TEXAS TECH UNIVERSITY
National Wind Institute™

July 2016—Issue 85

Letter from the Interim Director

Daan Liang, Ph.D., P.E., Interim Director, NWI.

Dr. Kishor Mehta, NWI co-founder and former Director, left me a note a few days ago saying NWI will celebrate its 50th anniversary in four short years and we ought to start the planning now. Wow, 50 years! Having an organization alive for that long is considered an exceptional feat in academia, let alone one that continues to expand in size and dimensions. What is so unique that allows NWI to weather through good times and bad over the past half century? Is it leadership, team effort, or pure luck? Charles Darwin said that it is not the strongest of the species nor the most intelligent that survives, but the one which is most adaptable to change. If that is true in our case, what has contributed to our adaptability? I'm sure someone can easily write a dissertation on that topic.

As we all know, running an organization like NWI requires a tremendous amount of resources – physical, human, intellectual, and financial. Recently, there have been active discussions about how to reduce our reliance on the university's support and be more self-sustained, which is by itself a good goal to strive for. Should the NWI become a fee-for-service provider? My answer would be "no" for two main reasons. First, the service center model works well with specific pieces of equipment and we have two successful examples: the Debris Impact Facility (DIF) and the mobile radars.

However, it would be impossible to apply this model to undergraduate and graduate programs unless the university adopts a totally different accounting structure (e.g. RCM). The bigger problem with this model, in my opinion, is the inability to make profit (as mandated by the regulation) and because of this, few resources would be accumulated to support innovation. Charging two cents for a black-and-white copy is a perfect way to sustain a copy shop, but would never bring up breakthroughs and discoveries that all of us are pursuing in academia. Nor will it enhance our competitive advantages that are core to our past, present, and future successes.

So what should NWI look like in another ten years from now? Will it be larger or leaner? Will it be still focused on wind or be expanded to other hazards and renewables? Will educational programs be expanded or given away? Will NWI become an academic department? … The possibilities are infinite, but we would love to hear your thoughts!

Go Raiders!

Daan Liang, Interim Director

NWI Alumni Update: Venkatesh Singarao, Ph.D.

Photo courtesy of Dr. Venkatesh Singarao.

(Above) - Dr. Venkatesh Singarao, Ph.D., a 2016 graduate of the Wind Science and Engineering program at TTU.

"After enrolling in NWI's Wind Science & Engineering Ph.D. program, I was required to do a summer internship to gain practical knowledge and outside experience. Although I struggled to find one initially, with the continuous motivation provided by NWI staff and due to the interdisciplinary nature of the doctoral program, I was able to obtain High Voltage Operations summer intern positions with EDP Renewables, a global renewable energy company in Houston, for both 2013 and 2014.

I was then invited to intern twice with E.ON Climate & Renewables' Electrical Engineering department, another global renewable energy company in Austin, which provided me with a two-way exchange benefit with ideas and valuable practical experience gained to back up my dissertation work. All four of these different high-paying intern positions with different global renewable energy leaders (combined with my Ph.D. degree) have enabled me to obtain a full time position in the industry without needing an interview.

I'm now currently working as an Automation Engineer with the Instrumentation & Control department at E.ON Climate & Renewables in Austin.

This has been one of my proudest Red Raider moments before I graduated with my Ph.D. degree in May 2016! Thanks to NWI for designing an internship policy in this Ph.D. program."

Dr. Singarao is a 2016 graduate of the NWI's Wind Science and Engineering doctoral program.

NWI Ph.D. student gives presentation at American Control Conference

(Above) - Yeqin Wang, NWI WiSE Ph.D. student, gives his presentation at the recent 2016 American Control Conference in Boston. The presentation title was "Robust Power Flow Control of Grid-Tied Inverters Based on the Uncertainty and Disturbance Estimator."

Photo courtesy of Yeqin Wang.

