Dr. Brandon A. Kemp, P. E.

Verbeth and Henry Ezra Coe Endowed Professor of Engineering Professor of Electrical Engineering Director of Engineering Graduate Programs Arkansas State University State University, AR 72467 USA (870) 253-7370 bkemp@astate.edu

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

<u>Doctor of Philosophy</u>, Electrical Engineering, June 2007 Thesis: *Optical Momentum Transfer to Macroscopic Media* Areas of Study: Electrical Engineering, Physics, Applied Mathematics

University of Missouri-Rolla, Rolla, MO

<u>Master of Science in Electrical Engineering</u>, December 1998 Thesis: *Validation of an EMI Expert System*

Arkansas State University, Jonesboro, AR

Bachelor of Science in Engineering, Magna Cum Laude, May 1997

ACADEMIC EXPERIENCE

Arkansas State University

Professor of Electrical Engineering (2019-Present) Director of Master of Science in Engineering Program (2012-Present) Director of Engineering Graduate Programs (2019-2021) Associate Professor of Electrical Engineering (2014 - 2019) Interim Associate Dean of Engineering (2017 - 2018) Assistant Professor of Electrical Engineering (2010 – 2014)

INDUSTRY EXPERIENCE

Lexmark International, Inc. Advisory Engineer, Laser Printer Technology (2007–2010): Knowledge Center team lead and laser printer technology development MIT Lincoln Laboratory (June 2006 – December 2006, Lexington, MA): Radar Cross Section (RCS) modeling

BAE Systems, Information and Electronic Warfare Systems (Summer 2004, Nashua, NH) Detection and localization sensor systems.

Lexmark International, Inc. Controller Electronics (1999-2004): Electromagnetic compatibility and signal integrity design, evaluation and testing.

HONORS AND AWARDS

- Alumni Academy Charter Member, A-State Engineering and Computer Science (2021)
- Verbeth and Henry Ezra Coe Professorship of Engineering (2016)
- Arkansas Research Alliance Fellowship (2015)
- ASU Faculty Award for Scholarship (2013)
- NSF CAREER Award (2012).

- IEEE Senior Member (since 2012).
- American Institute of Physics Honorarium from Applied Physics Reviews (2011).
- Lexmark Research and Technology Symposium best oral presentation award (2009)
- Lexmark "Make it Happen Vision Award" (2001)
- Most Outstanding Graduate in Electrical Engineering, Arkansas State University (1997)
- Barry M. Goldwater Scholar (1995)

PROFESSIONAL MEMBERSHIPS AND CERTIFICATIONS

- Professional Engineer Arkansas No. 17934; Kentucky No. 23495
- Arkansas Academy of Science Member
- Institute of Electrical and Electronics Engineers (IEEE) Senior Member
- International Society of Optics and Photonics (SPIE) Member
- Optical Society of America (OSA) Member
- American Society of Engineering Educators (ASEE) Member
- Member of the Honor Society of Phi Kappa Phi

PATENTS

- 1. Device for Determining and Adjusting Transfer Voltage in an Imaging Apparatus and a Method Thereof, US Patent 8,837,967 (September 16, 2014).
- 2. Transfer NIP for an Electrophotographic Device, and Methods of Making and Using Same, US Patent 8,588,667 (November 19, 2013).
- 3. Method for Enlarging Toner Transfer Window in EP Imaging Device and Transfer Station Employing the Method, US Patent 8,483,602 (July 9, 2013).
- 4. System for tailoring a transfer nip electric field for enhanced toner transfer in diverse environments, US Patent 8,126,342 (February 28, 2012).
- 5. Electrode-based post nip field conditioning method and apparatus, US Patent 7,965,953 (June 21, 2011).

EDITOR REVIEWED BOOK CHAPTERS AND ARTICLES

- 1. B. A. Kemp, "Nanophotonics: Momentum in metamaterials," *Nature Photonics* **10**, 291-293 (2016). <u>http://doi:10.1038/nphoton.2016.81</u>
- B. A. Kemp, "Macroscopic theory of optical momentum," *Progress in Optics* Volume 60, Chapter 5, (2015). ISBN: 978-0-12-802284-9 http://dx.doi.org/10.1016/bs.po.2015.02.005

JOURNAL PUBLICATIONS

- 1. C. Jones, B. A. Kemp, C. J. Sheppard, "Enhanced radiation pressure reversal on free carriers in nanoparticles and polarization dependence in the Rayleigh regime," *Optical Engineering* 60(2), 027104 (2021). doi: 10.1117/1.OE.60.2.027104.
- 2. M. H. Rahaman, Tamal Sarkar, and B. A. Kemp, "Tunable and large plasmonic field enhancement in core-shell heterodimer/trimer," *Journal of electromagnetic Waves and Applications*, DOI: 10.1080/09205071.2019.1683473 (2019).
- 3. N. Mitra, B. A. Kemp, T. Sarkar, and C. J. Sheppard, "Non-touching confinement of ternary particle systems by electrostatic surface forces," *Journal of Applied Physics* 126, 075111 (2019).
- 4. M. H. Rahaman and B. A. Kemp, "Negative force on free carriers in positive index nanoparticles," *APL Photonics* 2(10), 101301 (2017).
- 5. M. H. Rahaman and B. A. Kemp, "Analytical modeling of plasmonic resonance from multiple core-shell nanoparticles," *Optical Engineering* 56(12), 121903 (2017).

