

IME NEWSLETTER



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Dates to Remember:

- Fall classes start Aug. 23rd
- Job Fairs: Sept. 2, 14, 22, and 28th
- Oct. 4—9th Homecoming Week
- Oct. 8th IME Advisory Board Meeting & Engineering Homecoming Showcase
- Dec. 16th Order of the Engineer Induction Ceremony & Reception
- Dec. 17th Commencement

Cover Story: IME and Healthcare

The cover story for this issue of the IME newsletter focuses on yet another sector of the economy where IME is changing the future and making a difference....
Healthcare



Meet Trung Le (Tim), an Assistant Professor in the IME department. Tim, tell us a little about yourself and how you became interested in Industrial Engineering (IE)? I got my bachelor's degree in Electronics and Electrical Engineering with a focus on Automatic Control. The interest in IE germinated when I was working on an automatic control solution for a material handling system for my undergraduate capstone project. I decided to apply for Ph.D. program in Industrial Engineering at Oklahoma State University. There, I was also introduced to different projects related to healthcare. The impact of research in healthcare is enormous; hence the first time I heard of healthcare in IE, I knew it is for me, I broke into this arena. My Ph.D. work and post-doctoral research related to the connected healthcare systems and predictive analytics for the application in diagnosis and prediction of obstructive sleep apnea, myocardial infarction and epileptic seizures. I joined NDSU in 2018 and have founded Sensing & Predictive Analytics for Computational Healthcare Systems (SPACHES) Lab.

How does IE relate to healthcare in your research?

Due to my diversified background, my research interests encompass interdisciplinary topics, including health informatics and health system engineering. Such research topics combine healthcare system design, reliability and survivability, predictive modeling, human factor, and health data analytics in IE. Precisely, my interdisciplinary research consists of, 1) Data-driven and Sensor-based Modeling to characterize the coupling dynamics of the pathological processes via investigating the nonlinear lump parameter systems; 2) Internet-of-Thing (IoT) system for medical diagnosis and treatment system to deploying customized biosignals and data by considering the wearable, non-invasive, and connected designs with the integration of nonlinear bio-signal processing techniques and 3) Predictive Analytics for personalized healthcare to forecast acute event onsets using time series predictive models integrated with nonlinear dynamic system approaches. The scope of my work ranges from the fundamental method to translational applications in medicine.

Tell us about your current research and your collaboration with Sanford Health.

We have been working with Sanford on two projects. In the first project, we worked with Sanford Sleep Center to investigate the feasibility of a new wearable system as an at-home solution to monitor obstructive sleep apnea (OSA). The second project is based on the first project to examine the utilization of the Internet of Things (IoT) solution in monitoring and predicting the severity of OSA during radiotherapy in Head and Neck cancer patients. This project involves the NDSU SPACHES lab with Sanford Sleep Center and Sanford Roger Maris Cancer Center. These projects are funded by the National Institutes of Health (NIH)-Daccota grants.

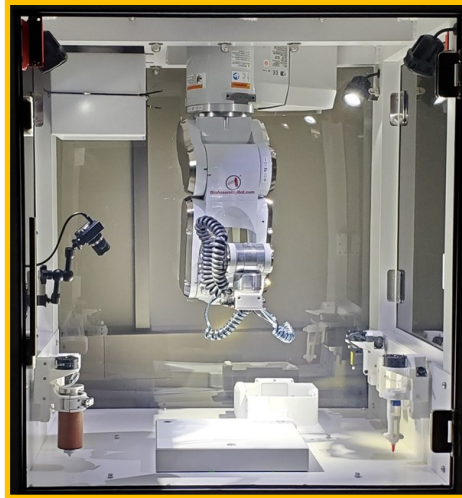
Where do you see your research heading, and what do you hope to accomplish?

One of the primary goals in the healthcare industry for the next decade is the critical transition from reactive damage control to proactive and personalized preventive care. This transformation can be illustrated by the P4 paradigm (prediction- prevention-personalization-participation). The implementation of P4 systems provides affordable medical instrumentation, enhances early diagnosis and prognosis for at-risk populations (e.g. critical care), and subsequently lowers treatment costs, effectively reducing mortality and morbidity. My vision focuses on using fundamental research methods to develop P4 translational solutions for the monitoring, diagnosis, and treatment of sleep breathing diseases, cardiovascular and neurodegenerative disorders.

DEPARTMENT NEWS...

Research Equipment

Dr. Narayanan recently acquired a state of the art bi-3D printer equipped with a 6-axis robot with the capability to print multiple bio-materials to fabricate model therapeutic tissues. He plans to use it for his research for transforming the manufacturing process for organ implants.



Spring Graduates:

Congratulations to all of our graduates! We were very excited to celebrate graduation and the ring ceremony in person this semester!

