

Summer 6-2017

Electrical and Computer Engineering Newsletter

Department of Electrical and Computer Engineering

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Recommended Citation

Department of Electrical and Computer Engineering, "Electrical and Computer Engineering Newsletter" (2017). *Electrical and Computer Engineering Newsletter*. 12.
http://ecommons.udayton.edu/ece_newsletter/12

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CALENDAR OF EVENTS

Classes Begin
August 23, 2017



Mid-term Break
October 4, 2017



Thanksgiving Break
November 22, 2017



Feast of the Immaculate
Conception/Christmas
on Campus
December 8, 2017



Christmas Break
December 16, 2017–
January 15, 2018



Spring Term Begins
January 16, 2018



Chair's Corner *Dr. Guru Subramanyam*



Congratulations to the Class of 2017 graduates! We had an outstanding and a record graduating class of 55 undergraduates for May 2017 graduation! Our graduates continue to be placed in excellent jobs or in graduate schools. Our placement continues to exceed over 95 percent during the past eight years.

Our department faculty had an outstanding year of research productivity in 2016–17. Professors Vamsy Chodavarapu and I have formed a new company (Prixarc, LLC) as the result of an Air Force Small Business Innovative Research (SBIR) funding. The company will be incubated in our campus until the new technology hub is opened in 2018. The

new company provides advanced technology solutions for sensors and electronics. Professor Keigo Hirakawa has established research collaborations with Samsung and Ford through the Intelligent Signals and Systems Lab. Professor Tarek Taha continues to break new ground in neuromorphic computing. Professor Vijayan Asari continues to develop technologies for autonomous systems. Professor Raúl Ordóñez has established a new partnership with Yashkawa Motoman Robotics Company for replacing the existing robots with new.

Our faculty approved a new concentration in Aerospace Electronic Systems at the graduate level along with a new graduate certificate in the same name. Our Center of Excellence for Thin-film Research and Surface Engineering (CETRASE) will be hosting the Second International Workshop on Thin Films for Electronics, Electro-optics, Energy and Sensors (TFE3S) in collaboration with the Society for Photo-Instrumentation Engineers (SPIE) June 25-27, at the University of Dayton River Campus. We have over 40 invited speakers presenting at the workshop from around the world. We are looking forward to welcoming our new class of 2021 cohort in the Fall 2017. Please enjoy our articles about our department's recent activities.

Innovation Team with ECE Ph.D. Graduate Presented with the Soin Award for Innovation



Hariharan Ananthanarayanan – UD ELE alumni 2015, Jon Dekar – UD MEE alumni 2011 and Scott Stone (above right, l-r)

The Soin Award for Innovation 2017 was presented to DESiN, LLC, which is a company that was founded by a former UD mechanical engineering student and his father. “The Soin Award for Innovation was designed to identify, honor and financially assist a company in the Dayton region, which demonstrated the historical innovative spirit of the community,” according to the Dayton Area Chamber of Commerce. DESiN created a dining companion that has revolutionized the eating process for those who cannot feed themselves. A small team of UD engineering students designed Obi. ECE Ph.D. graduate, Hariharan Ananthanarayanan was a part of the team and is now VP of Technology for Obi. Hari says, “I firmly believe that education and experience find value when fulfilling a need of the greater good. It is a most humbling and grateful experience to be part of Obi and creating independence and happiness to those using Obi. I look forward to our younger generations continuing the advancement of technology and the human condition in a purposeful manner as we are doing here at DESiN.” Congratulations to Hari and the entire DESiN team on their achievements with Obi! Please visit <https://vimeo.com/213522083/f2f25732b6> for a video on DESiN and their Soin Award for Innovation 2017 achievement.

Ashish Gogia Awarded the 2017 Krishna M. Pasala, Ph.D. Memorial Scholarship



Ashish Gogia and Dr. Guru Subramanyam (l-r)

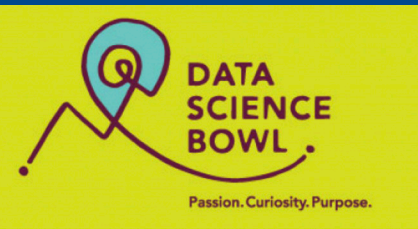
The IEEE Dayton Section is pleased to announce the 2017 award of the Krishna M. Pasala, Ph.D. Memorial Scholarship to Ashish Gogia. The scholarship is awarded annually to a graduate student attending the University of Dayton within the Department of Electrical and Computer Engineering (ECE). The award is based on academic excellence in electrical engineering and includes a prize of up to \$1,000. We congratulate Ashish on his winning the award on behalf of the IEEE Dayton Section and the IEEE Foundation. He was presented his award at the IEEE Dayton Section banquet on April 29, 2017.