Yeqin Wang (*left*), a Ph.D. student with the NWI, attended the 2016 American Control Conference (ACC) from July 6-8 in Boston, and gave a presentation titled "Robust Power Flow Control of Grid-Tied Inverters Based on the Uncertainty and Disturbance Estimator."

Yeqin also received the *Best Section Presentation Award* for his lecture which covered the topic of grid-tied inverters for the integration of renewable energies, and offers a potential solution to deal with different disturbances (such as frequency variation or voltage variation of grid voltage and fluctuating DC-link voltage) faced by industrial applications.

The ACC is an internationally recognized conference that attracts researchers and practitioners interested in issues related to control and automation. The event is a premier forum for sharing technical advancements and for networking with national and international leaders in the field.

NWI Debris Impact Facility Gains Accreditation From A2LA

(Above) - NWI's Debris Impact Facility team with their best "Guns Up."

The National Wind Institute's Debris Impact Facility (DIF) at Texas Tech University has received its ISO/IEC 17025 accreditation from the American Association for Laboratory Accreditation (A2LA).

The internationally recognized accreditation comes after a thorough assessment of the quality management system, the traceability of measurements and calibrations to national standards, and the competence of the National Wind Institute's Debris Impact Facility.

Larry Tanner, manager of the DIF and a Research Assistant Professor for the National Wind Institute (NWI), said the facility now is accredited as an ISO/IEC 17-25 laboratory that provides impact testing services for national and international clients.

"We have been competing with the larger laboratories for many years, and this accreditation puts us onto a level playing field," Tanner said. "As an internationally accredited laboratory, clients can comfortably test their products at the Debris Impact Facility laboratory knowing their product tests will be in strict accordance with all national and international guidelines and standards."

The DIF promotes public safety and welfare and helps lower losses incurred due to weather hazards and their effects. The DIF performs debris impact tests on storm shelters, shelter components and building materials in order to develop the safest, most impact-resistant materials to better protect individuals.

"This accreditation is the fruition of tremendous forward thinking, planning and diligence of DIF management and staff, including Larry Tanner, Tammy Pitzer, and Professor Ernie Kiesling, over a long period of time," said Daan Liang, Interim Director of the National Wind Institute. "It represents a major milestone in Texas Tech University's more than four decades of wind-related research and development efforts and will further strengthen our partnership with industry on technology transfer and commercialization, a key goal in NWI's Strategic Plan."

The A2LA evaluated the DIF on its quality management system, the validity and appropriateness of test methods, the traceability of measurements and calibrations to national standards, the suitability, calibration and maintenance of test equipment, the assurance of test and calibration data laboratory and the competence of the DIF laboratory to perform specific tests related to weather hazards.

The A2LA accreditation demonstrates ability of the DIF to manage and perform the activities defined by its A2LA Scope of Accreditation.

"The Debris Impact Facility continues to play an important role in establishing Texas Tech's reputation as an international leader in wind storm research and wind storm damage mitigation," said Guy Loneragan, Texas Tech's Interim Vice President for Research. "This accreditation reflects the superior research and testing done at the facility and by our outstanding faculty."

The A2LA is a nonprofit, nongovernmental membership society that is internationally recognized as an independent accreditation body in the United States. It offers a wide range of laboratory-related accreditation services and training available to any type of organization, private or governmental, based on an internationally accepted competency criteria.

"Accreditation is regarded as one of the key benchmarks for measuring the quality of an organization," the A2LA said. "Accreditation gives our testing facility an unbiased, credible and reputable compliance standard to uphold to assure the highest quality for our clients."

(Text credit: George Watson, Office of Communications & Marketing, TTU.)

Researcher Aiding in Study of Eagle Interaction with Wind Turbines

Excerpts taken from story by George Watson, Office of Communications & Marketing, TTU.

In the avian world, the eagle is known as the apex predator, meaning no other bird considers an eagle its prey. The eagle is on the top of the avian food chain.

