



All Things Wind at Texas Tech

September and October, 2017 Newsletter

Letter from the Interim Director



Leaves are falling and air becomes crisp as we are getting ready for the External Advisory Board meeting on November 2. This annual event brings together EAB members, faculty affiliates, staff, and university administrators to review progress made towards NWI's strategic plan and look for ways to best capture future opportunities. We are grateful for the time and expertise contributed by all and look forward to a very productive meeting.

This year, the United States experienced three major land-falling hurricanes – Harvey, Irma, and Maria, causing record losses that we haven't seen since Hurricane Katrina. Several of TTU research teams were deployed before and after these storms, documenting wind field and wind damage. The success of these deployments relied heavily on facilities and technical capabilities that NWI

maintains and operates on a continuous basis. They not only generate valuable data but also raise the reputation of Texas Tech in wind hazard research. NWI is committed to expanding this line of work by further engaging industry partners and state agencies to mitigate economic impact of windstorms.

For FY2017, NWI has set a new high for research awards received. The total reached \$7.7m and all four thrust areas – wind energy, smart grid, severe storm, and wind engineering – saw year-to-year growth. Impressively, Federal awards stood at \$3.5m in total, \$2m more than FY2016. Participation of faculty continued to be diverse, with Geosciences, Electrical Engineering, Civil Engineering and Mechanical Engineering being the top contributing departments.

In order to continue and accelerate the upward trend in NWI research activities, we have to constantly address barriers that our faculty affiliates encounter. Rome wasn't built in a day. Therefore, what we are doing could determine our future five or ten years from now. Once again, I call upon all of you for contributing innovative and disruptive ideas to make NWI more competitive.

Go Raiders!

-Daan Liang, Interim Director

China Wind Power 2017



Dr. Daan Liang, Interim Director of NWI, attended the annual China Wind Power (CWP) Conference in Beijing, China in October. One of the most influential events in the wind industry, CWP is co-organized.

These organizations include: Chinese Wind Energy Association (CWEA), Renewable Energy Industries Association (CREIA), Global Wind Energy Council (GWEC), China National Renewable Energy Centre (CNREC) and China Wind Energy Equipment Association (CWEEA). The CWP was first launched in 2008 and celebrated its 10th anniversary this year. Over 400 companies exhibited their products, along with keynote speeches, forums, and technical sessions. They broadly covered policies, market and technology trend, as well as important issues related to the industry. Dr. Liang took this opportunity to get an insight into the Chinese and global wind energy market and discussed with turbine and parts manufacturers for potential collaboration.

Marcando el Relámpago (Marking the Lighting)

"The art and science exhibit sponsored by my current NSF award has opened at the TTU Museum. We have worked with an artist, Tina Fuentes from the TTU School of Art, to depict lightning and the turbulent motions in clouds. The exhibit is titled "Marcando el Relámpago (Marking the Lightning), and will be open through the end of January. There will be a public panel discussion on November 8 (time TBD) in association with the TTU Creative Process Commons.

Alongside numerous painted and video works of varying scales, my graduate students have assembled photos of our field work, large-format plots of radar and lightning data, and 3D printed lightning flashes. These pair together to engage the public in linking their experience of nature to how we study lightning and clouds."

-Eric Burning

You can see more details through the link:

<http://www.depts.ttu.edu/museumttu/exhibitions/2017/Marcando.php>

Top TECHsan award

Wes Burgett, received the TECHsan award, this award recognizes 4 individuals that have shown extraordinary work proficiency. We are so proud of Wes for receiving this award. Wes is the Research Associate, for the National Wind Institute.

-We are so proud to have one of our own receive this award! Thank you for all your hard work, Wes!



NWI In China



"Drs Xinzhong Chen and Kishor Mehta, Affiliates of NWI, were invited to participate in the International High-end Forum on Structure and Wind Engineering held in Chongqing, China on October 14 – 15, 2017.

Both of them made presentations at the Forum; 1. Crosswind Response of Tall Buildings: Aeroelastic, Inelastic and Nonstationary Effects – Chen, and 2. Evolution of Wind Speed Assessment in Tornadoes – Mehta. Dr. Chen also lectured in the International Advanced School on Wind Engineering on the subject of Response of Long Span Bridges in Strong

Winds. The Advanced School was attended by 50 M.S., Ph.D. and Post-doc students from all over China."