Dr. Eric Balster Keynote Speaker

Dr. Eric Balster was invited to the 7th IEEE Annual Computing and Communication Workshop and Conference that was held from January 9th to the 13th in Las Vegas, Nevada. IEEE cordially invited Dr. Balster to deliver a keynote speech on his research field and paper that he initially submitted for presentation. Congratulations to Dr. Balster on this great opportunity!



Dr. Russell Hardie in the Data Science Bowl 2017



Dr. Russell Hardie participated in the Data Science Bowl 2017 entitled “Can you improve lung cancer detection?” There were 1,972 teams participating for the \$1,000,000 prize. Dr. Hardie finished 62nd on the final competition leaderboard with his lung cancer detection algorithm.

<https://www.kaggle.com/c/data-science-bowl-2017> in April 2017



Dr. Russell Hardie's Science Olympiad Work



Dr. Russell Hardie has been a Science Olympiad coach at Tower Heights Middle School in Centerville for 4 years. This year, he coached student teams in 3 of the 23 Science Olympiad events: Optics, Wind Power and Hovercraft. His students in Optics and Wind Power finished 1st at the 2017 Ohio State Science Olympiad Tournament (<https://ohso.osu.edu/>). This is the first state championship win in the school's history. The team earned the honor of representing the state of Ohio at the 2017 Science Olympiad National Tournament in May (<https://www.soinc.org/2017-national-tournament>). This is a total family affair for the Hardies. Dr. Hardie's wife, Karen, is one of the head coaches for the Tower Heights team. Both of his daughters, Alison (9th grade) and Emily (8th grade), compete on the team. Justin, who is now in the 5th grade, plans to participate next year.



Computer Engineering Student Awarded 2017 NMIA Scholarship

UD computer engineering student, Jason Demeter, is one of 6 recipients of the 2017 scholarship awards from the National Military Intelligence Association-Ohio Chapter. The NMIA scholarship program provides assistance to students who plan to advance their education and professional skills in areas that would support the Intelligence Community. Jason was presented with the scholarship award on May 24, 2017. Congratulations to Jason on his hard work and accomplishments!



Fox 45 News Interview with Dr. Raúl Ordóñez

On Tuesday, May 2, 2017, Fox 45 News did a segment on “New Competition in the Workforce: Robots taking over Jobs in the Miami Valley.” Nathan Edwards, Fox 45 News staff, talked with Dr. Raúl Ordóñez, UD robotics professor. Raúl commented, “Certainly some jobs will go away; I’m fairly certain of that.” Dr. Ordóñez, then explained that “there has to be infrastructure to allow people to acquire new skills.” To view the whole video and article, please visit



<http://fox45now.com/news/local/new-competition-in-the-workforce-robots-taking-over-jobs-in-the-miami-valley>.

Advanced Radar Class Paper Presented at the 2016 NAECON/OIS Conference

As part of their coursework, the UD Advanced Radar class presented a paper entitled “On the Use of Circular SAR to Improve the Performance of Knowledge-Aided STAP” at the 2016 National Aerospace and Electronics Conference and Ohio Innovation Summit. Dr. Michael Wicks taught the class

Dr. Feng Ye Invited to the 2017 SIFYS Conference in Shanghai



Dr. Feng Ye



2nd SJTU Future Information Technology International Forum

Dr. Feng Ye was invited to attend the 2nd SJTU Future Information Technology International Forum for Young Scholars (SIFYS) in April of 2017. The forum was held in Shanghai, China, where Dr. Ye presented “SAW-MAN: Exploring Smart Service-Aware Wireless Mixed-Area Networks.”