- 6. B. A. Kemp and C. J. Sheppard, "Electromagnetic and material contributions to stress, energy, and momentum in metamaterials," *Advanced Electromagnetics* 6, 11-19 (2017).
- 7. M. H. Rahaman and B. A. Kemp, "Revisiting Mie's scattering theory for the analysis of the plasmonic resonance of metal nanospheres," *Journal of Electromagnetic Waves and Applications* 30, 2088 (2016). http://dx.doi.org/10.1080/09205071.2016.1231089.
- 8. N. K. Paul and B. A. Kemp, "Optical Manipulation of a Rayleigh Particle on the Surface of A Dielectric Medium," *Journal of Optics* 18, 085402 (2016).
- 9. C. J. Sheppard and B. A. Kemp, "Relativistic analysis of field-kinetic and canonical electromagnetic systems," *Physical Review A* 93, 053832 (2016).
- 10. B. A. Kemp, I. Nikolayev, and C. J. Sheppard, "Coupled electrostatic and material surface stresses yield anomalous particle interactions and deformation," *Journal of Applied Physics*. 119, 145105 (2016).
- 11. C. J. Sheppard and B. A. Kemp, "Kinetic energy-momentum tensor in electrodynamics," *Physical Review A*, 93, 013855 (2016).
- N. K. Paul and B. A. Kemp, "Optical pulling force on a particle near the surface of a dielectric slab waveguide," *Optical Engineering* 55(1), 015106 (2016). doi:10.1117/1.OE.55.1.015106.
- N. K. Paul and B. A. Kemp, "Push-pull phenomenon of a dielectric particle in a rectangular waveguide," *Progress in Electromagnetics Research (PIER)*, Vol. 151, 73-81 (2015).
- 14. C. J. Sheppard and B. A. Kemp, "Optical pressure deduced from energy relations within relativistic formulations of electrodynamics," *Physical Review A* 89, 013825 (2014).
- 15. B. A. Kemp and J. G. Whitney, "Nonlinear nature of micro-particle detachment by an applied static field," *Applied Physics Letters* 102, 141605 (2013).
- 16. B. A. Kemp and J. G. Whitney, "Electrostatic adhesion of multiple non-uniformly charged dielectric particles," *Journal of Applied Physics* 113, 044903 (2013).
- 17. J. G. Whitney and B. A. Kemp, "Deformation and non-uniform charging of toner particles: Coupling of electrostatic and dispersive adhesion forces," *Journal of Imaging Science and Technology* 57, 50505 (2013).
- 18. J. G. Whitney and B. A. Kemp, "Powder adhesion measurement using metered air pulse," *Journal of Imaging Science and Technology* 57, 50504 (2013).
- 19. B. A. Kemp, "Comment on Revisiting the Balazs thought experiment in the presence of loss: electromagnetic-pulse-induced displacement of a positive-index slab having arbitrary complex permittivity and permeability," *Applied Physics A* 110, 517 (2013).
- 20. B. A. Kemp, "Resolution of the Abraham-Minkowski debate: Implications for the electromagnetic wave theory of light in matter," *Journal of Applied Physics* 109, 111101 (2011).
- 21. B. A. Kemp and T. M. Grzegorczyk, "The observable pressure of light in dielectric fluids," *Optics Letters* 36, 493 (2011).
- 22. H. Chen, B. Zhang, B. A. Kemp, and B. I. Wu, "Optical force on a cylindrical cloak under arbitrary wave illumination," *Optics Letters* 35, 667 (2010).
- 23. H. Chen, B. Zhang, Y. Luo, B. A. Kemp, J. Zhang, and B. I. Wu, "Lorentz force and radiation pressure on a spherical cloak," *Physical Review A* 80, 011808 (2009).
- 24. B. A. Kemp, J. A. Kong, and T. M. Grzegorczyk, "Reversal of wave momentum in isotropic left-handed media," *Physical Review A* 97, 053810 (2007).
- 25. B. A. Kemp, T. M. Grzegorczyk, B. I. Wu, and J. A. Kong, "Application of the electrostatic mean value theorem to electrostatic sensor electrodes," *Journal of Electrostatics* 65, 69 (2007).
- 26. B. A. Kemp, T. M. Grzegorczyk, and J. A. Kong, "Optical momentum transfer to absorbing Mie particles," *Physical Review Letters* 97, 133902 (2006).

- 27. T. M. Grzegorczyk, B. A. Kemp, and J. A. Kong, "Passive guiding and sorting of small particles with optical binding forces," *Optics Letters* 31, 3378 (2006).
- 28. T. M. Grzegorczyk, B. A. Kemp, and J. A. Kong, "Stable optical trapping based on optical binding forces," *Physical Review Letters* 96, 113903, (2006).
- 29. T. M. Grzegorczyk, B. A. Kemp, and J. A. Kong, "Trapping and binding of an arbitrary number of cylindrical particles in an in-plane electromagnetic field," *Journal of the Optical Society of America A* 23, 2324 (2006).
- 30. B. A. Kemp, T. M. Grzegorczyk, and J. A. Kong, "Lorentz Force on Dielectric and Magnetic Particles," *Journal of Electromagnetic Waves and Applications* 20, 827 (2006).
- 31. B. A. Kemp, T. M. Grzegorczyk, and J. A. Kong, "Ab initio study of the radiation pressure on dielectric and magnetic media," *Optics Express* 13, 9280-9291 (2005).
- 32. C. Barber, R. Engelken, W. Aleem, B. A. Kemp, I. Khan, C. Edrington, M. Buck, and T. Jakobs, "Preparation of Powder Precursors for and Evaporation of Photoconductive Indium (III) Sulfide Films", *Journal of the Arkansas Academy of Science* 51, 18 25 (1997).
- A. Raza, R. Engelken, B. A. Kemp, I. Khan, W. Aleem, and C. Barber, "Electrodeposition of Copper Indium Sulfide Films from Organic Solutions", *Journal of the Arkansas Academy of Science* 50, 99-104 (1996).
- 34. B. A. Kemp, R. Engelken, A. Raza, W. Aleem, I. Khan, and C. Barber, "Improved Methods for Electroplating Cadmium Sulfide Thin Films," *Journal of the Arkansas Academy of Science* 50, 79-83 (1996).
- 35. B. A. Kemp, R. Engelken, A. Raza, A. Siddiqui, and O. Mustafa, "Diagnostics of CdTe Electrodeposition by Rest Potential Voltammetry," *Journal of the Arkansas Academy of Science* 49, 87-93 (1995).
- 36. A. Raza, R. Engelken, B. A. Kemp, A. Siddiqui, and O. Mustafa, "Molten Salt Electrolytes for Electrodeposition of CdTe Films", *Journal of the Arkansas Academy of Science* 49, 143-48 (1995).
- 37. C. Poole, R. Engelken, B. A. Kemp, and J. Brannen, "Tetraethylene Glycol Based Electrolytes for High Temperature Electrochemical Deposition of Compound Semiconductors", *Journal of the Arkansas Academy of Science* 48, 133-139 (1994).