Spring Undergrads:
IEM – 15 graduates
Mfg – 7 graduates



Ring Ceremony participants giving the “Horns Up” with their new rings!
Emma Anderson, Ethan Olson, Dr. David Grewell, Mason Galde, and Emma Culshaw.



Congratulations to Dr. Marinov!

Dr. Val Marinov, IME Professor, retired from teaching this past fall. During his tenure at NDSU Dr. Marinov led research in flexible hybrid electronics technology and advanced packaging and laser processing in microelectronics. Based on his research at NDSU, he founded a startup company, Uniqarta, Inc. This past spring his hard work and diligence paid off as Kulicke & Soffa paid \$26.5 M to acquire Uniqarta group!!!

To see the press release, scan here:



AWARDS & RECOGNITION...

IME Professor and Chair, Dr. David Grewell, receives the R.D. Thomas Memorial Award



David Grewell, chair and professor of the Industrial and Manufacturing engineering department has been selected by his peers to be the recipient of the R.D. Thomas Memorial Award. This award is sponsored by R. D. Thomas & Co. It honors the late R. D. Thomas, an AWS charter member and the AWS Representative to the first organization meeting of the International Institute of Welding (IIW). This award is presented to a member of the American Council of IIW or to an AWS member who has made a substantial contribution to the activities of the IIW. His formal recognition ceremony will be held in conjunction with the 2021 FABTECH in Chicago mid September 2021.



IME Grad student, Nguyen Quoc, awarded Graduate Student Council Award.

Quoc's proposal on "Create Learning system for arrhythmia classification app using hospital data and create wearable devices" received \$500 from the graduate school to purchase equipment for his proposal. Quoc's advisor is Dr. Trung Tim Le.



IME Grad student, Raihan Quader, awarded Outstanding Contribution to Research

Raihan Quader was awarded \$1,000 from the NDSU Graduate School for outstanding contributions to research. Raihan's advisor is Dr. Grewell and Dr. Narayanan.

IME Grad student, Alex Davila-Frias, awarded Oftshun Award

Alex Davila-Frias was awarded the SRE Stan Oftshun Best Student Paper Award. This award recognizes the best technical paper by an SRE student author/coauthor accepted for presentation at the Annual RAMS® Conference. At least one of the coauthors must be an SRE member. The award consists of a certificate of recognition and \$1,000 cash.

Alex (pictured to the right) presenting his paper entitled Deep Neural Networks for All-Terminal Network Reliability Estimation at the RAMS conference on May 24th. The paper was co-authored by Saeed Salem and his advisor, Om Prakash Yadav, North Dakota State University.



SPOTLIGHTS...

Alumni Spotlight... Hannah Holt

Hannah Holte earned her degree in industrial engineering and management from NDSU in 2016 where she sought to pursue her analytical talent and test her logic-based mindset and problem-solving abilities. The industrial engineering program helped her learn the tools and principles to optimize a complex processes. Holte wanted to apply the principles learned in class to the world of health care, and she quickly learned that idea would be her path to success. An internship at Sanford Health as a student paved the way for full-time employment.



Hannah was recently featured in a issue of *Area Woman Magazine* titled “From Internship to Successful Career”. “I really enjoy digging into a process and working with a variety of teams to understand and map out who is involved, what steps are needed, how the work is being done, and determining the pain points deterring teams from meeting their goals,” Holte says. One of Holte’s ongoing goals is to provide value in any position she finds herself in, while also offering vision for others to follow and execute themselves. She credits NDSU’s College of Engineering for preparing her for the real world, offering opportunities to work with local businesses and internships that would ultimately lead to a permanent career.



To read the full article, use the QR code on the right.

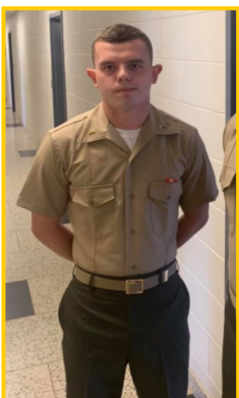
Student Spotlight... James Kaczor

James Kaczor, a junior in the manufacturing engineering program and a linebacker for NDSU’s Bison football team, was featured in an issue of *Bison Illustrated* “Making the Grade: James Kaczor”. The article states, “no doubt we will continue to praise Kaczor for his on-field accolades. Yet, one has to recognize that Kaczor’s future after football is perhaps bigger and brighter than the lights inside the Fargo-dome.” Kaczor's 3.8 GPA in a difficult major is quite impressive! Kaczor states the key to his success is cultivating skills in time management and discipline. He attributes Kelli Layman and her team of athletic academics that do a fantastic job helping acclimate to the college rigors. To read the full article, use the QR code to the right.