Publications

- ▶ Almbrok Essa, Paheding Sidike, and **Vijayan K. Asari**, “Efficient key frame selection approach for object detection in wide area surveillance applications,” *IGI International Journal of Monitoring and Surveillance Technologies Research*, doi: 10.4018/IJMSTR.2015040102, vol. 3, no. 2, pp. 34-48, 2016.
- ▶ Almbrok Essa, and **Vijayan Asari**, “Face recognition based on modular histogram of oriented directional features,” *National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS)*, Dayton, OH, USA, July 26-29, 2016.
- ▶ Almbrok Essa, and **Vijayan K. Asari**, “Histogram of oriented directional features for robust face recognition,” *IGI International Journal of Monitoring and Surveillance Technologies Research*, doi: 10.4018/IJMSTR.2016070103, vol. 4, no. 3, pp. 37-52, 2016.
- ▶ Almbrok Essa, and **Vijayan Asari**, “Local edge/corner feature integration for illumination invariant face recognition,” *The First International Conference on Applications and Systems of Visual Paradigms - VISUAL 2016*, Barcelona, Spain, November 13-17, 2016.
- ▶ Evan Krieger, Paheding Sidike, Almbrok Essa, and **Vijayan K. Asari**, “Boosted ringlet features for robust object tracking,” *IEEE Applied Imagery Pattern Recognition Workshop: Imaging and Artificial Intelligence: Intersection and Synergy - AIPR 2016*, Washington DC, USA, October 18-20, 2016.
- ▶ Hussin Ragb, and **Vijayan K. Asari**, “Color and local phase based descriptor for human detection,” *National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS)*, Dayton, OH, USA, July 26-29, 2016.
- ▶ Hussin Ragb, and **Vijayan K. Asari**, “Fused structure and texture (FST) features for improved pedestrian detection,” *WASET International Journal of Computer, Electrical, Automation, Control and Information Engineering*, vol. 10, no. 1, pp. 202-209, 2016.
- ▶ Hussin Ragb, and **Vijayan K. Asari**, “Local phase features in chromatic domain for human detection,” *IGI International Journal of Monitoring and Surveillance Technologies Research*, doi: 10.4018/IJMSTR.2016070104, vol. 4, no. 3, pp. 53-72, 2016.
- ▶ Hussin Ragb, and **Vijayan Asari**, “Multi-feature fusion and PCA based approach for efficient human detection,” *IEEE Computer Society Workshop on Applied Imagery and Pattern Recognition – AIPR 2016: Imaging and Artificial Intelligence: Intersection and Synergy*, Washington DC, USA, October 18-20, 2016.
- ▶ Md. Zahangir Alom, Paheding Sidike, Tarek Taha, and **Vijayan K. Asari**, “State preserving extreme learning machine: A monotonically increasing learning approach,” *Neural Processing Letters* (Springer), doi: 10.1007/s11063-016-9552-8, pp. 1-23, 2016.
- ▶ Mohammad Moinul Islam, Mohammed Nazrul Islam, **Vijayan K. Asari**, and Mohammad A. Karim, «Hybrid edge and feature based single image super-resolution,» *SPIE/IS&T Journal of Electronic Imaging*, vol. 25, no. 4, pp. 1-8, doi:[10.1117/1.JEI.25.4.043005](https://doi.org/10.1117/1.JEI.25.4.043005), 2016.
- ▶ Nina Varney, **Vijayan K. Asari**, and Garrett Sargent, “A novel feature extraction methodology for region classification in LiDAR data,” *SPIE Remote Sensing Conference*, Edinburgh International Conference Center, Edinburgh, United Kingdom, September 26-29, 2016.
- ▶ Paheding Sidike, Chen Chen, **Vijayan K. Asari**, Yan Xu, and Wei Li, “Classification of hyper-spectral image using multi-scale spatial texture features,” *8th IEEE Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS)*, Los Angeles (UCLA campus), CA, USA, August 21-24, 2016.
- ▶ Paheding Sidike, Daniel Prince, Almbrok Essa, and **Vijayan K. Asari**, “Automatic building change detection through adaptive local textural features and sequential background removal,” *2016 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2016)*, Beijing, China, July 10-15, 2016.