PUBLICATIONS IN REVIEWED PROCEEDINGS

- 1. B. A. Kemp and C. J. Sheppard, "Modeling optical manipulation using the field-kinetic and canonical formulations of electrodynamics," *Proc. SPIE 11083* (2019).
- 2. T. Sarkar and B. A. Kemp, "Effects of external field control on non-uniformly distributed charged particle assembly," Proc. 2019Annual Meeting of the Electrostatics Society of America (2019).
- 3. M. H. Rahaman, T. Sarkar, and B. A. Kemp, "Electric field enhancement in the plasma coated/core-shell nanoparticles," *IEEE SoutheastCon 2019*, Huntsville, AR, USA (2019), pp 1-8.
- T. Sarkar, N. Mitra, and B. A. Kemp, "Nonlinear Electrostatic Behavior of Multiple Charged Particles in Electrostatically Inverted Systems," *IEEE SoutheastCon 2018*, St. Petersburg, FL, USA (2018), pp. 1-3. doi: 10.1109/SECON.2018.8479145
- M. H. Rahaman and B. A. Kemp, "A study of plasmonic field enhancement in bimetallic and active core-shell nanoparticles/nanorods," *IEEE SoutheastCon 2017*, Concord, NC, USA (2017), pp. 1-6. doi: 10.1109/SECON.2017.7925344
- M. H. Rahaman, M. S. Nazim and B. A. Kemp, "Radiation pressure on core-shell nanoparticles in Rayleigh regime," *IEEE SoutheastCon 2017*, Concord, NC, USA (2017), pp. 1-6. doi: 10.1109/SECON.2017.7925345

- 7. B. A. Kemp and C. J. Sheppard, "Field and Material Stresses Predict Observable Surface Forces in Optical and Electrostatic Manipulation," Proc. *SPIE* 9922, 99220T (2016).
- 8. B. A. Kemp and C. J. Sheppard, "Electromagnetic and material contributions to stress, energy, and momentum in metamaterials," Proceedings of the 4th Annual Advanced Electromagnetics Symposium, 214 (2016). ISSN 2491-2417.
- 9. B. A. Kemp and C. J. Sheppard, "Physics of electromagnetic and material stresses in optical manipulation," Proc. *SPIE* 9548, 95480L (2015).
- 10. B. A. Kemp, "Modeling the electrostatic component of toner adhesion and detachment," *IS&T NIP* 29 (2013).
- B. A. Kemp, "The Kinetic Formulation of Electrodynamics and Implications for Optical Manipulation," in *Optics in the Life Sciences*, OSA Technical Digest (online) (Optical Society of America, 2013), paper JT2A.31.
- 12. B. A. Kemp, "The kinetic subsystem of light and its role in optical manipulation," Proc. *SPIE*, 8810, 88100J (2013).
- 13. B. A. Kemp, "Subsystem approach to the electrodynamics in dielectric fluids," *Proc. SPIE* 8458, 845803 (2012).
- 14. B. A. Kemp, "Semi-Analytical Model of Charge Image Formation in Electrophotography," *IS&T NIP* 28, 487 (2012).
- 15. B. A. Kemp and J. G. Whitney, "Analytical Modeling of Electrostatic Toner Adhesion," Focal Presentation *IS&T NIP* 27, 140 (2011).
- 16. J. G. Whitney and B. A. Kemp, "Toner Adhesion Measurement," *IS&T NIP* 26, 229 (2010).
- 17. B. A. Kemp, C. M. Bennett, and J. G. Whitney, "Efficient Estimation of Critical Transfer Belt Parameters from an Electrical Characterization Fixture," *IS&T NIP* 25, 261 (2009).
- 18. T. M. Grzegorczyk and B. A. Kemp, "Transfer of Optical Momentum: Reconciliations of the Abraham and Minkowski Formulations," *Proc. SPIE* 7038, 70381S (2008).
- 19. A. J. Dumaninan, E. C. Burt, and B. A. Kemp, "A Component Model Approach for the RCS Validation of an Electrically Large Open-Ended Cylindrical Cavity," IEEE Antennas & Propagation Society Symposium Proceedings, pg. 2471 (2007).

NATIONAL/INTERNATIONAL CONFERENCE PRESENTATIONS (PRESENTER IN BOLD)

- 1. **B. A. Kemp** and C. J. Sheppard, "Modeling optical manipulation using the field-kinetic and canonical formulations of electrodynamics," *SPIE Optics and Photonics: Optical Trapping and Optical Micromanipulation XVI*, San Diego, CA, USA, August 2019.
- 2. **T. Sarkar** and B. A. Kemp, "Effects of external field control on non-uniformly distributed charged particle assembly," 2019 Annual Meeting of the Electrostatics Society of America, Rochester, NY, USA, June 2019.
- M. H. Rahaman, T. Sarkar, and B. A. Kemp, "Electric field enhancement in the plasma coated/core-shell nanoparticles," *IEEE SoutheastCon 2019*, Huntsville, AL, USA, April 12, 2019.
- 4. **T. Sarkar**, N. Mitra, and B. A. Kemp, "Nonlinear Electrostatic Behavior Of Multiple Charged Particles In Electrostatically Inverted Systems," *IEEE SoutheastCon 2018*, St. Petersburg, FL, USA, 2018.
- 5. **M. H. Rahaman** and B. A. Kemp, "A study of plasmonic field enhancement in bimetallic and active core-shell nanoparticles/nanorods," *IEEE SoutheastCon* 2017, Concord, NC, USA, 2017.
- 6. M. H. Rahaman, **M. S. Nazim** and B. A. Kemp, "Radiation pressure on core-shell nanoparticles in Rayleigh regime," *IEEE SoutheastCon 2017*, Concord, NC, USA, 2017.

