

Darshana L. Weerawarne

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Education

- 2017 Ph.D, Physics, State University of New York at Binghamton, New York, USA
- 2014 M.S, Physics, State University of New York at Binghamton, New York, USA
- 2010 B.Sc (Hons), Engineering Physics, University of Colombo, Colombo, Sri Lanka

Research Interest: Printed flexible electronics, Applied optics, Laser assisted heating

Research Experience

Key Collaborators - NextFlex, General Electric, Lockheed Martin, MIT, Cornell University, Columbia University

- 2017-2019 Postdoctoral Research - Flexible Electronics
Center for Advanced Microelectronics Manufacturing, Binghamton University
 - Substrate and conductive material characterization for flexible electronics
 - Design, fabrication, and testing of flexible electronics
 - Laser assisted thermal processing of nanoparticle inks
 - Optical metrology to assess reliability of printed electronics
- 2013-2017 Doctoral Research - Nonlinear Propagation of Ultrashort Laser Pulses
Femtosecond Spectroscopy and Smart Energy Laser Lab, Binghamton University
 - Low-order time-resolved harmonic generation
 - Digital in-line holography and optical imaging
 - Femtosecond/nanosecond laser sintering of nanoparticle inks
 - Mathematical simulations of ultrashort laser pulse propagation and laser assisted heating (C++, Matlab, Mathematica)
- 2010-2012 Postgraduate Research - Sustainable Computing and Electronics
Sustainable Computing Research Group, University of Colombo School of Computing, Sri Lanka
 - Wireless Ad-Hoc and Sensor Networks communication
 - Smart home systems and electronics
- 2008-2010 Undergraduate Research - Lightning Induced Electric Field Detection
Atmospheric and Lightning Research Group, University of Colombo, Sri Lanka
 - Lightning induced electric field detection and antenna systems

Teaching Experience

- 2012-2017 Graduate Teaching Assistant
State University of New York at Binghamton, USA
 - General Physics, Computational Physics (using Mathematica)
- 2010-2012 Visiting Lecturer
University of Colombo School of Computing, Sri Lanka

- Analogue and Digital Electronics (for BSc in Computer Science)
- 2011-2012 Teaching Assistant
University of Colombo School of Computing, Sri Lanka
- Wireless Ad-hoc and Sensor Networks, High Performance Computing (For MSc and BSc in Computer Science)
- 2010-2011 Temporary Instructor, Teaching Assistant
Department of Physics, University of Colombo, Sri Lanka
- Electronic Instrumentation Laboratory, Computational and Simulation Laboratory (For BSc in Physics and MSc in Applied Electronics)

Professional Service

- 2015-2018 Member of the outreach program
Physics Outreach Program (POP), Binghamton University
- 2013-2016 Graduate volunteer
Broome County Promise Zone (a university-community partnership)
- 2012 Lecturer
Robotics, Embedded systems, and Wireless Sensor Networks
IEEE student branch, University of Colombo School of Computing, Sri Lanka
- 2011-2012 Team member
National Peoples Registry project, Defence Ministry, Sri Lanka
- 2012 Team member
Network and Security audit, Cooperate Insurance, Sri Lanka
- 2011 Member of the Logistics Committee
International Conference on Advances in ICT for Emerging Regions (ICTer) 2011
Colombo Sri Lanka

Technical Skills

- **Printed flexible electronics;** Aerosol Jet Printing (AJP), Precision dispensing, Screen printing, Reliability testing (Instron, MTS), AutoCAD, Mastercam layout design
- **Optical science;** High power laser operation and safety, Femtosecond time resolved spectroscopy, Digital inline holography and imaging, Laser sintering and micromachining, Optical metrology and image processing
- **Mathematical modelling and simulations;** Ultrashort laser pulse propagation and nonlinear effects, Laser assisted heating and thermal effects
- **Electronic circuit design, simulation, and fabrication;** Simulink, Orcad, PSPICE
- **System automation, control, and software development:** Communication protocols SSP (SPI, I2C), USART, Motion controlling FTDI, SPiiPlus, APT SDK, Kinesis SDK, Image acquisition FlyCapture SDK, Spinnaker SDK, Pylon
- **Wireless sensor network development and programming;** Sensor platforms MSB430, Micaz, Tmote Sky
- **Microcontroller/microprocessor programming and programmable logic;** Micro-controllers PIC, Atmel, AtMega, AVR, MSP, Arduino
- **Scientific computing;** C/C++, Python, Matlab, Mathematica, Labview, Octave, Octopus (TDFT), MEEP (FDTD), MNPBEM (BEM)