But that doesn't mean they live without dangers, most of them manmade, and with the push toward clean energy, West Texas and Eastern New Mexico have seen a tremendous growth in the popularity and construction of wind turbine farms.

"Wind energy development throughout the western U.S. is ongoing, and it is an important renewable energy source," said Boal, a Professor in the Department of Natural Resources Management in the College of Agricultural Sciences & Natural Resources. Boal is also an NWI faculty affiliate.

"But it doesn't come without some ecological cost that can be either displacement of wildlife or the direct mortality of wildlife. If the species is really abundant, it may not be a substantive issue. But when you have a species that is not as abundant, has a long life span, and has low productivity, it does become an issue."

Boal, a member of the United States Geological Survey's Cooperative Research Unit at Texas Tech, along with the U.S. Fish and Wildlife Service's Region 2 office and its Western Golden Eagle Team, are in the process of studying golden eagle movements and potential interactions with wind turbines.

They are doing this by capturing golden eagle chicks before they can fly and affixing lightweight GPS transmitters on their backs. The chicks are returned to the nest and their movements can then be tracked over the next several years.

Golden eagles are not on the endangered or threatened species lists, but the species is protected under the Bald and Golden Eagle Protection Act. According to Boal, a golden eagle reaches full maturity in about five years and produces only one to two chicks per year, if any, when it reaches breeding age.

But, Boal said, since the 1970s there has been no real assessment of the golden eagle population in Texas. Boal said the last two winters he and other researchers have studied eagle habitats off the plains of Oklahoma and Texas and into Eastern New Mexico, examining both the birds that stay in the area year-round and those that migrate to the area every year. They've also examined some of the sites where golden eagles have nested since the 1970s, in the Trans Pecos region of Texas and, more closely, along the Caprock Escarpment.

Capturing a golden eagle is quite a process. Once an appropriate nest is located along the face of a cliff, a group of the researchers fan out across the bottom of the cliff. A climber descends from the top of the cliff above the nest and either captures it at the nest, or it flees the climber by jumping from the nest. Though it can't yet fly, the young eagle can glide very well – up to a kilometer, Boal said – before reaching the ground.

There, the researchers capture the young eagle, put a hood over its head to keep it calm, affix the solar-powered GPS transmitter, tag the bird and take some blood samples for genetic analysis before the climber returns it to its nest.

Last year, Boal and the other researchers tagged and fitted six golden eagles in Eastern New Mexico, several of which migrated into the Texas Panhandle between Lubbock and Amarillo and into the Caprock. Another seven birds have been fitted and tagged this year so far.

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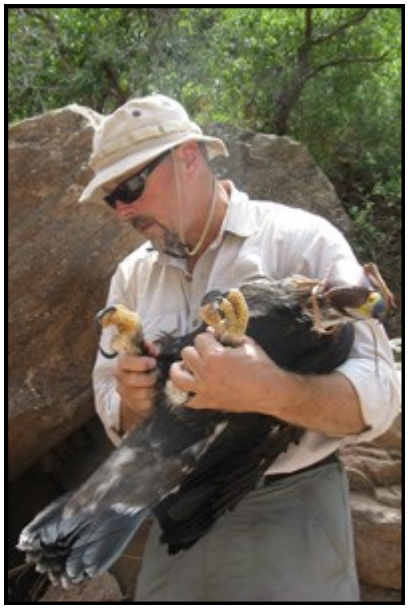
Eagle Study *cont'd from page 4*



Boal with a just captured young Golden Eagle.

Boal admits that regardless of what the GPS trackers say about a golden eagle's movements, not much can be done to change an eagle's habits.

"An eagle's going to go where an eagle wants to go," Boal said.

So, the task for Boal and other researchers becomes ensuring eagle habitats and the landscape are as conducive as possible to ensure survival and reproduction while at the same time having mitigation policies in place for landowners who erect wind turbine farms that could endanger eagles.