- 7. **B. A. Kemp**, "Modeling anomalous electromagnetic interactions with materials via theoretical advances in the energy momentum debate," EMN Meeting on Smart and Multifunctional Materials 2017, Rome, Italy (June 2017).
- 8. **B. A. Kemp** and C. J. Sheppard, "Electromagnetic and material contributions to stress, energy, and momentum in metamaterials," *Advanced Electromagnetics Symposium*, Malaga, Spain (July 2016).
- 9. **B. A. Kemp** and C. J. Sheppard, "Field and Material Stresses Predict Observable Surface Forces in Optical and Electrostatic Manipulation," *SPIE Optical Trapping and Optical Micromanipulation XIII*, Invited Presentation, San Diego, CA (August 2016).
- 10. **C. J. Sheppard** and B. A. Kemp, "A Relativistic Treatment of the Kinetic and Canonical Electromagnetic Systems," *Progress in Electromagnetics Research Symposium*, Invited Presentation, Shanghai, China (August 2016).
- 11. **B. A. Kemp** and C. J. Sheppard, "Physics of electromagnetic and material stresses in optical manipulation," *SPIE Optical Trapping and Optical Micromanipulation XII*, Invited Presentation, San Diego, CA (August 2015).
- 12. **B. A. Kemp**, "The kinetic formulation of electrodynamics and implications for optical manipulation," *Optics in Life Sciences Conference*, Waikoloa, HI (April 2013).
- 13. **B. A. Kemp**, "The kinetic subsystem of light and its role in optical manipulation," *SPIE Optical Trapping and Optical Micromanipulation X*, Invited Presentation, San Diego, CA (August 2013).
- 14. **B. A. Kemp**, "Modeling the electrostatic component of toner adhesion and detachment," *IS&T NIP* 29, Seattle, WA (October 2013).
- 15. **B. A. Kemp**, "Subsystem approach to the electrodynamics in dielectric fluids," *SPIE Optical Trapping and Optical Micromanipulation IX* 28, Invited Presentation, San Diego, CA (2012).
- 16. **B. A. Kemp**, "Semi-Analytical Model of Charge Image Formation in Electrophotography," *IS&T NIP* 28, Quebec, Canada (2012).
- 17. **B. A. Kemp** and J. G. Whitney, "Analytical Modeling of Electrostatic Toner Adhesion," Focal Presentation *IS&T NIP* 27, Minneapolis, MN (2011).
- 18. J. G. Whitney and B. A. Kemp, "Toner Adhesion Measurement," *IS&T NIP* 26, Austin, TX (2010).
- B. A. Kemp, C. M. Bennett, and J. G. Whitney, "Efficient Estimation of Critical Transfer Belt Parameters from an Electrical Characterization Fixture," *IS&T NIP* 25, Louisville, KY (2009).
- 20. **T. M. Grzegorczyk** and B. A. Kemp, "Transfer of Optical Momentum: Reconciliations of the Abraham and Minkowski Formulations," *Optical Trapping and Optical Micromanipulation*, San Diego, CA (2008).
- 21. **A. J. Dumaninan**, E. C. Burt, and B. A. Kemp, "A Component Model Approach for the RCS Validation of an Electrically Large Open-Ended Cylindrical Cavity," 2007 IEEE Antennas & Propagation Society Symposium, Honolulu, HI.
- 22. **B. A. Kemp**, T. M. Grzegorczyk, and J. A. Kong, "Comparison of methods for the calculation of radiation pressure on dielectric and magnetic particles," PIERS-2006, Cambridge, MA.
- 23. **B. A. Kemp**, T. M. Grzegorczyk, B. I. Wu, and J. A. Kong, "Three satellite geolocation from TDOA and FDOA measurements," PIERS-2006, Cambridge, MA.
- 24. **B. A. Kemp**, T. M. Grzegorczyk, and J. A. Kong, "Optimal sensor placement for the localization of an electrostatic source," PIERS-2006, Cambridge, MA.
- 25. **T. M. Grzegorczyk**, B. A. Kemp, and J. A. Kong, "Theory and modeling of optical forces within a collection of Mie scatterers," PIERS-2006, Cambridge, MA.

REGIONAL CONFERENCE PAPERS AND PRESENTATIONS (PRESENTER IN BOLD):

- 1. **E. K. Roy**, "Dynamic Modeling of Multiparticle Electrostatic Self-assembly Toward Tunable Surfaces in Inverted Dielectric System," Presented by Roy April 2021 at the 104th Meeting of the Arkansas Academy of Science (online). This presentation won First Place in the Graduate Engineering and Computer Science Presentation category.
- 2. E. K. Roy and B. A. Kemp, "Development of multiparticle dynamic simulator for electrostatic self-assembly," Presented by Roy April 2020 at the Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 3. **C. Jones** and B. A. Kemp, "Tunable nanoparticle surfaces for advanced propulsion," Presented by Jones April 2020 at the Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This presentation won First Place in the Graduate Engineering Oral Presentation category.
- 4. **T. Sarkar** and B. A. Kemp, "Electromagnetic tunability of charged particles in altered dielectric systems," Presented (oral) by Sarkar April 2019 at the 103rd Meeting of the Arkansas Academy of Science, Conway, AR. This presentation won First Place in the Graduate Engineering Oral Presentation category.
- 5. **C. Jones** and B. A. Kemp, "Optical Momentum Reversal in Nanoparticle Surface Arrays," Presented by Jones April 2019 at the Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 6. **T. Sarkar** and B. A. Kemp, "Electrostatic stability and optical tunability of charged particles in inverted systems : An approach towards novel tunable surfaces," Presented by Sarkar April 2019 at the Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 7. **B. A Kemp** and C. J. Sheppard, "Applications of theoretical advances in the optical energy momentum debate: invisibility cloaks, tractor beams, and reversed radiation pressure," Presented by Kemp April 2018 at the 102nd Meeting of the Arkansas Academy of Science, Jonesboro, AR.
- 8. **C. J. Sheppard** and B. A. Kemp, "The Electrodynamics of Kinetic, Canonical, and Hidden Systems Under Relativistic Motion," Presented by Sheppard April 2018 at the 102nd Meeting of the Arkansas Academy of Science, Jonesboro, AR.
- 9. T. Sarkar and B. A. Kemp, "Anomalous electrostatic nature of charged particles: An approach towards stable equilibrium in inverted systems," Presented (Poster) by Sarkar April 2018 at the 102nd Meeting of the Arkansas Academy of Science, Jonesboro, AR. This presentation won First Place in the Graduate Engineering Poster Presentation category.
- 10. Md. S. Nazim and B. A. Kemp, "Rayleigh Scattering in Multiple Nanoparticle Systems: A Study of the Scattered Magnetic Fields," Presented (Poster) by Nazim April 2018 at the 102nd Meeting of the Arkansas Academy of Science, Jonesboro, AR.
- 11. **Md. S. Nazim** and B. A. Kemp, "Particle Motion Simulator in 3-D: A MATLAB Program," Presented by Nazim April 2018 at the eighth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 12. **Md. S. Nazim** and B. A. Kemp, "Scattered Magnetic Field in Multiple Rayleigh Particles Systems," Presented by Nazim April 2018 at the eighth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 13. **M. H. Rahaman** and B. A. Kemp (faculty advisor), "Negative Force on Free Carriers and Charges in Metal Particles," Presented by Rahaman April 2017 at the seventh annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This presentation won First Place in the Graduate Agriculture, Engineering, and Technology Oral Presentation Category.

