Department of Mechanical Engineering
UNT ME Search Committee
UNT Discovery Park, Mechanical Engineering
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Wesley T. Honeycutt
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March 10, 2025

Dear Faculty Search Committee:

I am writing to apply for the position of Assistant Professor of Mechanical Engineering at the University of North Texas. My application through the UNT portal is for the opening in Mechatronics, Automation, and Intelligent Control Systems, but as a transdisciplinary researcher, I may also fit with Robotics and Control, AI/ML Applications for Design and Manufacturing, and Environmental Sustainability. I am currently performing collaborative, transdisciplinary research with several groups in the School of Meteorology and the College of Engineering at the University of Oklahoma. I would be delighted to bring my research experience, mentoring focus, and collaborative communicativeness as a researcher with a broad scope capable of helping UNT rise in rank by training tomorrow's leaders on emerging engineering challenges.

My goal is to establish a transdisciplinary research group summarized by the statement: "how should we sense the world and how do we make sense of what we sense?", in multiple contexts including design, feedback loops, and adaptive systems which match well with departmental interests at UNT ME. In the process, I plan to establish a self-sustaining, inclusive research group which communicates findings in scholarly venues and encourages student achievement. As with many projects designed to consider systems as a whole, my efforts are not confined to a single niche. Instead, I approach the following Research Themes which cross disciplines:

RT1 **Developing new sensing tools and information streams for machine interaction;**
RT2 **Environmental sustainability and energy transitions modeled as Wicked Problems;**
RT3 **Addressing transdisciplinary challenges with emergent methods.**

My research experience hails from many sources beyond the traditional path. In addition to my refereed publications (9 in journals, 11 at conferences), obtained research funding ($150,000+ to date, $550,000+ under review), I have produced 1 funded entrepreneurial startup (**FF5**), I have a provisional patent which will be converted to a US patent in 2025 (**IP1**), I have privately consulted for 3 companies, I have produced research output for corporate partners (3 technical reports, 6 presentations), and I am currently in talks to license my PhD project to a company monitoring capped wells (**FF10**). I would like to transition from the non-traditional path to an academic one, focusing more on traditional publications. I am motivated to find a professorial research home to act upon and create new avenues to bridge divides between observation and social action on policy issues. I would be especially eager to develop these areas of inquiry at UNT to expand ME's growth-oriented portfolio there. My prior technical training provides the depth in knowledge that I now apply in the breadth of my current endeavors to study entire systems. I developed my technical skills during my PhD from Oklahoma State University where I completed my dissertation research entitled *Development and Applications of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane* including work on greenhouse gas sensor evaluation (**AJ9**) and networking devices for 2D spatial coverage (**AJ7**). This experience allowed my perspectives to grow by performing work within a complex system that sharpened *my understanding of what we sense* through the importance in *how and where it is sensed*. I co-founded the XGEM Big Idea Challenge 1.0 project at OU (**PG4**) to create grassroots research efforts that includes both technical and social sciences at project inceptions. With XGEM, I guided our research to create high-level, meaningful change—recently achieving national influence on the Biden administration's GHG monitoring policy. My research observing the world is topic agnostic: my postdoctoral work traded GHG analytes for birds when I developed the LunAero moon tracking robot to monitor nocturnal avian migration (**AJ7**) using unique methods of computer vision and count bird silhouettes across the moon (**AJ6**) which acts as a citizen-science compatible (**FF4**) complement to radar aeroecology (**AJ5**) at the OU Biological Survey. I

have collaborated extensively with the Farrokh Mistree/Janet K. Allen laboratory on mechanical engineering and systems design related projects including evolving cyber-physical-social systems (**AJ1**), constraining bird strikes on airplanes using system dynamics (**AC5**), and formulating socio-environmental challenges as Wicked Problems (**AC6**). Currently, we are exploring methods to create novel information in knowledge gaps using large language models enhanced with climate and soil models on an example problem involving native plants.

