

Dieff Vital, Ph.D.

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Professional Experience

University of Illinois at Chicago

Bridge to the Faculty Postdoctoral Associate
Department of Electrical and Computer Engineering

August 2021-Present

RF Engineer, Sensatek Propulsion Technologies, Inc.

Passive RF sensing for turbine blades

April 2021-June 2021

Academic Degrees & Honors

Ph.D., Florida International University

Electrical and Computer Engineering GPA- 3.84/4.0

April 2021

- McKnight Dissertation Year Fellowship (2020-2021)
- Dissertation defended and approved as of March 26, 2021

MS, Florida International University

Electrical and Computer Engineering GPA-3.84/4.0

Dec. 2020

- SGA Graduate Scholarship (2018-2019, 2019-2020)

BS, Florida Polytechnic University

Mechanical and Industrial Engineering GPA-3.97/4.0 (*Summa Cum Laude*)

May 2017

- Presidential List (Fall 2015, Fall 2016, Spring 2017)
- Provost's List (Spring 2016)

Associate in Arts, Miami Dade College

Mechanical and Industrial Engineering GPA-3.95/4.0 (*Highest Honors with Distinction*)

Dec. 2014

- Dean's List (Spring 2013, Fall 2013, Spring 2014, Fall 2014, Spring 2015)
- Mathematics Award (April 2014)
- Basketball Properties Scholarship

Research Experience and other Work Experience

Graduate Research Assistant

Florida International University (RFCOMLab), Miami FL

Oct. 2017-Present

- Developed near-field and far-field Wireless RF-Power harvesting systems for on-body sensors
 - Prototyped the combination of antenna and power harvesting circuit on fabric
 - Developing a flexible wireless sensor network for space, military, and health applications (a smart bandage for wound monitoring and sensing)

Undergraduate Research Assistant

Florida Polytechnic University, Lakeland, FL

Jan. 2016-Aug. 2017

- Developed low-cost dielectric cell to test the dielectric properties of epoxy/diatom composites
 - Cultured diatoms that were later used to dope clay material
 - Characterized the capacitive properties of phosphatic clay-diatom mixture

Professional Development

NSF Regional and National Innovation Corps (I-Corps) program

Proposed a clothing-integrated wireless charging platform to help wearable electronic users to continuously power/charge their devices.

- Conducted more than 180 interviews with potential users and get their feedback
- Discovered that:
 - (1) lack of charging can be a lifesaving grace for patients with charging needs for their medical devices
 - (2) wireless charging modalities will allow for less human-touch for COVID-19 patient, and
 - (3) wireless charging will help front line workers like nurses and firefighters to save lives while protecting their own
- Won a \$50,000-NSF grant to conduct interviews and further the line of research to get the technology ready for commercialization

Technical Knowledge

- Lab equipment: LCR, multimeter, Spectrum Analyzer, Network Analyzer, Impedance Analyzer, Analog Signal Generator, Anechoic Chamber, Embroidery Machine, PCB Milling Machine, Lathe,
- Languages: French, Creole, Spanish (intermediate), English
- Software: C/C++, MatLab, Minitab, Latex, ADS, AutoCAD, ANSYS/HFSS, SolidWorks, Eagle

Journal Articles

1. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "Textile-Based Large Area RF-Power Harvesting System for Wearable Applications," IEEE Transactions on Antennas and Propagation (*journal article, 9 pages*)
2. **Vital, Dieff**, Bhardwaj, Shubhendu, "Misalignment Resilient Anchor-Shaped Antennas in Near-Field Wireless Power Transfer Using Electric and Magnetic Coupling Modes," IEEE Transactions on Antennas and Propagation (*Early access*) (*journal article, 8 pages*)
3. **Vital, Dieff**, Gaire, Pawan, Bhardwaj, Shubhendu, Volakis, John L. "An Ergonomic Wireless Charging System for Integration with Daily Life Activities," IEEE Transactions on Microwave Theory and Techniques (*journal article, 8 pages*)
4. Mao, Chun Xu, **Vital, Dieff**, Werner, Douglas H., Wu, Yuhao, Bhardwaj, Shubhendu, "Dual-Polarized Embroidered Textile Armband Antenna Array with Omni-Directional Radiation for On/Off-Body Wearable Applications," IEEE Transactions on Antennas and Propagation (*journal article, 10 pages*)
5. Gaire, Pawan, **Vital, Dieff**, Khan, Md Rayhan, Chibane, Cherif, Bhardwaj, Shubhendu "Ad-Hoc Mobile Power Connectivity Using a Wireless Power Transmission Grid," Nature Scientific Report (*Under Review*) (*journal article, 10 pages*)
6. Martinez, Idellyse, Mao, Chun Xu, **Vital, Dieff**, Shahariar, Hasan, Werner, Douglas H., Jur, Jesse, S., Bhardwaj, Shubhendu. "Compact, Low-Profile and Robust Textile Antennas with Improved Bandwidth for Easy Garment Integration," IEEE Access (*journal article, 11 pages*)