One mitigation strategy could be to put wind turbines in areas, like a cotton field, where the prey eagles seek is scarce. It's the native grasslands where prey like jackrabbits and cottontail rabbits are most abundant, and eagles may venture to hunt even if there are wind turbines present.

Because golden eagles are protected, the Fish and Wildlife Service has developed an incidental take permit system. That program allows energy companies to apply for an incidental take permit that protects these companies from liability if an eagle is struck by a wind turbine blade, which would be a violation of the Bald and Golden Eagle Protection Act.

This is where some of the data Boal and his team are collecting can be used to determine how many eagles are expected to be in an area and the potential for being killed if a wind energy center is placed in a certain area. But those incidental take permits usually span only about 5-10 years, and a condition of those permits is that for every eagle killed by a wind turbine, the energy company has to offset the loss by ensuring the birth of a new eagle somewhere else or prevent an eagle in another location from dying from other causes.

"There aren't very many different ways to do mitigation yet that we have figured out, but there are some," Boal said.

Ensuring the viability of the landscape for eagles to hunt and capture prey is an area of particular interest to Boal. One example of that, he said, is the encroachment of juniper all along the Caprock.

Boal holds a young Golden Eagle while Stahlecker collects a feather for isotopic analysis.

Boal said landowners are interested in reducing juniper because it degrades the quality of land for cattle grazing and also uses a large amount of water. Boal wants to find a way to estimate how many eagle chicks can be produced by restoring a certain amount of land to native grassland that eagles can hunt in.

"That's a way where energy companies can say, 'we want to put money into a mitigation bank to help the landowners do what they already want to do and that is controlling the juniper and mesquite encroachment,'" Boal said. In the long term, Boal said he would like to also study eagles' food habits by putting remote cameras near eagle nests to see what kind of prey they bring back for their young. A better understanding of the diversity and proportions of different prey species used would help determine how to manage the landscape to ensure an adequate food supply for eagles to hunt.

"I think it's a win-win for everybody involved," Boal said. "You get clean energy through turbines and a good habitat for eagles, and it also benefits the cattle ranchers."

(Text credit: George Watson, Office of Communications & Marketing, TTU.)

NWI GRANTS AND CONTRACTS — JULY 2016

No grants or contracts were reported for the month of July 2016.

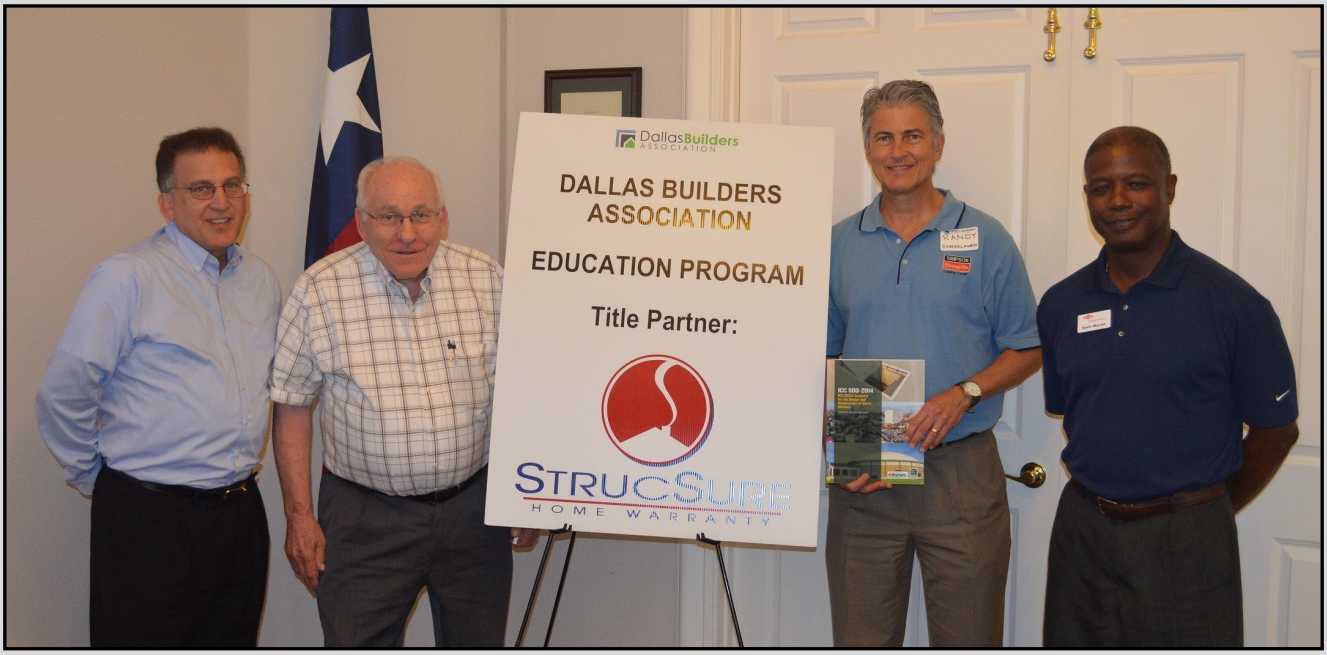
Reaching the Scientists of Tomorrow...