My teaching and mentoring seeks to impart a similar holistic outlook to my students and mentees by challenging them to answer big-picture questions in bite-sized parts, then asking them to contextualize what they discovered as experiential learning. To date, I have mentored **20 students**. I leverage my technical breadth to match students with projects based on each individual student's needs, yet each project is contextualized as a piece of my research vision. I adapt my instruction and presentation style to the audience and engage using techniques developed in classical theater training. I implement my current Q&A style for invited classes like **METR 2613** and dialog-style seminars (like **PS1** and **PS3**). When instructing 1000-level chemistry courses as a graduate teaching assistant (**info**), my students consistently positively reviewed my instruction style as it prepared each them to think about the material and discover greater understanding of the material's meaning. I have developed custom curricula for the LaTeX typesetting language, with scaffolding techniques to ensure that students in portions of the course build upon previous material (**info** and links to materials (1), (2), (3)). All of these skills will prepare mentees and pupils to become engaged, critically thinking citizens who can innovate in a changing world.

My outreach is focused on research outreach, connecting otherwise disparate disciplines across colleges, institutions, and groups far removed from academia to collaborate on truly transdisciplinary projects that are driven by the necessity to address grand challenges. I believe action on issues must acknowledge the binary contradiction: progress on a cross-cutting challenge without STEM techniques is disarmed, but a technical solution without social context is meaningless. In my efforts on major, transdisciplinary projects like XGEM, I learned to achieve convergence through communication and committees by providing tools to social researchers from Philosophy and meaning to the STEM researchers from Engineering, empowering both to succeed by translating the field-specific language of each group. Researching topics related to energy transitions and climate justice in Oklahoma would seemingly put me at odds with industry, however I navigate relationships between academics and industry (**FF2**) and the community (**AG2**) through empathetic understanding of stakeholder drivers identified with systems design theory, a boon when considering potential outreach to partners. Academic research alone is insufficient to create change in the world, so I have learned to use tools like environmental entrepreneurship (including a startup **FF5** and a patent **IP1**) to address invasive species management and regulatory defense, and I have leveraged Open Hardware publication of transformative research tools (**AJ8**) to improve technology access. By forming collaborations with researchers, I would be a productive team member on many projects in areas of interest to any engineering department interested in creating the next generation of innovators including engineering design for challenges in rapidly industrializing communities (**PP8**), UAS infrastructure (**PG10**), and modeling public policy as cyber-physical-social systems with machine learning (**AC6**).

My commitment to students is rooted in empathy, especially for those with a differential access and experience than myself, so I seek to be an advocate and organizer of change. I have a record of **training students** from an abundance of backgrounds and experiences. I acknowledge this in my role as a mentor by providing students with the new experiences they need to fill gaps and attain success among their peers.

This application packet contains this cover letter, my curriculum vitæ, references, research statement, and teaching statement. This is a hypertext-enabled document when viewed as a total packet, but certain links across sections may break when individual portions are submitted separately. If you prefer to use this functionality, I have saved a complete copy on my website which you may access **through this hyperlink** in the original PDF. Please feel free to contact me at **hone9226@gmail.com** or via my cell number: +1(918)214-2519 with any questions. I would love to speak with you further regarding this position. Thank you for taking the time to review my application packet.

Sincerely,

Wesley T. Honeycutt

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Wesley T. Honeycutt

Curriculum Vitae

Career Objectives

Obtain a research faculty role with intent to establish a transdisciplinary group studying holistic applications of sensing as a system for sustainability. Specific objectives include:

- Establish a self-sustaining, inclusive research group supported by external funding through merits of its scholarly achievement.
- Communicate research through open-source products by way of scholarly publication in open journals, presentations, and public data repositories.
- Encourage collaborative achievement in both transdisciplinary application of sensing strategies and convergent research across partnerships.