In Honor of Memorial Day

A quick shout out to several of our recent alums who are serving our country. Pictured on the left is Chris Swedzinski at cadet training school (fall 2020 grad). On the right is Ayanfe Afelumo (spring 2021 grad). Ayanfe was heading to Missouri after graduation for training and will then be stationed at Fort Bliss in Texas. We THANK YOU for your service!



2021 SPRING CAPSTONE PROJECTS...

IME students finished their senior capstone projects with a full morning of in-person presentations that were streamed live on our Facebook page (www.facebook.com/NDSU.IME). A big thank you to our sponsors listed below and our judges, Jason Link from Land O'Lakes, Inc , Brett Winkelman from Wells Fargo Advisors, and Ray Berry from OmniByte Technology. The winners were announced at the awards banquet where alumnus, Ray Berry, founder/CEO of OmniByte Technology, was the guest speaker. Congratulations goes to Action Fabricating for winning the first place title, BTD Manufacturing for taking second place, Dakota Fiber for 3rd place, and an Honorable Mention was given to TSR Parts!



Company	Project	Students
 Action Fabrication	Manufacturing Process Evaluation & Analysis	Patrick Burns, Emma Culshaw, Dominic Heazlett, Nathan Hegstad, Dominic Schlangen
 BTD Manufacturing	Manufacturing Equipment Justification & Process Analysis	Rachel Bany, Megan Girard, Brecon Gross, Anthony Muhich, Megan Thorson
 Dakota Fiber	Custom Manufacturing Equipment RE-design & Buildout	Sterling Clooten, Wyatt Guggisberg, Christopher Reller, Ryan Turk Sydney von Arb
FAST Manufacturing	Human Factor Ergonomic Workstation Design	Brady Anderson, Anne Bundy, Shamari Chism, Kaija Rizzo, Alexis Summers
Felling Trailers	Welding Fixture Design & Build	Mason Champion, Megan Chromy, Riley Kinney, Parker Ortez, Ryan Stalpes
Massman Automation	Inventory Control Analysis & 5S	Ayanfe Afelumo, Michael Allen, Mason Galde, Will Odland, John Petersen
 TSR Parts	Manufacturing Metallurgy Blade Hardness Analysis	Emma Anderson, Jacob Crestik, Timothy Erickson, Ethan Olson
UNFI	Ergonomic Lift Simulation Lab Buildout & Training SOP	Abdirizak Abdikadir, Heinz Ahlers, Betsy Surver, Terra Thiel

NOTE WORTHY HAPPENINGS...

CERL Workshop Dr. Grewell, in collaboration with Jane Schuh from the VPR's office, led the planning and execution of a CERL (dept of defense) 1/2 day workshop on January 29th. The workshop consisted of one minute pitches per proposal from NDSU PI's and researchers to the DOD with breakout sessions for discussion. The three areas of focus were: 1) Resilient Systems, 2) Advanced Materials, and 3) Autonomous Systems. The purpose was to assure alignment of NDSU efforts and CERL funding opportunities to promote federal DoD funding to NDSU.

Webinar Series On April 28, the IME department, working together with UIDP (Innovative Approaches to University/Industry Collaboration) launched their first free webinar series. The first webinar was presented by Dr. Xu on Machine Learning. These webinars are also made available to teachers for CEU credits. Dr. Xu had over 200 participants from industry, students, and faculty around the world. The department will continue to offer webinars every other month hosted by IME faculty specific to their research area topics. To listen to the webinar scan the URL code to the right.



The Spring Advisory Board Meeting was held via Zoom on April 30th. Hannah Holt, a 2016 NDSU IME alum, was voted onto the board. Hannah joins us as a supply chain project manager with Sanford Health. The focus of the advisory board meeting was on recruitment and how we can get the word out to students about what IME is. Currently, a video is being created and an internal and external social media campaign will be put together this summer along with other brainstorming ideas resulting from the meeting. A BIG thanks to Christy Strong and Dennis Steinman this past semester for participating in student recruitment activities via zoom!!

The CB² Spring Meeting was held May 11-12 and was a virtual success with ninety one participants. During the two day conference fourteen new seed concepts were reviewed and PI's from last fall's awards gave their six month presentations on the progress of their projects. CB² currently has thirty-two industry members and is waiting for NSF approval for Phase II.



RESEARCH/GRANTS...

Smart IoT System for Obstructive Sleep Apnea Monitoring & Forecasting

Dr. Le received a \$75,000 ready-to-go pilot grant funded by the National Institute of Health-Dakota Cancer Collaborative on Translational Activity. Dr. Le will be collaborating with UND and Sanford Health.



Strengthening 3D printed Parts

Dr. Narayanan received \$36,500 to study the effect of ultrasonic vibration on mechanical properties of 3D printed parts made with biobased plastic materials.



Looking for more information about the IME department
or past newsletters?

Check us out on our website at: [NDSU.edu/ime](https://www.ndsu.edu/ime)

You can also connect with us on Facebook!



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