-Kishor Mehta

Patent Approved

Three of the NWI researchers: Dr. John Schroeder, Dr. Brian Hirth, and Jerry Guynes, had a patent approved. The patent is a System and Method for Evaluating Wind Flow Fields Using Remote Sensing Devices. By receiving this they will be eligible to be recognized as part of the Celebration of Faculty Excellence in Research, Scholarship, and Creative Activity. This recognition is based on specific eligibility guidelines and is only bestowed upon those achieving national and/or international prominence in their disciplines.

-All of us here at the NWI would like to extend our congratulations to these gentlemen, and to show our support for the amazing work they have done thus far. We expect to see great things from them in the future!

NWI Host Professor

On Friday, September 22 2017, the NWI Hosted Kevin M. Simmons, Ph.D. Corrigan Chair and Professor of Economics of Austin College at Sherman, Texas.

Dr. Simmons spoke about Fatality and Damage Predictions from Potential Tornado Outbreaks. The project combines the efforts of a university economist and scientists from National Severe Storms Laboratory, Storm Prediction Center and the National Center for Environmental with additional input from the Federal Emergency Management Agency.

They are able to build models based on population, socio-demographic, and the type of tornado to determine how many fatalities along with the amount of damage there will be.



By being able to predict the amount of damage that can be caused, it will help to be able to better educate the public on how to stay safe. By educating the public, hopefully it will save lives and decrease the amount of damage caused by severe storms.

Thank you, Dr. Simmons, for coming and sharing your research with us!

(Pictured above is: Dr. Kishor Mehta, Dr. Kevin Simmons, and Dr. Daan Liang)

Disaster Strikes Close to Home

In our program, we have students that work all across the world, including Puerto Rico. Below is a quote from one of our alumni that is currently living in Puerto Rico.

“My family and I are safe. My home didn't sustain any damages. We have water, but we don't have power. Things are very slowly getting back to normal. But many places in the island were hit very hard. A lot of people still need help. So the reports have not been exaggerated. FEMA and the US Corps of Engineers are working hard together with the local government. Hopefully everybody will get the help they need.”

-Hector Cruzado

Our thoughts are with our fellow Red Raider, his family, and everyone else who has been impacted by this disaster.

Alumni Spotlight



“I graduated from the program in 2014 and completed my MBA at Tech in 2015. My current title is project development manager for Tri Global Energy out of Dallas. I oversee the day-to-day development work (wind data collection, site design, environmental & regulatory permitting, etc.) for our portfolio of renewable projects.”

-Logan Arrant

The link included will take you to the website for Tri Global Energy. If you are interested in learning more about what they do, check it out! <https://www.triglobalenergy.com/leadership>

Also, thank you, Logan for letting us do our very first Alumni Spotlight! Congratulations on all of your success.

All Things Wind would like to hear what our alumni are doing and how they are succeeding after graduation. If you would like to be featured in the NWI newsletter, please contact Renee Molloy at renee.molloy@ttu.edu.

2017 Storm Shelter Conference

Lead Sponsor: National Storm Shelter Association

November 8-9 | McKinney, Texas



Event Location

Simpson Strong-Tie Plant

2221 Country Lane, McKinney, TX

The conference will feature technical sessions, committee meetings and a social event Wednesday night at [Tupps Brewery](#)

For details regarding sessions, registration, hotel accommodations and more [click here](#)

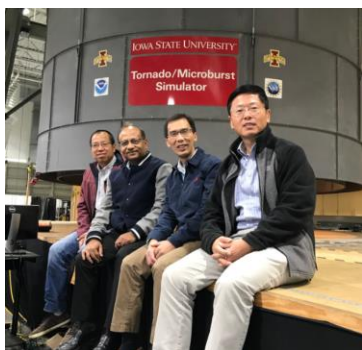
or

Go to www.nssa.cc and click the "Events" tab at the top of our home page.

Please join us!