Education

Oklahoma State University — **Stillwater, OK**
Ph.D., Chemistry — *2012–2017*
Nicholas F. Materer Research Group

Dissertation: *Development and Applications of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane* (LINK)

University of Oklahoma — **Norman, OK**
B.Sc, Chemistry — *2006–2011*
Robert L. White Research Group

Thesis: *Methods of Environmental Tobacco Determination by Gas Chromatography* (LINK)

Synthesis of Research Themes (RT)

How should we sense the world and how do we make sense of what we sense?

These research themes are addressed throughout this packet. Click the **RED** hyperlinks for more info.

RT1 : Developing new sensing tools and information streams for machine interaction. Including:

- Considering sensing networks across spatial domains (**AJ2**—**AJ7**, **AJ9**)
- Using sensor characteristics in design-feedback loops (**AC9**, **PS4**, **PS7**, **PG1**, **PP1**, **PP7**—**PP12**)

RT2 : Environmental sustainability and energy transitions modeled as Wicked Problems. This means:

- Constraining Wicked Problems (**AC6**, **PS3**, **FF9**)
- Addressing systems of energy use and sustainability (**PS6**, **PG4**, **PG12**, **FF3**)

RT3 : Addressing transdisciplinary challenges with emergent methods. For example:

- Partnering to solve engineering problems outside the usual research silo like:
  1. robots to monitor bird migration (**AJ8** and **AC8**),
  2. meteorologic influences on methane (**AJ3**) funded as an internship (**FF2**), and
  3. engineering system dynamics of birds hitting airplanes (**AC5**)
- Yielding emergent findings which transcend the capabilities of a single partner above, respectively:
  1. found bird behavioral patterns (**AJ4**) using novel computer vision techniques (**AJ6**),
  2. created new environmental monitoring IP with greater capability than any similar tool (**IP1**), and
  3. revealed the necessity to treat cyber-physical-social problems as evolving (**AJ1**).

Peer-Reviewed Publications

Journal Articles

AJ1 : Harshit Gupta, Mayank J. Bhalerao, **Wesley T. Honeycutt**, Janet K. Allen, and Farrokh Mistree. On Designing Evolving Cyber-Physical-Social Systems (E-CPSS): A Decision- Based Design Perspective. *Journal of Computing and Information Science in Engineering*, (in review)

AJ2 : **Wesley T Honeycutt**, Khosrow Namjou, Parisa M. Khiabani, Sean M. R. Crowell, Chenghao Wang, Erkan Kayacan, and Binbin Weng. Sensor Networks for Methane Emissions Detection and Monitoring: A Critical Review. *Sensors and Actuators Reports*, (in review)

AJ3 : Xiao-Ming Hu, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, Bowen Zhou, and Ming Xue. Observation and simulation of methane plumes during the morning boundary layer transition. *Journal of Geophysical Research-Atmospheres*, (In Press)

AJ4 : Eli S Bridge, **Wesley T Honeycutt**, Angela J Chen, Riley Miller, and Jeffrey F Kelly. Social behavior among nocturnally migrating birds revealed by automated moonwatching. *Ornithology*, 141(1):ukad055, February 2024. ISSN 0004-8038, 2732-4613. doi: 10.1093/ornithology/ukad055 (LINK)

AJ5 : **Wesley T Honeycutt** and Eli S Bridge. Use of the LunAero Open-Source Hardware Platform to Enhance the Accuracy and Precision of Traditional Nocturnal Migration Bird Counts. *Integrative and Comparative Biology*, page icac053, June 2022. ISSN 1540-7063. doi: 10.1093/icb/icac053 (LINK)

AJ6 : **Wesley T. Honeycutt** and Eli S. Bridge. UnCanny: Exploiting reversed edge detection as a basis for object tracking in video. *Journal of Imaging*, 7(5), 2021. ISSN 2313-433X. doi: 10.3390/jimaging7050077 (LINK)