- **Visual Programming**; Visual studio / C++
- **High performance computing**; Parallel computing: Pthreads, MPI, GPU
- **Computer literacy**; Operating systems Windows, Linux, Word processing MS Office, Open Office, L^AT_EX

Publications

Citations 232, h-index 5, i10-index 5

- [1] R. R. Salary, J. P. Lombardi, D. L. Weerawarne, P. K. Rao, and M. D. Poliks, “Toward defect-free additive fabricating of flexible and hybrid electronics: Physics-based computational modeling and control of aerosol jet printing,” in *International Conference on Applied Human Factors and Ergonomics*, pp. 351–361, Springer, Cham, 2019.
- [2] J. P. Lombardi, R. R. Salary, D. L. Weerawarne, P. K. Rao, and M. D. Poliks, “Image-based closed-loop control of aerosol jet printing using classical control methods,” *Journal of Manufacturing Science and Engineering*, vol. 141, no. 7, p. 071011, 2019.
- [3] G. S. Khinda, M. Strohmayer, D. L. Weerawarne, J. P. Lombardi III, N. Tokranova, J. Castracane, C. A. Ventrice, Jr, M. D. Poliks, and I. A. Levitsky, “Transparent conductive printable meshes based on percolation patterns,” *ACS Applied Electronic Materials*, 2019.
- [4] R. R. Salary, J. P. Lombardi, D. L. Weerawarne, P. K. Rao, and M. D. Poliks, “A computational fluid dynamics (CFD) study of material transport and deposition in aerosol jet printing (AJP) process,” in *ASME 2018 International Mechanical Engineering Congress and Exposition*, pp. V002T02A057–V002T02A057, American Society of Mechanical Engineers, 2018.
- [5] M. Alhendi, J. P. Lombardi III, G. S. Khinda, M. Z. Kokash, D. L. Weerawarne, P. Borgesen, M. D. Poliks, N. C. Stoffel, and J. Iannotti, “Fatigue cycling of electrical interconnects dispensed on flexible substrate,” in *International Symposium on Microelectronics*, vol. 2018, pp. 000543–000548, International Microelectronics Assembly and Packaging Society, 2018.
- [6] R. R. Salary, J. P. Lombardi, D. L. Weerawarne, M. S. Tootooni, P. K. Rao, and M. D. Poliks, “In situ functional monitoring of aerosol jet-printed electronic devices using a combined sparse representation-based classification (SRC) approach,” in *ASME 2018 13th International Manufacturing Science and Engineering Conference*, pp. V001T01A040–V001T01A040, American Society of Mechanical Engineers, 2018.
- [7] J. P. Lombardi, R. R. Salary, D. L. Weerawarne, P. K. Rao, and M. D. Poliks, “In-situ image-based monitoring and closed-loop control of aerosol jet printing,” in *ASME 2018 13th International Manufacturing Science and Engineering Conference*, pp. V001T01A039–V001T01A039, American Society of Mechanical Engineers, 2018.
- [8] R. S. Sivasubramony, N. Adams, M. Alhendi, G. S. Khinda, M. Z. Kokash, J. P. Lombardi, A. Raj, S. Thekkut, D. L. Weerawarne, M. Yadav, *et al.*, “Isothermal fatigue of interconnections in flexible hybrid electronics based human performance monitors,” in