NWI, along with TTU's Institute for the Development and Enrichment of Advanced Learners (IDEAL), works hard to extend its reach to younger students from all over the region in order to expose them to the world of STEM and beyond.

The two week-long camps focused on different age groups: *Run on the Wind* project was focused on middle school students, and *GenerationTech,* which was focused on high school students.

The two camps reached a total of 21 participants from Lubbock and the surrounding areas, and special thanks go to NWI's **Matt Saldana, Dr. Chris Pattison, Dr. Andy Swift, Andrew Buchock, Kacey Young,** and **Larry Tanner** for their work.

NSSA Executive Director presents at Dallas Builders' Association



National Storm Shelter Association (NSSA) Executive Director **Dr. Ernst Kiesling** recently gave an educational presentation to the members of the Dallas Builders Association. Fondly named by conference organizers as "the Father of Storm Shelters," Dr. Kiesling's lecture ran smoothly and was well received by the audience.

(Above L-R) - James Bell (ASSA ABLOY), Dr. Ernst Kiesling (NSSA Executive Director), Randy Shackleford (Simpson Strong-Tie), and Kevin McLain (Home Builders Association).

Thank you to our Student Support!

(Left L-R) - NWI Social Media Intern **Skylar Starbuck** is from Clovis, NM, and working on her Master's degree in the College of Media and Communication. She would like to work in digital marketing where she can create content for a company. Skylar has a photography business and likes to do CrossFit.

NWI Social Media Intern **Rebecca Beach** is from Houston, TX. She is aun undegraduate student in Public Relations with plans to be a publicist for either a musician or an actor. A fun fact about Rebecca: She has been skydiving and has climbed a mountain.

(Right) - **Taylor Love** is a Master's student in Higher Education Administration and a full-time employee at TTU in the Undergraduate Admissions Office. Once graduated, Taylor plans to continue working on a college campus and interacting with students each day. Taylor likes to watch baseball as well as travel. She also played water polo for the Texas Tech club team during her undergraduate years.

(Left) - **Nestor Mancha** is from Dallas and is studying Mechanical Engineering, enjoying the fact that "mechanical engineering is something you may not notice, but is all around you." Nestor is a Senior undergraduate student and is planning to graduate in May 2017. He is a competitive boxer and fights for the Lubbock Warriors Boxing Club.

(Right) - **Ty Froman** is from Seminole, TX, and is a Bachelor of Science Wind Energy student. He plans to be a project developer in the wind energy industry and hopes to have the chance to travel with his job. Ty's spare time is spent doing carpentry with his current focus on building a bar in his garage.