- ▶ Paheding Sidike, Evan Krieger, M. Zahangir Alom, **Vijayan K. Asari**, and Tarek Taha, “A fast single image super-resolution via directional edge guided regularized extreme learning regression,” *Signal, Image and Video Processing* (Springer), doi: 10.1007/s11760-016-1045-8, pp. 1-8, 2016.
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- ▶ Theus Aspiras, **Vijayan K. Asari**, and Wesam Sakla, “Weighted nonlinear line attractor for complex manifold learning,” *Computational Intelligence*, edited by Juan Julián Merelo, Agostinho Rosa, José M. Cadenas, António Dourado, Kurosh Madani, António Ruano, and Joaquim Filipe, Book series: [Studies in Computational Intelligence \(SCI\)](#), doi: 10.1007/978-3-319-48506-5_19, vol. 669, pp. 371-385, November 2016.
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- ▶ **Vijayan K. Asari**, “Automated intrusion detection for oil/gas pipeline infrastructure protection,” *2016 DC ACM Webinar Series, Organized by the Washington DC Chapter of ACM DC ACM 2016*, Webinar, June 27, 2016. (Invited Talk)
- ▶ **Vijayan K. Asari**, “Automatic object recognition and tracking in complex environmental conditions,” *Global Summit and Expo on Multimedia and Applications MULTIMEDIA 2016*, London, United Kingdom, August 15-16, 2016. (Invited Talk)
- ▶ **Vijayan K. Asari**, “Learning complex manifold of visual perception for pattern association,” *International Conference on Applications and Systems of Visual Paradigms VISUAL 2016*, Barcelona, Spain, November 13-17, 2016. (Keynote Talk)
- ▶ **Vijayan K. Asari**, “Object detection, tracking and recognition in complex environmental conditions,” *International Conference on Applications and Systems of Visual Paradigms VISUAL 2016*, Barcelona, Spain, November 13-17, 2016. (Tutorial)
- ▶ **Vijayan K. Asari**, “Wide area aerial surveillance for situation awareness and security automation,” *IEEE International Conference on Communication Systems and Networks - COMNET 2016*, Trivandrum, India, July 22, 2016. (Keynote Talk)
- ▶ **E. J. Balster**, F. A. Scarpino, A. M. Kordik, and K. L. Hill. “A simulator for spotlight SAR image formation,” in *Proceedings of IEEE Computing and Communication Workshop and Conference*, Los Vegas, NV, January 9-11, 2017. *Best Paper Award*.
- ▶ **E. J. Balster**, M. P. Hoffman, J. P. Skeans, and D. Fan. “GPGPU acceleration using OpenCL for a spotlight SAR simulator,” to appear in *Proceedings of International Workshop on OpenCL*. Toronto, Canada, May 16-18, 2017.
- ▶ P. C. Hytla, **E. J. Balster**, J. R. Vasquez, and R. M. Neuroth, “Multi-radio fusion change detection with adaptive thresholding,” to appear in *SPIE Journal of Applied Remote Sensing (JARS)*. April 17, 2017.
- ▶ A. Mohamed, and **M. R. Chatterjee**, “Slanted electromagnetic wave propagation through atmospheric phase turbulence using altitude-dependent structure parameter,” submitted to *IEEE NAECON Conference*, 2017.
- ▶ **M. R. Chatterjee**, and A. Mohamed, “Anisoplanatic electromagnetic image propagation through narrow or extended phase turbulence using altitude-dependent structure parameter,” *FiO OSA Technical Digest, Joint Poster Session I (JW4A)*, Rochester, NY, October 2016, <https://doi.org/10.1364/FIO.2016.JW4A.90>.
- ▶ **M. R. Chatterjee**, and A. Mohamed, “Anisoplanatic image propagation along a slanted path under lower atmosphere phase turbulence in the presence of encrypted chaos,” *SPIE Defense and Security Conference*, Anaheim, CA, April 2017.
- ▶ **M. R. Chatterjee**, and A. Mohamed, “Chaos-based mitigation of image distortion under anisoplanatic electromagnetic signal propagation through turbulence,” submitted to *OSA FiO Conference 2017*, April 2017.
- ▶ **M. R. Chatterjee**, A. Mohamed and F. Mohamed, “A numerical examination of the diffraction properties of uniform and Gaussian profiled beams through modified Von Karman turbulence,” to be submitted to *Optical Engineering*.