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NWI Researchers' visit to Iowa State University



Three NWI faculty affiliates - Dr. Daan Liang, Dr. Xinzhong Chen, and Dr. Delong Zuo – visited Iowa State University on September 29 and 30. Dr. Partha Sarkar, Professor of Aerospace Engineering and Director of WiST Laboratory hosted the group.

Dr. Sarkar has a strong connection to Texas Tech. He was a faculty member in civil engineering between 1992 and 2000 and an invited speaker to the McDonald-Mehta Lecture Series in 2012. This visit was part of NSF-supported collaborative project titled Characterization, Modeling and Uncertainty Analysis of Tornado Wind and Its

Effects on Buildings. They discussed project progress and on-going research. In addition, TTU visitors toured the ISU wind engineering facilities including multiple wind tunnels and famed tornado simulator, and met with several Ph.D. students and faculty. The group agreed to expand future collaboration in research and educational activities.

Presenting Texas Tech NWI

Sundari Ramabhotla, Ph.D, an instructor at the National Wind Institute at Texas Tech University of Lubbock, presented 3 of her own posters along with Dr.Ruiz poster, at the NAWEA 2017 on September 26th - 29th, 2017, at Iowa State University, in Ames, Iowa. The posters are included below.

[1] **Sundari Ramabhotla**, Ph.D., Stephen Bayne, Ph.D., Michael Giesselmann, Ph.D., “*Modeling of Phosphoric Acid Fuel Cell in PSCAD*”, North American Wind Energy Academy (NAWEA) Symposium, September 26th - 29th, 2017, Iowa State University, Ames, Iowa

[2] **Sundari Ramabhotla**, Ph.D., Stephen Bayne, Ph.D., Michael Giesselmann, Ph.D., “*Review of Fuel Cell Technologies*”, North American Wind Energy Academy (NAWEA) Symposium, September 26th – 29th , 2017, Iowa State University, Ames, Iowa

[3] **Sundari Ramabhotla**, Ph.D., Stephen Bayne, Ph.D., Michael Giesselmann, Ph.D., “*Operation and Maintenance Cost Optimization with Respect to the Availability of a Microgrid*”, North American Wind Energy Academy (NAWEA) Symposium, September 26th - 29th, 2017, Iowa State University, Ames, Iowa

Dr.Ruiz “*The Texas Tech Bachelor of Science in Wind Energy and its Helix of Learning*”, North American Wind Energy Academy (NAWEA) Symposium, September 26th – 29th, 2017, Iowa State University, Ames, Iowa (will be presented on September 28th, 2017).

-We know that she did a great job representing the NWI program, and are very proud of all of her hard work!

Contracts and Awards

<u>Investigator</u>	<u>Unit</u>	<u>Credit</u>	<u>Award Amount Credited</u>	<u>Title</u>	<u>Agency</u>
Li, Changzhi	Electrical and Computer Engr	100%	41,690	RAPID: Low-cost Smart RF Sensor for Autonomous Floodwater Level Monitoring	Ntl Science Foundation
Boal, Clint W	Coop Fish & Wildlife Research Unit, CASNR	100%	\$65,000	TCU 411: NWI SWiFT Environmental Assessment and Monitoring Study	DOE Sandia Ntl Laboratories

-Congratulations to Changzhi Li, and Clint W. Boal!



Texas Tech Receives HEED Award

Texas Tech received the Higher Education Excellence in Diversity (HEED) Award. This is the 6th year in a row that Tech has reviewed this award, which is a great accomplishment!

One of our very own students, Nelly Rubio-Rayas, was included in the picture with the president of Texas Tech while accepting this award. We are extremely proud to have her represent our department!

-Congratulations, Nelly!

You can read more about this award through the link included below.