Referred Conference Proceedings

7. Mao, Chunxu, **Vital, Dieff**, Pingjuna L. Werner, Douglas Werner, Bhardwaj, Shubhendu. "Dual-Polarized Armband Embroidered Textile Antenna for On/Off-Body Wearable Applications," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2019 IEEE International Symposium on (*conference article, 2 pages*)
8. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "Misalignment Resilient, Near Field Wireless Power Transfer (WPT) Antennas using Anchor Shape," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2019 IEEE International Symposium on (*conference article, 2 pages*)
9. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "Bending and Twisting Tests for RF Performances of Textile Transmission Lines," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2019 IEEE International Symposium on (*conference article, 2 pages*)
10. **Vital, Dieff**, Zhong, Jingni, Bhardwaj, Shubhendu, Volakis, John L. "Loss-Characterization and Guidelines for Embroidery of Conductive Textiles," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2018 IEEE International Symposium on (*conference article, 2 pages*)
11. Zhong, Jingni, **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "2.45 GHz Wearable RF-Harvester for Large Area Textile Harvester (LATH) Integration," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2018 IEEE International Symposium on (*conference article, 2 pages*)
12. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "Textile-Based Novel Anchor-Shaped Antenna for Near-Field Wireless Power Transfer," 2019 International Workshop on Antenna Technology (iWAT) (*conference article, 2 pages*)
13. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "A 2.45 GHz RF Power Harvesting System Using Textile-Based Single-Diode Rectennas," IEEE IMS-MTT International Microwave Symposium 2019 (*conference article, 4 pages*)
14. Bhardwaj, Shubhendu, Sayeed, SK Yeahia Been, Jose Solis Camara, **Vital, Dieff**, Raj, PM, "Reconfigurable mm-Wave Flexible Packages with Ultra-Thin Fan-Out Embedded Tunable Ceramic IPDs," International Symposium on Microelectronics 2019 (*conference article, 4 pages*)
15. Sayeed, SK Yeahia Been, Daniel Wilding, Jose Solis Camara, **Vital, Dieff**, Bhardwaj, Shubhendu, Raj, PM, "Deformable Interconnects with Embedded Devices in Flexible Fan-Out Packages," International Symposium on Microelectronics 2019 (*conference article, 4 pages*)
16. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "A Wireless Power Transfer System (WPTS) Using Misalignment Resilient, On-Fabric Resonators for Wearable Applications," IEEE IMS-MTT International Microwave Symposium 2020 (*Accepted*) (*conference article, 4 pages*)
17. **Vital, Dieff**, Volakis, John L., Bhansali, Shekhar, Bhardwaj, Shubhendu "Electronic Wound Monitoring Using Fabric-Integrated Data Modulation," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2020 IEEE International Symposium on (*Accepted*) (*conference article, 2 pages*)
18. **Vital, Dieff**, Gonzalez, Alfredo, Volakis, John L., Alwan, Elias A., Bhardwaj, Shubhendu "A 2.45 -GHz Frugal Dumbbell-Shaped Rectenna Built on Recyclable Substrates," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2020 IEEE International Symposium on (*Accepted*) (*conference article, 2 pages*)