We greatly appreciate our student support for their assistance in building the wind enterprise at TTU.

NWI Staff Participate in Professional Development Workshop

NWI and NSSA staffers recently took active roles in a professional development workshop in the last week of July. Run by the TTU-HR's Talent Development team, the time was spent team-building and understanding different work-style patterns so it was productive and entertaining at the same time.

Many thanks to **Dr. Anna Young** for giving the time and support, and to HR's **Elvia Cazares** for designing and implementing the workshop.

Undergraduate Group Visits NWI Research Facilities

The NWI research facilities were recently visited by students in Texas Tech University's Computer Science Research Experience for Undergraduates (REU) group. This program is an NSF-sponsored 10-week summer program that has been running from 2014 to 2016. This year's REU group was comprised of 10 undergraduate students from almost every corner of the country visiting Texas Tech for the summer as they conduct research for the Computer Science Department.

As Levi Brown, one of the students in the REU group, wrote, "we were given the opportunity to tour the Institute, learn about Lubbock's wind history, and experience a pneumatic cannon demonstration in the Debris Impact Facility. We were also able to get an up close look at Doppler radars, a tornado simulator and how the NWI helps and investigates both tornado damage and safety. The Texas Tech REU group thanks the National Wind Institute for extending this experience to us. It was truly an honor and privilege."

TTU's Dr. Yuanlin Zhang, Associate Professor in the Department of Computer Science and the group's organizer, reports, "NWI has done an excellent job designing the content of the visit. **Larry [Tanner]** and **Liz [Inskip-Paulk]** are particularly helpful."

NWI was proud to host such a great group and looks forward to seeing one or two later on in their careers. Thank you to all who were involved.

Photo courtesy of Dr. Yuanlin Zhang (TTU-CS.)

NWI MOVERS & SHAKERS

- NWI staffers were recently in the spotlight at the annual Texas Tech University Staff Senate transition ceremony (left) which recognizes when elected Senators as they begin or leave their terms of service.

Image on left (L-R) - **Kacey Young**, NWI Lead Academic Advisor (far left) was inducted as a Senator; **Liz Inskip-Paulk**, NWI Unit Coordinator, was inducted as Staff Senate President 2016-2017; NWI Associate Managing Director **Dr. Anna T. Young**, Past President (2014-2015); **Maggie Durham Gilchrest** (far right), Academic Advisor and new Senator.

Thank you to the ongoing support from NWI.

- ATMO Assistant Professor **Brian Ancell** was recently published in the June 2016 volume of *Weather and Forecasting* 31.3 (p. 1019-1036). The paper was titled "Improving High-Impact Forecasts through Sensitivity-Based Ensemble Subsets: Demonstration and Initial Tests."
- NWI has been diligently working over the summer months to improve the web-site experience for on-line visitors. With the recent university-wide switch to new software, NWI staffers have been able to strengthen the website by making the process more intuitive and easier than ever.

  With new pages, updated information, and our new approach, NWI is excited to announce that the new website (same address: www.wind.ttu.edu) will launch at the end of August.

  We look forward to hearing your suggestions and comments on your new and improved on-line experience so please let us know your thoughts. We are happy to strive to reach the next level of excellence with your help.

NWI's Education team has been working hard all summer to prepare for assisting new and returning students as they arrive on campus for the upcoming semester.

(Above L-R) - Maggie Gilchrest, Matt Saldana, Kyle Jay, Education Director Dr. Andy Swift, Dr. Sundari Ramabhotla, Dr. Archie Ruiz-Columbie, Dr. Chris Pattison, Andrew Burchok, and Kacey Young.

If you are interested in having your latest scholarly endeavors featured in the next NWI newsletter, please forward your information (publications, proceedings, conference/workshop attendance, or other news etc.) to Liz Inskip-Paulk (email: Elizabeth.paulk@ttu.edu). Go Red Raiders!