<http://today.ttu.edu/posts/2017/09/heed-award>

Information from Amanda Castro-Crist in Today at TTU

Recent Publications by NWI Affiliates (reported by Web of Science)

Fan, Zhaoyang; Islam, Nazifah; **Bayne, Stephen B.** (2017) Towards kilohertz electrochemical capacitors for filtering and pulse energy harvesting, NANO ENERGY, 39 306-320; 10.1016/j.nanoen.2017.06.048 SEP 2017

Peng, Liuliu; Huang, Guoqing; **Chen, Xinzhong**; Kareem, Ahsan (2017) Simulation of Multivariate Nonstationary Random Processes: Hybrid Stochastic Wave and Proper Orthogonal Decomposition Approach, JOURNAL OF ENGINEERING MECHANICS, 143 (9):10.1061/(ASCE)EM.1943-7889.0001273 SEP 2017

Peng, Zhengyu; Ran, Lixin; **Li, Changzhi** (2017) A K-Band Portable FMCW Radar With Beamforming Array for Short-Range Localization and Vital-Doppler Targets Discrimination, IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES, 65 (9):3443-3452; 10.1109/TMTT.2017.2662680 SEP 2017

Qiu, Shi; He, Binbin; **Zhu, Zhe**; Liao, Zhanmang; Quan, Xingwen (2017) Improving Fmask cloud and cloud shadow detection in mountainous area for Landsats 4-8 images, REMOTE SENSING OF ENVIRONMENT, 199 107-119; 10.1016/j.rse.2017.07.002 SEP 15 2017

Smith, Nicholas H.; **Ancell, Brian C.** (2017) Ensemble Sensitivity Analysis of Wind Ramp Events with Applications to Observation Targeting, MONTHLY WEATHER REVIEW, 145 (7):2505-2522; 10.1175/MWR-D-16-0306.1 JUL 2017

Grisham, Blake A.; Godar, Alixandra J.; **Boal, Clint W.**; Haukos, David A. (2017) Interactive effects between nest microclimate and nest vegetation structure confirm microclimate thresholds for Lesser Prairie-Chicken nest survival, CONDOR, 118 (4):728-746; 10.1650/CONDOR-16-38.1 NOV 2016

Mauget, S. A.; Leiker, G. L.; **Schroeder, J.; Hirth, B.; Burgett, W.**; Haynie, K. B. (2017) A Web Application for Managing Regional Crop Production: The West Texas Mesonet Agro-Climat Monitor, AGRONOMY JOURNAL, 109 (4):1602-1611; 10.2134/agronj2016.07.0424 JUL-AUG 2017

Lacouture, Shelby; Schrock, James; Hirsch, Emily; **Bayne, Stephen**; O'Brien, Heather; Ogunniyi, Aderinto A. (2017) An open circuit voltage decay system for performing injection dependent lifetime spectroscopy, REVIEW OF SCIENTIFIC INSTRUMENTS, 88 (9):10.1063/1.5001732 SEP 2017

Javid, Roxana J.; **Nejat, Ali**; Hayhoe, Katharine (2017) Quantifying the environmental impacts of increasing high occupancy vehicle lanes in the United States, TRANSPORTATION RESEARCH PART D-TRANSPORT AND ENVIRONMENT, 56 155-174; 10.1016/j.trd.2017.07.031 OCT 2017



Hurricane Harvey Damage Survey

Supported by the National Science Foundation (NSF), Dr. Daan Liang, Interim Director of NWI, participated in a rapid damage assessment team after Hurricane Harvey from September 14th to the 18th. The team successfully documented over 200 residential and commercial structures and collected hundreds of photos. Detailed damage information was recorded using an iOS app provided by University of Notre Dame. The other team members are Dr. Arn Womble (team lead, Assistant Professor, West Texas A&M University, TTU graduate), Dr. Steve Cai (Professor, of Louisiana State University), Dr. Thang Dao (Assistant Professor, University of Alabama) and two engineers from Simpson Strong-Tie.

Texas Tech Heads to the Coast

During the month of October,

Dr. David Roueche from Auburn University (lead-PI), Dr. Frank Lombardo from the University of Illinois Urbana-Champaign (TTU Alum, CoPI), and Richard Joseph Krupar III from the University of Maryland (Postdoctoral Associate) were awarded part of the NSF RAPID proposal. They were awarded \$39,854 to return to the Texas Coast, to continue their research. They will be collecting data on wind energy and storm surge, including damage to residential buildings.

-Congratulations to these gentleman!

Keeping Up With All Things Wind

We want you all to keep up with "All Things Wind". The links are included for the NWI Social Media at the very bottom of the newsletter! NWI would love for you to like and follow our pages, to help stay in touch with all the great things happening here!

Thank you all!