AJ7 : **Wesley T. Honeycutt**, Taehwan Kim, M. Tyler Ley, and Nicholas F. Materer. Sensor array for wireless remote monitoring of carbon dioxide and methane near carbon sequestration and oil recovery sites. *RSC Advances*, 11(12):6972–6984, 2021. ISSN 2046-2069. doi: 10.1039/D0RA08593F (LINK)

AJ8 : **Wesley T. Honeycutt**, Alyse V. Heaston, Jeffrey F. Kelly, and Eli S. Bridge. LunAero: Automated "Smart" Hardware for Recording Video of Nocturnal Migration. *HardwareX*, 7:e00106, April 2020. ISSN 2468-0672. doi: 10.1016/j.ohx.2020.e00106 (LINK)

AJ9 : **Wesley T. Honeycutt**, M. Tyler Ley, and Nicholas F. Materer. Precision and Limits of Detection for Selected Commercially Available, Low-Cost Carbon Dioxide and Methane Gas Sensors. *Sensors*, 19(14), 2019. ISSN 1424-8220. doi: 10.3390/s19143157 (LINK)

Conference Papers

AC1 : Qingyu Wang, Xiao-Ming Hu, Petra Klein, **Wesley T. Honeycutt**, Binbin Weng, Ming Xue, Sean M. R. Crowell, and Chenghao Wang. Characterizing local methane enhancements at the Southern Great Plains ARM site in Oklahoma: Meteorological influences and source attribution. In *The 27th Conference on Atmospheric Chemistry and the 38th Conference on Climate Variability and Change*, Baltimore, MD, January 2025. American Meteorological Society

AC2 : Qingyu Wang, Xiao-Ming Hu, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, and Ming Xue. Mobile CH4 measurement and inversion & an interactive visualization platform. In *The 27th Conference on Atmospheric Chemistry and the 38th Conference on Climate Variability and Change*, Baltimore, MD, January 2025. American Meteorological Society

AC3 : Qingyu Wang, Xiao-Ming Hu, Petra Maria Klein, Binbin Weng, Ming Xue, **Wesley T. Honeycutt**, Sean Crowell, and Chenghao Wang. Examination of Meteorological Factors and Emissions Sources Leading to the Large Methane (CH4) Enhancements at the ARM Site in Oklahoma. In *Proceedings of American Geophysical Union 2024*, Washington, D.C., United States, December 2024. American Geophysical Union

AC4 : Xiao-Ming Hu, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, and Ming Xue. Observation and Simulation of Methane (CH 4) Plumes during the Morning Boundary Layer Transition. In *Proceedings of American Geophysical Union 2024*, Washington, D.C., United States, December 2024. American Geophysical Union

AC5 : Joey Paul E. Haynes, Mayank J. Bhalerao, **Wesley T. Honeycutt**, Janet K. Allen, and Farrokh Mistree. The Impact of Artificial Lights at Night (ALAN) on Bird Strikes: Predictive Modeling for Public Policy

Design. In *International Design Engineering Technical Conferences & Computer Information in Engineering Conference*, Washington, D.C., United States, August 2024. American Society of Mechanical Engineers. doi: 10.1115/DETC2024-143780 (LINK)

AC6 : Mayank J. Bhalerao, **Wesley T. Honeycutt**, Ashok K. Das, Janet K. Allen, and Farrokh Mistree. Framing Wicked Problems Through Evidentiary and Interpretative Analysis. In *IDETC-CIE2023*, Volume 3B: 49th Design Automation Conference (DAC), August 2023. doi: 10.1115/DETC2023-117285 (LINK)

