottawa, Ontario, Canada
  - o Blockchain and Intelligent transport systems, A. Hafid: Université de Montréal, Montréal, Québec, Canada
  - o Resource Allocation in Edge Computing Network: A. Abouaomar, Al Akhawayn University, Ifrane, Morocco
  - o Actin-based Wired Nano Communication: B. Chakraborty, Georgia Institute of Technology, Atlanta, Georgia, USA
  - o Internet of things and Ad-hoc sensor network: Abdellatif Kobbane, ENSIAS, Mohammed V University, Rabat, Morocco

- Leaded international applied research projects
  - o Nano-communication project funded by Natural Sciences and Engineering Research Council of Canada (NSERC), 2021-2022, "Design and Evaluation of an Optical Neural Stimulator Interface: Bio-Neural Dust (BND)".

- Professional Training and attended conferences
  - o Engineering and Computer Science Poster Workshop 2024, University of Ottawa, Ottawa, Canada.
  - o IEEE International Conference on Communications (ICC), June 2020. Dublin, Ireland.
  - o Artificial Intelligence Homecamp, Silicon Valley, 2020, #DZAICAMP2020.
  - o IEEE Global Communications Conference (GLOBECOM), December 2019, Waikoloa, Hawaii, USA.
  - o IEEE Wireless Communications and Networking Conference (WCNC), April, 2019, Marrakesh, Morocco.
  - o 15th International Wireless Communications and Mobile Computing Conference (IWCMC), June, 2019, Tangier, Morocco.
  - o 14th International Wireless Communications and Mobile Computing Conference (IWCMC), June, 2018, Limassol, Cyprus.
  - o "Python and Pandas for Data Engineering" online non-credit course authorized by Duke University and offered through Coursera.
  - o "Linux and Bash for Data Engineering" online non-credit course authorized by Duke University and offered through Coursera.
  - o "Scripting with Python and SQL for Data Engineering" online non-credit course authorized by Duke University and offered through Coursera.

Several publications in international peer reviewed journals and conference proceedings:

List of publications in international refereed journals:

- **Under review:**
    - Yahya Shahsavari, <u>Oussama Abderrahmane Dambri</u>, Yaser Baseri, A. Hafid, and Dimitrios Makrakis. "Integration of Federated Learning and Blockchain in Healthcare: A Tutorial", **IEEE Communications Surveys & Tutorials**, 2024.
    - Dimitrios Makrakis, <u>Oussama Abderrahmane Dambri</u> and A. Hafid, "Design of Bio-Optical Transceiver for in vivo Biomedical Sensor Applications", **Sensors**, 2024.
    - <u>Oussama Abderrahmane Dambri</u>, Dimitrios Makrakis and A. Hafid, "Neuronal Communication Systems: A New Frontier in Brain-Machine Interfaces and Neuro-prosthetics", **IEEE Nanotechnology Magazine**, 2024.

- **Published:**
    1. <u>Oussama Abderrahmane Dambri</u>, S. Cherkaoui and D. Makrakis. "Design and Evaluation of a Receiver for Wired Nano-Communication Networks", **IEEE Transactions on NanoBioscience**, vol. 22, no. 2, pp. 223-236, April 2023.
    2. A. Azarnoush, <u>Oussama Abderrahmane Dambri</u>, U. K. Eslin, D. Makrakis and S. Cherkaoui. "Simulation and Performance Evaluation of a Bio-inspired Nanogenerator for Medical Applications", Accepted for publication the **IEEE Transactions on Biomedical Engineering**, Mars 2023.
    3. <u>Oussama Abderrahmane Dambri</u> and S. Cherkaoui. "Modeling Self-Assembly of Polymer-Based Wired Nano-Communication Channel", **IEEE Transactions on Molecular, Biological and Multi-Scale Communications**, vol. 8, no. 2, pp. 107-118, June 2022.
    4. <u>Oussama Abderrahmane Dambri</u> and S. Cherkaoui. "Performance Enhancement of Diffusion Based Molecular Communication", **IEEE Transactions on NanoBioscience**, vol. 19, no. 1, pp. 48-58, January 2020.
    5. <u>Oussama Abderrahmane Dambri</u> and S. Cherkaoui. "Toward a Wired Ad Hoc Nanonetwork", **IEEE International Conference on ' Communications** (ICC), 2019, Dublin, Ireland.
    6. A. Abouaomar, S. Cherkaoui, A. Kobbane and <u>Oussama Abderrahmane Dambri</u>, "A Resources Representation for Resource Allocation in Fog Computing Networks", **IEEE Global Communications Conference** (GLOBECOM), 2019, Waikoloa, HI, USA.
    7. <u>Oussama Abderrahmane Dambri</u>, A. Abouaomar and S. Cherkaoui. "Design Optimization of a MIMO Receiver for Diffusion-based Molecular Communication", **IEEE Wireless Communications and Networking Conference** (WCNC), 2019, Marrakesh, Morocco.
    8. <u>Oussama Abderrahmane Dambri</u>, S. Cherkaoui and B. Chakraborty. "Design and Evaluation of Self-Assembled Actin-Based Nano-Communication", 15th **International Wireless Communications and Mobile Computing Conference** (IWCMC), 2019, Tangier, Morocco.
    9. <u>Oussama Abderrahmane Dambri</u> and S. Cherkaoui. "Enhancing Signal Strength and ISI Avoidance of Diffusion-based Molecular Communication", 14th **International Wireless Communications and Mobile Computing Conference** (IWCMC), 2018, Limassol, Cyprus.