- 14. **M. H. Rahaman** and B. A. Kemp (faculty advisor), "Field Enhancement in Plasmonically Active Multiple Core-Shell Nanoparticles/Nanorods," Presented by Rahaman April 2017 at the seventh annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 15. S. Sanjari and B. A. Kemp (faculty advisor), "Development of Standalone Image Analysis Toolboxes for Analyzing the Structural Properties of Fibrous Scaffolds," Presented by Sanjari April 2017 at the seventh annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 16. **M. Saha** and B. A. Kemp (faculty advisor), "Analytical Modeling of Electric Field Pattern of Dielectric Material Using Rayleigh Scattering and Mie Theory," Presented by Saha April 2017 at the seventh annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 17. **M. H. Rahaman** and B. A. Kemp, "Radiation pressure on core-shell nanoparticles," Presented (Poster) by Rahaman April 2017 at the 101th Meeting of the Arkansas Academy of Science, Conway, AR.
- 18. S. Sanjari and B. A. Kemp, "Image Analysis Toolboxes for Finding the Mean Pore Size of Scaffolds and Diameter Distribution of Fibers," Presented (Poster) by Sanjari April 2017 at the 101th Meeting of the Arkansas Academy of Science, Conway, AR.
- 19. **M. Saha** and B. A. Kemp, "Analytical modeling of microscopic and macroscopic analysis of dielectric material," Presented (Poster) by Saha April 2017 at the 101th Meeting of the Arkansas Academy of Science, Conway, AR.
- 20. **C. J. Sheppard** and B. A. Kemp, "A Relativistic Approach to Kinetic and Canonical Electromagnetic Systems," Presented (oral) by Sheppard April 1, 2016 at the 100th Meeting of the Arkansas Academy of Science, Fayetteville, AR.
- 21. N. K. Paul and B. A. Kemp, "Optical tractor beam and manipulation of small particles on dielectric surface," Presented (poster) by Paul April 2, 2016 at the 100th Meeting of the Arkansas Academy of Science, Fayetteville, AR.
- 22. **M. H. Rahaman** and B. A. Kemp, "Study of Lorentz force on a metallic Mie particles," Presented (poster) by Rahaman April 2, 2016 at the 100th Meeting of the Arkansas Academy of Science, Fayetteville, AR.
- 23. N. K. Paul and B. A. Kemp (faculty advisor), "Manipulation of Small Particles on the Surface of a Material," Presented by Paul April 2016 at the sixth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This presentation won First Place in Graduate STEM Oral Presentation Category.
- 24. **S. Sanjari** and B. A. Kemp (faculty advisor), "Development of an Image Analysis Toolbox for Biological Imaging," Presented by Sanjari April 2016 at the sixth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This presentation won First Place in Graduate STEM Poster Presentation Category.
- 25. **N. K. Paul** and B. A. Kemp (faculty advisor), "Optical Tractor Beam on a Chip," Presented by Paul April 2016 at the sixth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 26. **M. H. Rahaman** and B. A. Kemp (faculty advisor), "Revisiting Mie's scattering theory for the analysis of the plasmonic resonance of metal nanosphere," Presented by Rahaman April 2016 at the sixth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 27. **C. J. Sheppard** and B. A. Kemp, "The kinetic of subsystem of light: A Lagrangian approach," Presented by Sheppard April 2015 at the fifth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 28. **C. J. Sheppard** and B. A. Kemp, "Balazs' Thought Experiment Revisited: The Relativistic Electromagnetic Approach," Presented by Sheppard April 2015 at the fifth

annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.

- 29. **N. K. Paul** and B. A. Kemp, "Push-Pull Phenomenon of a Dielectric Phenomenon of a Dielectric Particle in a Rectangular Waveguide," Presented by Paul April 2015 at the fifth annual Create @STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This poster won Second Place in Graduate Agriculture, Science, Technology, Engineering, and Math Poster Category.
- 30. C. J. Sheppard and B. A. Kemp, "Optical Energy and Pressure from Relativistic Electrodynamics," Presented by Sheppard April 2014 at the fourth annual Create @ STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR. This paper won Best Overall Presentation in Chemistry and Physics.
- 31. E. C. Barwick and B. A. Kemp, "Like-Charged Particle Attraction," Presented by Barwick April 2014 at the fourth annual Create @ STATE: A Symposium of Research, Scholarship & Creativity, Jonesboro, AR.
- 32. **C. J. Sheppard** and B. A. Kemp, "Optical Pressure and Energy Relations of Relativistic Electrodynamics," Presented by Sheppard March 7, 2014 at Arkansas Posters at the Capitol, Little Rock, AR.
- 33. B. Kemp, R. Engelken, C. Edrington, W. Aleem, C. Barber, and M. Buck, "Iodide Ion Based Improvements in CuInS₂ Films Electrodeposited from the Three Solvent Bath," Presented to the Arkansas Academy of Science-Monticello. (This presentation won the second place prize for the "Best Undergraduate Paper in Physical Science.")
- 34. B. Kemp and R. Engelken, "Iodine Ion-Activated Improvement in Film Quality During Electrodeposition of Copper Indium Dichalcogenides," Presented by Kemp April 11-12, 1997 at the Fourth Annual Arkansas Undergraduate Research Conference-Arkadelphia, Conf. Proc., 115 (1997).
- 35. C. Barber, R. Engelken, W. Aleem, B. Kemp, I. Khan, C. Edrington, M. Buck, and T. Jakobs, "Preparation of Powder Precursors for and Evaporation of Photoconductive Indium (III) Sulfide Films", Journal of the Arkansas Academy of Science, 51, 18 25 (1997). (This presentation won the first place award for the "Best Undergraduate Presentation in Physical Science".)
- 36. I. Khan, R. Engelken, W. Aleem, B. Kemp, C. Barber, C. Edrington, and M. Buck, "Further Optimization of Nonaqueous Baths for Chemical Precipitation Deposition of CdS Films", Presented by Khan at the Arkansas Academy of Science (1997).
- 37. I. Khan, R. Engelken, W. Aleem, B. Kemp, and C. Barber, "An Update on Development of Methods to Chemically Deposit Cadmium Sulfide Films from Low Hazard Organic Solutions", Presented by Khan at the 17th Annual University of Memphis (TN) Undergraduate Research Conference, March 1, 1997.
- 38. B. Kemp, R. Engelken, A. Raza, W. Aleem, I. Khan, and C. Barber, "New/Improved Methods for Electrodepositing CdS Films," Third Annual Arkansas Undergraduate Research Conference-Arkadelphia, April 19, 1996.
- 39. A. Raza, R. Engelken, B. Kemp, W. Aleem, I. Khan, and C. Barber, "Electrodeposition of Copper Indium Disulfide Films from Propylene Carbonate Electrolytes", Third Annual Arkansas Undergraduate Research Conference-Arkadelphia, April 19, 1996.
- 40. **I. Khan**, W. Aleem, R. Engelken, A. Raza, B. Kemp, and C. Barber, "Chemical Deposition of CdS Films from Triethylene Glycol Baths", Third Annual Arkansas Undergraduate Research Conference-Arkadelphia, April 19, 1996.
- 41. I. Khan, R. Engelken, W. Aleem, B. Kemp, A. Raza, and C. Barber, "New Redox Chemistries for Organic Liquid Solution Deposition of Semiconducting Metal Sulfide Thin Films", Presented by Khan at the 15th Annual University of Memphis Undergraduate Chemistry Research Conference, Memphis, TN, March 9, 1996.