AC7 : Elizabeth Spicer, Sean Crowell, Feng Xu, Nalini Krishnakutty, Xiao-Ming Hu, Nicole Jacobs, **Wesley T. Honeycutt**, Timothy Miller, Andrew Shearer, Vishnu Kadiyala, Elizabeth N. Smith, Conner J. Flynn, Elizabeth Pillar-Little, Petra Klein, Lucas Livingstone, James H. Flynn, Maria Eugenia Velasco Moreira, Tyler Bell, Evan Keeler, Jenni Kyrouac, and Brian Enmold. Urban and Industrial Carbon-Based Pollutant Monitoring Using EM27/SUNs in Houston, Texas During the Summer 2022 GeoCarb-TRACER Campaign: A Focus on Validation, January 2023

AC8 : **Wesley T. Honeycutt** and Eli S. Bridge. Low-cost Open-source Hardware Development for Nocturnal Migration Quantification by 'Moonwatching', January 2022 (LINK)

AC9 : Jamey Jacob, Taylor Mitchell, **Wesley T. Honeycutt**, Nicholas F. Materer, and Peter Clark. Monitoring of Carbon Dioxide and Methane Plumes from Combined Ground-Airborne Sensors. In *Convection and Boyancy Driven Flows: Environmental*, volume 61 of *Series 20*. APS, November 2016

AC10 : **Wesley T. Honeycutt**, Hayden Hamby, Allen Apblett, and Nicholas F. Materer. Uptake kinetics of heavy metals from water using a high surface area supported inorganic metal oxide. In *Abstracts of Papers, 247th ACS National Meeting & Exposition, Dallas, TX, United States, March 16-20, 2014*, pages ENVR–272. American Chemical Society, 2014

AC11 : **Wesley T. Honeycutt**, Evgueni B. Kadossov, Allen W. Apblett, and Nicholas F. Materer. Selectivity and kinetic behavior of heavy metal and radionuclides on supported ion-exchange adsorbant. In *Abstracts of Papers, 249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015*, pages I+EC–44. American Chemical Society, 2015

Patents

Patents and Intellectual Property

IP1 : Xiao-Ming Hu and **Wesley T. Honeycutt**. Quantifying Diffusion of Methane Gas Plumes, Provisional

General Audience

Popular Press Coverage

AG1 : Rebecca Heismann. *Flight Paths: How a Passionate and Quirky Group of Pioneering Scientists Solved the Mystery of Bird Migration a Book by Rebecca Heisman*. HarperCollins, March 2023. ISBN 978-0-06-316114-6 (LINK)

AG2 : Charlotte Hu. Using moon shadows to track the transit of birds. *Popular Science*, February 2022 (LINK)

Experience

School of Meteorology—University of Oklahoma **Norman, OK**
Research Associate *2025–*
Developing a novel, automated enclosure for a total-column atmospheric spectrometer capable of protecting sensitive components from extreme conditions encountered during field work in Houston, TX. Responsible for CAD, electronics, programming, and undergraduate researcher leadership.

DOE FECM iM4—University of Oklahoma **Norman, OK**
Research Associate *2023–2024*
Conducting research to identify gaps in current practice and theory of methane sensing networks through systematic gap-mapping review, technological comparisons, and organizing field work to evaluate devices on the DOE Fossil Energy and Carbon Management Innovative Methane Measurement, Monitoring, and Mitigation Technologies (iM4) program.

GeoCarb—University of Oklahoma **Norman, OK**
Senior Research Associate *2021–2023*
Development of custom portable terrestrial column measurement for satellite validation including field campaigns, student mentoring, and personal interface with stakeholder groups and individuals.

X-GEM Project—University of Oklahoma **Norman, OK**
Research Associate *2021–2022*
Transdisciplinary (electrical engineering, systems engineering, architecture, and social sciences) postdoctoral research on greenhouse gases as well as co-PI leadership responsibilities related to 2021 Big Idea Challenge 1.0 Grant at OU.

Oklahoma Biological Survey—University of Oklahoma **Norman, OK**
Postdoctoral Research Associate *2017–2020*
Postdoctoral work coordinating part of the OU Aeroecology University Strategic Initiative at OU-OBS. Developed robotics, sensors, and computer vision technology for ecological applications, using Python, C, C++, and CAD.