- ▶ **M. R. Chatterjee**, and F. Almeahmadi, “Examination of the nonlinear dynamics and possible chaos encryption in a zeroth-order acousto-optic Bragg modulator with feedback,” *FiO OSA Technical Digest, General Optical Sciences II* (FF3H), Rochester, NY, October 2016, <https://doi.org/10.1364/FIO.2016.FF3H.6>.
- ▶ **M. R. Chatterjee**, and F. Almeahmadi (Invited Paper), “Information encryption, decryption and other applications using acousto-optic chaos,” to be presented at the *13th School on Acousto-Optics and Applications*, Moscow, Russia, June 2017.
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- ▶ **M. R. Chatterjee**, and R. Y. Ataa, “Fresnel coefficients for electromagnetic propagation across a non-chiral and chiral dispersive interface with negative index,” submitted to *OSA FiO Conference 2017*, April 2017.
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- ▶ **M. R. Chatterjee**, and S. Chaparala, “Nonlinear dynamics, bifurcation maps, signal encryption and decryption using acousto-optic chaos under a variable aperture illumination,” *FiO OSA Technical Digest, Joint Poster Session I* (JW4A), Rochester, NY (Oct 2016), <https://doi.org/10.1364/FIO.2016.JW4A.73>.
- ▶ **M.R. Chatterjee** and T. Algadey, “Negative index in chiral metamaterials under conductive loss and first-order material dispersion using Lorentzian, Condon and Drude Models,” *FiO OSA Technical Digest, Joint Poster Session I* (JW4A), Rochester, NY, October 2016, <https://doi.org/10.1364/FIO.2016.JW4A.70>.
- ▶ **M. R. Chatterjee**, and F. H. A. Mohamed (Invited Paper), “Transmission of modulated chaos waves through modified von Karman phase turbulence: A numerical examination,” *OSA Technical Digest, International Conference on Fiber Optics and Photonics, Integrated and Diffractive Optics I* (W2F), Kanpur, India, December 2016, <https://doi.org/10.1364/PHOTONICS.2016.W2F.1>.
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- ▶ G. Xereas, and **V. P. Chodavarapu**, “Wafer-level vacuum encapsulated silicon ring resonators for timing and frequency references,” *SPIE Journal of Micro/Nanolithography, MEMS, and MOEMS*, vol. 15, no. 3, 035004, 2016.
- ▶ Junjun Huan, George Xereas, and **Vamsy P. Chodavarapu**, “Wafer-level vacuum-encapsulated ultra-low voltage tuning fork MEMS resonator,” *IEEE National Aerospace and Electronics Conference*, Dayton, OH, July 2016.
- ▶ Ritu Kumar, Guru Subramanyam, and **Vamsy P. Chodavarapu**, “Energy harvesting flexible regenerative power source for wearable devices,” *IEEE National Aerospace and Electronics Conference*, Dayton, OH, July 2016.
- ▶ B. N. Narayanan, **R. C. Hardie**, and T. M. Kebede, “Analysis of various classification techniques for computer aided detection system of pulmonary nodules in CT,” *IEEE National Aerospace and Electronics Conference* (NAECON), Dayton, OH, July 2016.
- ▶ B. N. Narayanan, **R. C. Hardie**, and T. M. Kebede, “Feature selection using linear classifier for computer aided detection of pulmonary nodules in CT,” *International Conference on Medical Imaging and Diagnosis, Medical Imaging 2016*, Chicago, IL, October 20-21, 2016. (Young Research Forum Award).
- ▶ B. N. Narayanan, **R. C. Hardie**, T. M. Kebede, and M. J. Sprague, “Optimized feature selection based clustering approach for computer aided detection of lung nodules in different modalities,” submitted to *Pattern Analysis and Applications*, December 2016.
- ▶ Daniel A. LeMaster, **Russell C. Hardie**, Szymon Gladysz, Matthew D. Howard, Michael A. Rucci, Matthew E. Trippel, Jonathan D. Power, and Barry K. Karch, “Differential tilt variance effects of turbulence in imagery: Comparing simulations with theory.” *Proc. SPIE.*, 9846, Long-Range Imaging, 984606, May 18, 2016, doi: 10.1117/12.2223470
- ▶ Matthew J. Sprague, **Russell C. Hardie**, Temesguen Messay, and Barath N. Narayanan, “A genetic algorithm approach to feature selection for computer aided detection of long nodules in computed tomography,” submitted to *Computer Methods and Programs in Biomedicine*, January 2017.
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- ▶ M. Abdesalam, and **R. Ordóñez**, “Non-uniform 1D antenna array optimal configuration via extremum seeking control,” *IEEE MSC*, Buenos Aires, Argentina, September 2016.
- ▶ M. Abdesalam, and **R. Ordóñez**, “Systematic comparison of the sensitivity of perturbation-based extremum seeking control versus numerical optimization-based extremum seeking control using particle swarm optimization to changes in initial conditions,” *IEEE NAECON-OIS*, Dayton, OH, July 2016.
- ▶ M. K. Sharma, and **R. Ordóñez**, “Design and fabrication of an intention based upper-limb exo-skeleton,” *IEEE MSC*, Buenos Aires, Argentina, September 2016.
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- ▶ **Robert P. Penno**, Roger Crum, and Eddie Rojas, “It’s simply different there! Studying abroad to advance engineering problem solving while cultivating engineering leadership,” *ASEE Conference*, Columbus, OH, accepted, June 2017.
- ▶ Esmail Abuhdima, and **Robert Penno**, “Simulation of the scattered EM fields from a conducting cylinder in rotation and translation,” *Journal of Energy and Power Engineering*, no.6, 2017.
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