- 42. **B. Kemp**, R. Engelken, A. Raza, W. Aleem, I. Khan, and C. Barber, "Improved Methods for Electroplating Cadmium Sulfide Thin Films," Presented to the Arkansas Academy of Science (1996).
- 43. **A. Raza**, R. Engelken, B. Kemp, I. Khan, W. Aleem, and C. Barber, "Electrodeposition of Copper Indium Sulfide Films from Organic Solutions", Presented to the Arkansas Academy of Science (1996).
- 44. **I. Khan**, R. Engelken, W. Aleem, B. Kemp, A. Raza, and C. Barber, "Chemical Bath Deposition of Cadmium Sulfide Films from High Temperature Triethylene Glycol Based Organic Baths", Presented by to the Arkansas Academy of Science Ft. Smith, April 12, 1996.
- 45. C. Barber, R.Engelken, B. Johnson, W. Aleem, B. Kemp, A. Raza, I. Khan, J. Parker, B. Latham, and H. Jones, "Preparation, Doping, and Photoconductive Properties of Vacuum Evaporated Tin (II) Sulfide Powders", Presented by Barber, to the Arkansas Academy of Science Ft. Smith, April 12, 1996. (This presentation won the second place prize for "Best Undergraduate Presentation in Physical Science".)
- 46. **B. Kemp**, R. Engelken, A. Raza, A. Siddiqui, and O. Mustafa, "Diagnostics of CdTe Electrodeposition by Rest Potential Voltammetry," Presented to the Arkansas Academy of Science (1995).
- A. Raza, R. Engelken, B. Kemp, A. Siddiqui, and O. Mustafa, "Molten Salt Electrolytes for Electrodeposition of CdTe Films", Presented to the Arkansas Academy of Science, (1995).
- 48. A. Siddiqui, R. Engelken, O. Mustafa, B. Kemp, and A. Raza, "Development of New, Minimally Toxic Solution Chemistries for Chemical Precipitation Deposition of Cadmium Sulfide Films", Presented by Siddiqui at the Second Annual Arkansas Undergraduate Research Conference - Arkadelphia, April 22, 1995, Conf. Proc., 105 (1995).
- 49. **A. Raza**, R. Engelken, B. Kemp, A. Siddiqui, and O. Mustafa, "Electrochemistry of the Cd-Te System in Molten Salt KCl/LiCl Electrolytes", Presented by Raza at the Second Annual Arkansas Undergraduate Research Conference -Arkadelphia, April 22, 1995, Conf. Proc., 94 (1995).
- 50. B. Kemp, R. Engelken, A. Raza, A. Siddiqui, and O. Mustafa, "Correlation of Rest Potentials, Photovoltammetric Structures, and Phase of CdTe Films Electrodeposited from Nonacidic Organic Electrolytes," Presented by Kemp at the Second Annual Arkansas Undergraduate Research Conference-Arkadelphia, April 22, 1995, Conf. Proc., 78 (1995).
- 51. C. Poole, R. Engelken, B. Kemp, and J. Brannen, "Tetraethylene Glycol Based Electrolytes for High Temperature Electrochemical Deposition of Compound Semiconductors", Presented by Poole to the Arkansas Academy of Science, April 8, 1994. (This presentation won the award for "Best Undergraduate Presentation in Physical Science".)
- 52. R. Engelken, G. Williams, C. Poole, L. Yu, J. Brannen, and B. Kemp, "Electrochemical Preparation and Characterization of Hg_{1-x}M_xTe (M = Zn, Cd) Semiconductors and Other Aspects of the Arkansas State University JOVE Effort", Poster Presentation, NASA JOVE (JOint VEnture) Program Annual Retreat - Galveston, TX, July 7 - 10, 1993.

OTHER PRESENTATIONS/PUBLICATIONS:

- 1. "Engineering a Cloak of Invisibility," presented June 18, 2013 as part of the ASU Adult Mini College.
- 2. Phi Kappa Phi 2013 Initiation Banquet keynote speaker.

- 3. "Cloaks, tractor beams, and optical matter: Emerging technology from science fiction," Presented at the 2012 ASU Faculty Conference.
- "Interpreting Classical Electrodynamics for Modern Applications," 2011 CAREER Award Regional Forum, Poster Presentation, Louisiana State University, November 7-9, 2011.
- "Science Fiction to Science Fact: Developing new physics into 21st century engineering applications" Arkansas State University College of Engineering guest lecture, February 4, 2010.
- 6. Keynote speaker for Arkansas State University Awards Seminar. "Electrical Engineering in the age of the computer engineer" May 2002.