19. **Vital, Dieff**, Monshi, Md Monirojjaman, Bhardwaj, Shubhendu, Raj, P. Markondeya, Volakis, John L. "Flexible Ink-Based Interconnects for Textile-Integrated RF Components," Antennas and Propagation & USNC/URSI National Radio Science Meeting, 2020 IEEE International Symposium on (Accepted) (conference article, 2 pages)
20. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "Textile-Based Corrugated-X Resonators for Wireless RF Power Transfer for Wearable Applications," 2020 Antenna Measurement Techniques Association Symposium (conference article, 2 pages)
21. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "An Ultra-High-Frequency Wirelessly-Powered Smart Bandage for Wound Monitoring and Sensing using Frequency Modulation," IEEE IMS-MTT International Microwave Symposium 2021 (accepted) (conference article, 3 pages)
22. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "A Novel Corrugated-Shank Anchor-Shaped Antenna for Wireless Power Transfer," IEEE URSI-GASS 2021 (Accepted) (conference article, 2 pages)
23. Gaire, Pawan, **Vital, Dieff**, Khan, Md Rayhan, Chibane, Cherif, Bhardwaj, Shubhendu "Wireless Power Charging of Smartphone up to 6 Feet from Transmitter Antenna at 2.4 GHz," IEEE APS/URSI 2021 (Accepted) (conference article, 2 pages)

Abstracts Presented

1. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "On-Textile Coupled Magnetic Resonators for Wireless Power Harvesting Applications," USNC-URSI 2019, Boulder Colorado
2. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "A 2.45 GHz Textile-based RF Rectenna Array for Sensor Applications," USNC-URSI 2019, Boulder Colorado
3. **Vital, Dieff**, Bhardwaj, Shubhendu, Volakis, John L. "Anchor-Shaped Antenna-Based Wireless Charging Platform for Internet of Things," USNC-URSI 2021, Virtual

Patent (Awarded)

1. **Vital, Dieff**, Volakis, John L., Bhardwaj, Shubhendu "Power Transfer and Harvesting System Having Anchor-Shaped Antennas (US 16/916,187),"
2. **Vital, Dieff**, Pulak Bhushan, Shekhar Bhansali, Volakis, John L., Bhardwaj, Shubhendu "Smart Bandage for Electrochemical Monitoring and Sensing Using Fabric-Integrated Data Modulation," (US 17/157,624)

In the News...

Vital, Dieff, and Volakis, John L. featured in "E-Textiles for Health Monitoring: Off to a Slow Start, but Coming Soon," (IEEE Pulse) written by Leslie Mertz in June 2020.

Awards

- Honorable Mention: IMS 2019 3MT® Competition, 2020
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- 3rd place winner: IMS 2019 Student Design Competition, 2019
- IMS 2019/ RFIC2019 PhD Student Sponsorship (Travel Award), 2019
- 2019 USNC-URSI Travel fellowship, 2019
- NSF Student Travel Award, 2018
- 2021 Young Scientist Award (URSI-GASS)
- NSF IEEE RFIC' 20 Student Conference Registration Award, 2020
- FIU Fall 2018 Student Conference Award, 2018
- McKnight Fellowship Travel and Dissertation Grant (2019 and 2020)
- 2019 USNC-URSI Travel Fellowship for NRSM in Boulder, Colorado
- 2nd place winner: Best Poster Award-Transforming Antenna Center workshop on Origami Antennas and Electromagnetics at FIU
- Al Hall Memorial Award, Florida Academy of Sciences
- 2017-Association of Southeastern Biologists (ASB) Support Award for First generation Undergraduate
- 2017-Elizabeth Hayes Travel Award to attend the Florida Academy of Sciences Meeting
- 3rd Place Winner: Mathematics Olympics (2015)
- 1st Place Winner: 2015 State-wide Statistical Analysis Competition (Florida)
- 2nd Place Winner: 2015 State-wide Future Business Educator (Florida)
- 4th Place Winner: 2015 State-wide Macroeconomics (Florida)
- 4th Place Winner: 2015 National level Future Business Educator (USA)

Professional Memberships

- **Associate Member:** IEEE Union Radio-Science Internationale (URSI)-Commission B (academic)
- **Paul Harris Fellow:** Rotary International (leadership)

Professional Societies

- IEEE Microwave Theory and Techniques (**Member**)

- IEEE Electronics Packaging Society (**Member**)
- IEEE Young Professionals (**Member**)
- IEEE Engineering in Medicine and Biology Society (**Member**)
- IEEE MTT-TC-26 "RFID, Wireless Sensors and IoT" (**Affiliated Member**)
- **Reviewer**-IEEE Transaction on Antennas and Propagation
- **Reviewer**-IEEE Transaction on Components, Packaging and Manufacturing Technology
- Sigma Xi-The Scientific Research Society (**2019 Secretary**)
- Toastmasters International (**2020-2021 Treasurer**)
- Florida Polytechnic University-**Presidential Ambassadors**
- Rotaract Club-Florida Polytechnic University (**Founding President**)