- 2018 IEEE 68th Electronic Components and Technology Conference (ECTC), pp. 896–903, IEEE, 2018.
- [9] R. I. Grynko, D. L. Weerawarne, and B. Shim, “Effects of higher-order nonlinear processes on harmonic-generation phase matching,” *Physical Review A*, vol. 96, no. 1, p. 013816, 2017.
 - [10] D. L. Weerawarne, *Study of Nonlinear Propagation of Ultrashort Laser Pulses and Its Application to Harmonic Generation*. PhD thesis, State University of New York at Binghamton, 2017.
 - [11] R. I. Grynko, D. L. Weerawarne, X. Gao, H. Liang, H. J. Meyer, K.-H. Hong, A. L. Gaeta, and B. Shim, “Multi-filament inhibition and resulting solitary wave formation in condensed matter,” in *Frontiers in Optics*, pp. FF2C–1, Optical Society of America, 2016.
 - [12] R. I. Grynko, D. L. Weerawarne, X. Gao, H. Liang, H. J. Meyer, K.-H. Hong, A. L. Gaeta, and B. Shim, “Inhibition of multi-filamentation of high-power laser beams,” *Optics letters*, vol. 41, no. 17, pp. 4064–4067, 2016.
 - [13] J. Luo, W. Zhao, S. Shan, J. Lombardi, D. Weerawarne, T. Rovere, N. Kang, Z. Skeete, Y. Xu, A. Vargas, *et al.*, “Understanding low-temperature sintering and adhesion properties of metal nanoparticles printed sensor devices,” in *ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY*, vol. 252, AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA, 2016.
 - [14] H. Liang, D. L. Weerawarne, P. Krogen, R. I. Grynko, C.-J. Lai, B. Shim, F. X. Kärtner, and K.-H. Hong, “Mid-infrared laser filaments in air at a kilohertz repetition rate,” *Optica*, vol. 3, no. 7, pp. 678–681, 2016.
 - [15] H. Liang, P. Krogen, D. Weerawarne, C.-J. Lai, R. Grynko, B. Shim, F. X. Kärtner, and K.-H. Hong, “Mid-IR laser filamentation in air at a khz repetition rate,” in *Mid-Infrared Coherent Sources*, pp. MT2C–5, Optical Society of America, 2016.
 - [16] W. Zhao, T. Rovere, D. Weerawarne, G. Osterhoudt, N. Kang, P. Joseph, J. Luo, B. Shim, M. Poliks, and C.-J. Zhong, “Nanoalloy printed and pulse-laser sintered flexible sensor devices with enhanced stability and materials compatibility,” *ACS nano*, vol. 9, no. 6, pp. 6168–6177, 2015.
 - [17] D. L. Weerawarne, R. I. Grynko, H. J. Meyer, and B. Shim, “Significant enhancement of third-and fifth-harmonic generation in air via two-color, time-resolved methods,” in *2015 Conference on Lasers and Electro-Optics (CLEO)*, pp. 1–2, IEEE, 2015.
 - [18] H. Liang, P. Krogen, R. Grynko, O. Novak, C.-L. Chang, G. J. Stein, D. Weerawarne, B. Shim, F. X. Kärtner, and K.-H. Hong, “Mid-IR filamentation in dielectrics: 3-octave-spanning supercontinuum generation and sub-2-cycle self-compression,” in *2015 Conference on Lasers and Electro-Optics (CLEO)*, pp. 1–2, IEEE, 2015.
 - [19] H. Liang, P. Krogen, R. Grynko, O. Novak, C.-L. Chang, G. J. Stein, D. Weerawarne, B. Shim, F. X. Kärtner, and K.-H. Hong, “Three-octave-spanning supercontinuum gen-

- eration and sub-two-cycle self-compression of mid-infrared filaments in dielectrics,” *Optics letters*, vol. 40, no. 6, pp. 1069–1072, 2015.
- [20] D. L. Weerawarne, X. Gao, A. L. Gaeta, and B. Shim, “Higher-order nonlinearities revisited and their effect on harmonic generation,” *Physical review letters*, vol. 114, no. 9, p. 093901, 2015.
 - [21] H. Liang, P. Kroger, R. Grynko, O. Novak, C.-L. Chang, G. J. Stein, D. Weerawarne, B. Shim, F. X. Kärtner, and K.-H. Hong, “3-octave supercontinuum generation and sub-2-cycle self-compression of mid-ir filaments in dielectrics,” in *Advanced Solid State Lasers*, pp. ATu5A–4, Optical Society of America, 2014.
 - [22] D. Clark, V. Senthilkumar, C. Le, D. Weerawarne, B. Shim, J. Jang, J. Shim, J. Cho, Y. Sim, M.-J. Seong, *et al.*, “Strong optical nonlinearity of CVD-grown MoS₂ monolayer as probed by wavelength-dependent second-harmonic generation,” *Physical Review B*, vol. 90, no. 12, p. 121409, 2014.
 - [23] D. L. Weerawarne, X. Gao, A. L. Gaeta, and B. Shim, “Test of higher-order nonlinearity via low-order harmonic generation revisited,” in *2014 Conference on Lasers and Electro-Optics (CLEO)-Laser Science to Photonic Applications*, pp. 1–2, IEEE, 2014.
 - [24] L. Weerawarne, A. Sayakkara, D. Fernando, C. Suduwella, and K. De Zoysa, “Tikiripower-using tikiridbabstraction on smart home systems,” in *International Conference on Advances in ICT for Emerging Regions (ICTer2012)*, pp. 75–81, IEEE, 2012.