FUNDED RESEARCH

- Arkansas Research Alliance Fellowship (2016-2018). \$75k
- "Arkansas ASSET Initiative III" NSF EPSCoR establishment of AR Center for Advanced Surface Engineering (CASE), \$24M (\$20M NSF, \$4M AR match). G. McClure (PI) (8/2015-7/2020). Kemp serves on CASE management team and Co-Director of state cyberinfrastructure (CI) (approximately \$400k for Kemp research and \$1M for state CI).
- "Toward Reconciling Electrodynamics: The Case of Electrostatic Force and Stress," Arkansas Science and Technology Authority Basic Research Grant, \$47,375.00, B. A. Kemp (PI) (12/2014 – 11/2015).
- "MRI: Acquisition of an Atomic Force Microscope (AFM) for Research to Evaluate Nano-scale Properties of Materials," NSF, \$272,360, Z. Hossain (PI), H. Al-Hosney, K. Jeong, B. A. Kemp, and I. Seok.
- "MRI: Acquisition of a Mask Aligner for Micro/Nano-Fabrication Research at Arkansas State University," NSF, \$298,578, I. Seok (PI), B. Carrol, M. Dolan, Y. Hwang, and B. A. Kemp.
- "Interpretation of Electrodynamics for Modern Applications," NSF CAREER, \$400,000, B. A. Kemp (PI). (6/2012 – 5/2017).
- "Analytical Field Modeling for Efficient Printing Systems," Lexmark International, \$59,173, B. A. Kemp (PI). (2/2011-2/2012.

SELECTED PRESS

- Feature article: "Arkansas man tackles electromagnetics in teaching career," Washington Times (online), February 22, 2016. <u>http://www.washingtontimes.com/news/2016/feb/22/arkansas-man-tackles-</u> <u>electromagnetics-in-teaching-/</u>
- Feature article: "Professor finds passion in magnetics," by Sarah Morris, Sun Staff Writer. The Jonesboro Sun, January 7, 2016. This article about Kemp's research was featured on the front page of the Sun.
- Feature article: "ABI Professor awarded national science grant," by Sherry F. Pruitt, Sun Staff Writer. The Jonesboro Sun, July 28, 2012. This article about Kemp's research and the NSF CAREER award was featured on the front page of the Sun.
- "Professor receives foundation award," by Chris Branam, Arkansas Democrat-Gazette. The Northwest Arkansas Democrat-Gazette, July 26, 2012. This piece was about research carried out by NSF CAREER award winners from around the state.
- "Economic Development: new directives and resources in NE Arkansas foster innovative entrepreneurship," in Arkansas Business, July 9, 2012 (COPYRIGHT 2012 Journal Publishing, Inc.) includes two paragraphs about the impact of Dr. Kemp's research

efforts and the impact on overall research activity and expenditures at Arkansas State University. (http://www.arkansasbusiness.com/article/85468/arkansas-state-university-new-directives-and-resources-in-ne-arkansas-foster-innovative-entrepreneurship-sponsored-report?page=all)

- "Hail CESUR," Measure: The Research Publication of Arkansas State University (Fall 2011). An article about the Center for Efficient and Sustainable Use of Resources (CESUR) features the research of three faculties in the College of Engineering, including Kemp. (http://issuu.com/asuaa/docs/measure)
- "Dr. Brandon Kemp on the CESUR Center at ASU," interview about the Center for Efficient and Sustainable Use of Resources (CESUR) available on YouTube ASU Jonesboro Channel and accessible by QR code from printed campus media (e.g. Measure Magazine). https://www.youtube.com/user/ASUJonesboro

PROGRAM AND COURSE DEVELOPMENT

- Bachelor of Science in Engineering Management Systems
- Graduate Certificate in Engineering Management
- Master of Science in Engineering Program
 - Emphasis in Civil Engineering
 - o Emphasis in Electrical Engineering
 - Emphasis in Mechanical Engineering
- Courses:
 - EE 3393 Probability and Random Signals
 - ENGR 6023 Advanced Engineering Math
 - ENGR 6043 Applied Probability and Estimation
 - ENGR 6133 Engineering Electrodynamics
 - ENGR 6693 Engineering Research
 - ENGR 689V Thesis

SERVICE ACTIVITIES

- Associate Editor PIER Journal (2021-present)
- AR NSF EPSCoR Seed Grant Proposal Reviewer (2016, 2017)
- AR NSF EPSCoR Science Steering Committee (2015-2017)
 - AR NSF EPSCoR Cyberinfrastructure State co-lead (2015-2017)
- Session chair for Hybrid Organic-inorganic Materials I at the EMN Meeting on Smart and Multifunctional Materials 2017 (June 24-28, 2017).
- Invited presenter at the Arkansas Summer Research Institute, Hot Springs, AR (2017, 2018)
- Invited presenter at the EAST Initiative Summer Seminar (2016)
- Master of Science in Engineering Program Coordinator (2012-2017)
- Shared and Institutional Governance Committees:
 - Development, Communications, and Alumni Committee (2017-2018)
 - Graduate Council (2012-2017)
 - Faculty Research Awards Committee (2011-2016)
 - Honors Council (2011-2017)
- Other University Committees
 - Program Evaluation Task Force (2020-2021)
 - International Programs Faculty Advisory Council (2017-2019)
 - Academic Dean's Council (2017-2018)
 - First Year Experience Faculty Advisory Committee (2017-2019)

- Chancellor Search Advisory Committee (Spring 2017)
- Fulbright Committee (2014-2017)
- Provost's Academic Restructuring Advisory Committee (Spring 2015)
- Research Strategic Planning Committee (2015-2016)
- Create @STATE Faculty Advisory Committee (2011-2013)
- Patent Policy Task Force (2012-2013)
- Research Development Specialist Search Committee (2011-2012)
- College/Departmental Committees
 - College of Engineering and Computer Science Dean Search Committee (2018)
 - Mechanical Engineering Search Committee (2018)
 - Electrical Engineering Search Committee (2018)
 - Computer Engineering Search Committee (2017)
 - College of Engineering Graduate Committee (2012-2018); Chair (2012-2017)
 - College PRT Committee (2014-2017)
 - Undergraduate Curriculum Committee (2014-2017)
 - Mechanical Engineering Faculty Search Committee (2016)
 - Electrical Engineering Faculty Search Committee (2011-2012)
 - College Faculty Awards Committee (2014-2016)
 - College Website Committee (2014-2016)
- Adult Mini College at Arkansas State University"Engineering a Cloak of Invisibility" (June 18, 2013)
- ASU Engineering Club (2010-2011)
- Women in Engineering Day at Lexmark International (2010)
- Lexmark Employee Development Committee (2008)
- Progress in Electromagnetics Research Symposium (PIERS) committee service
 - PIERS 2006 Cambridge, MA, USA Administrative Committee
 - o PIERS 2005 Hangzhou, Zhejiang, China Extended Papers Technical Committee
- Reviewer for the following Journals: Nature Communications, Nature Photonics, Scientific Reports, Proceedings of the Royal Society of London A, Physical Review Letters, Physical Review A, Physical Review B, Physical Review X, Applied Physics Letters, Optics Letters, Annalen der Physik, Journal of the Optical Society of America A, Journal of the Optical Society of America B, Optics Express, Optics Communications, Journal of Optics, Optical Engineering, European Physics Journal, Canadian Journal of Physics, Journal of Electromagnetic Waves and Applications, Progress In Electromagnetics Research, Materials Today, European Physical Journal D, Annals of Physics, Applied Physics B: Lasers and Optics, Electrophoresis
- Book Reviewer: CRC Press Taylor & Francis Group

PROFESSIONAL ACTIVITIES

- Attended Conference on the First Year Experience (FYE), 2019 Las Vegas, NV.
- Attended NSF 2-day invitation only Communications Workshop, March 2015.
- Attended 2011 NSF CAREER Award Regional Forum. 2011 Louisiana State University.
- EMN Meeting on Smart and Multifunctional Materials: attended and session chair 2017, Rome, Italy.
- Advanced Electromagnetics Symposium/META '16 joint conference: attended 2016 Malaga, Spain.
- SPIE Optics and Photonics Conference: attended Optical Trapping and Optical Micromanipulation meetings 2012, 2013, 2015, 2016 and 2019 San Diego, CA.

- IS&T NIP: attended 2008 Pittsburgh, PA; 2009 Louisville, KY; 2010 Austin, TX; 2011 Minnesota, MN; 2012 Quebec City, Canada; 2013 Seattle, WA.
- OSA Optics of the Life Sciences Congress: Attended Optical Trapping Applications 2013, Waikoloa Beach, Hawaii.
- Progress in Electromagnetics Research Symposium (PIERS): attended 2006 Cambridge, MA.

MASTERS THESES SUPERVISED

- 1. Etee Kawna Roy, <u>Modeling the dynamics of charged nanoparticles in inverted dielectric</u> <u>systems for exploration of novel tunable materials</u>, Master of Science in Engineering thesis, Arkansas State University (Summer 2021).
- 2. Christopher Jones, <u>Enhanced Optical Propulsion and Material Analysis for Multiple</u> <u>Rayleigh Particles</u>, Master of Science in Engineering thesis, Arkansas State University (Summer 2020).
- 3. Tamal Sarkar, <u>Anomalous behavior of like-charge particles and optical tunability of non-touching photonic surfaces</u>, Master of Science in Engineering thesis, Arkansas State University (Summer 2019).
- 4. Md Saber Nazim, <u>Plasmonic Resonance of Active Nanoparticle Dimer Systems in the</u> <u>Presence of Optical Binding Forces</u>, Master of Science in Engineering thesis, Arkansas State University (Summer 2018).
- 5. Samia Sanjari, <u>Development of Image Analysis Toolboxes for Biological Imaging</u>, Master of Science in Engineering thesis, Arkansas State University (Fall 2017).
- 6. Nandine Mitra, <u>Analysis & Calculation of Electrostatic Force for Multiple Particles to</u> <u>demonstrate particles' behavior towards equilibrium</u>, Master of Science in Engineering thesis, Arkansas State University (Fall 2017).
- 7. Mohammad H. Rahaman, <u>Theory and applications of plasmonically active spherical and core-shell nanoparticles</u>, Master of Science in Engineering thesis, Arkansas State University (Summer 2017).
- 8. Misuk Saha, <u>Analysis of Field and Force Calculation of Multiple Rayleigh Scattering</u>, Master of Science in Engineering thesis, Arkansas State University (Spring 2017).
- 9. Nayan K. Paul, <u>Optical Pulling Force and Tractor Beams</u>, Master of Science in Engineering thesis, Arkansas State University (Spring 2016).
- Cheyenne J. Sheppard, <u>Mathematical Analysis of Continuum Electrodynamics:</u> <u>Implications for the Kinetic Formulation of Light</u>, Master of Science thesis in Mathematics, Arkansas State University (Spring 2015).

HONORS THESES SUPERVISED

- 1. Jed Schales, <u>Simulation of Particle Arrays for Optical Bandgap Control</u>, Honors Thesis in Mechanical Engineering, Arkansas State University (Spring 2015).
- 2. Rocklan McCall, <u>Preserving High Frequency Components in Signal Transmission</u>, Honors Thesis in Electrical Engineering, Arkansas State University (Spring 2020).

SENIOR DESIGN PROJECTS SUPERVISED

- 1. Rotor Blade Polymer Application (2021)
- 2. Energy Analytics (2021)
- 3. Fire Detection (2020)
- 4. Autonomous Robotic Military Supply (2019)
- 5. System Health Monitoring (2017)
- 6. Smart Traffic Light System (2012)

TEACHING EXPERIENCE

ENGR 1402 Concepts of Engineering ENGR 2423 Electric Circuits I EE 3312 Electric Circuits II EE 3343 Engineering Fields and Waves EE 3353 Continuous and Analog Systems EE 3393 Probability and Random Signals EE 4303 Electromagnetic Waves EE 4353 Power Systems EE 479V Internship ME 469V Physics for Engineers ENGR 6023 Advanced Engineering Math ENGR 6043 Applied Probability and Estimation ENGR 6133 Engineering Electrodynamics