BNH Technologies LLC. **Stillwater, OK**
Owner *2016–*
Started company to act as a face of my consulting and technology development projects. Fulfilled multiple consulting contracts through this entrepreneurial venture including gas detector design, 3D modeling of injection molded parts, and Bluetooth refrigerator electronics layout.

Department of Chemistry—Oklahoma State University **Stillwater, OK**
Research Assistant *2013–2017*
Worked as a research assistant to Prof. Nicholas F. Materer. Primary research was development of a network sensor array for CO_2 and CH_4 monitoring near injection wells. Secondary projects included uranium uptake kinetics on metal oxide sorbents, health implicaiton of aerosols in electronic cigarettes, and peroxide explosives detection.

XploSafe LLC. **Stillwater, OK**
Contract Scientist *2013–2013*
Subcontract work testing novel sorbent materials.

Department of Chemistry—Oklahoma State University **Stillwater, OK**
Teaching Assistant *2012–2013*
Taught lab sections of CHEM 1414 "Chemistry for Engineers" and teaching assistance for labs and lectures of CHEM 1314 "Chemistry for Non-Majors" for two semesters each. Received exceptional reviews from students above the departmental average.

Bartlesville Public Schools **Bartlesville, OK**
Substitute Teacher *2012–2012*
Substitute teacher for Chemistry, Biology, Theater, Speech, and At-Risk classes between previous contract work, ending and starting graduate studies.

Chevron Phillips Chemical Co. **Bartlesville, OK**
Lab Technician *2011–2012*
Worked in Rheology and Additive Characterization labs in relation to the production of polyethylene and other specialty polymers.

Instruction

Teaching & Curriculum

METR 2613 — Meteorology Instrumentation: Invited as a guest lecturer to OU's METR 2613 during yearly "demonstration days" to expand the students' understanding and contextualization of sensor networks by comparison with Oklahoma Mesonet stations (LINK).

LaTeX Workshops: Developed Carpentries-style workshop curriculum for introductory LaTeX skills for OU Libraries. Workshop is requested by departments (including math and geography) as well as campus wide research events (RezBaz) through OU Libraries. Asked to instruct the workshop at least once per semester since 2019 (LINK) (LINK).

LaTeX Intro: Developed a short presentation for OU Libraries to introduce LaTeX to students in under an hour. Taught on an as-needed basis since 2018 (LINK).

TikZ Intro: Developed a short presentation for OU Libraries to introduce TikZ to students in under an hour. Taught since 2020 roughly once per two years (LINK).

Graduate TA: Taught multiple lab sections including Freshman Chemistry for Non-Majors and Chemistry for Engineers.

CHEM 1314 Chemistry I
CHEM 1414 General Chemistry for Engineers
CHEM 5260 Foundations of Inorganic Chemistry

Substitute: Performed substitute teaching duties at Bartlesville High School in 2012

Chemistry Chemistry I/Honors Chemistry I
Biology Biology I/Honors Biology I
Drama Drama I-IV/Stagecraft

Mentoring

I have acted in a mentoring capacity for extended periods to the following number of students to date:

	Master's thesis committee member (1)	
Mayank J. Bhalerao	Industrial and Systems Engineering	2022–2024
	Graduate student mentor; non-committee role (2)	
Elizabeth Spicer	Meteorology	2021–
Meelyn M. Pandit	Biology	2018–2021
	Undergraduate student mentor (14)	
Jackson L. Clymer	Chemistry	2025–
Anthony J. Voci	Meteorology	2025–
Jet B. Flener	Electrical and Computer Engineering	2024–
Noah A. Schneiderman	Meteorology	2024–2024
Kathryn Joyce	Aerospace and Mechanical Engineering	2024–2024
Timi O. Oduleye	Aerospace and Mechanical Engineering	2024–2024
Daniel T. Hayden	Meteorology	2023–2023
Zainab Sajid	Biochemistry	2023–
Joey Paul Eli Haynes	Computer Science; Southern New Hampshire University	2023–2025
Harshit Gupta	Mechanical Engineering; Delhi Technological University	2022–2025
Andrea G. Reyes-Vega	Chemical Engineering	2023–2023
Rachael M. Auth	Meteorology	2022–2023
Lucas J. Livingstone	Petroleum Engineering	2022–2023
Zachary Fruits	Meteorology	2022–2022
Israel T. Lugo	Biology	2018–2020
Alyse V. Heaston	Biology	2018–2019
	High school student mentor (1)	
Ariyana Chadha	Leland High School; San Jose, CA	2023–

Presentations

Invited, Plenary, and Seminar Talks

PS1 : **Wesley T. Honeycutt**. From Signal to Insight: Sensing Fundamentals, February 2025

(Invited) Seminar for the Graduate Student Community *Feb. 26th, 2025*

PS2 : **Wesley T. Honeycutt**. Narrative Storytelling for STEM: The PechaKucha Oratory Exercise, September 2024 (LINK)

(Invited) Seminar given to the SRL@OU "Sharing to Gain" Series *Sep. 13th, 2024*

PS3 : **Wesley T. Honeycutt**. Constraining Wicked Problems: Oklahoma's Entangled Energy, Pollution, and Ecological Challenges, January 2024 (LINK)

(Invited) Seminar given to the SRL@OU "Conversations" Series *Jan. 26th, 2024*

PS4 : **Wesley T. Honeycutt**. City Planning Systems for Pollution in Urban Canyons: Towards Cyber Integration for Societal Health: Improving Understanding of Urban Air Pollution Stakeholder Networks by Applied Systems Engineering, September 2022 (LINK)

(Invited) Seminar given to the SRL@OU "Conversations" Series *Sept. 2nd, 2022*

PS5 : **Wesley T. Honeycutt** and Eli S. Bridge. Low-cost Open-source Hardware Development for Nocturnal Migration Quantification by 'Moonwatching', January 2022 (LINK)

(Invited) Society for Integrative and Comparative Biology 2022 Phoenix, AZ SICB-wide symposium: Open Source Solutions in Experimental Design — *Jan. 7th, 2022*

(Invited) Society for Integrative and Comparative Biology Online Asynchronous Sessions (SICB+) — *Jan. 3rd–7th, 2022*

PS6 : **Wesley T. Honeycutt**. On Sustainability as a Cyber-Physical-Social System: The XGEM Initiative Multiscale Integration of Methane Monitoring for Impact Characterization and Mitigation, September 2021 (LINK)

(Invited) Seminar given to the SRL@OU "Conversations" Series — *Sept. 17th, 2021*

PS7 : **Wesley T. Honeycutt**. Development and Application of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane, 2017 (LINK)

(Seminar) Public Dissertation Defense — *Apr. 17th, 2017*

PS8 : **Wesley T. Honeycutt**. The Degredation Products and Particle Aggregation Properties of Electronic Cigarette Vapor, June 2014

(Seminar) Proposal Defense/Ph.D. Candidacy Exam — *Jun. 17th 2014*

PS9 : **Wesley T. Honeycutt**. Fractal Aggregate Formation of Aerosols, March 2014 (LINK)

(Seminar) Graduate Student Seminar — *Mar. 11th 2014*

General Talks

I am only including entries in this section where either I or my student is a speaker.

PG1 : **Wesley T. Honeycutt**. City Planning Systems for Pollution in Urban Canyons, August 2024

ASME 2024 International Design Engineering Technical Conferences — *Aug. 26th, 2024*

PG2 : Joey Paul E. Haynes, Mayank J. Bhalerao, **Wesley T. Honeycutt**, Janet K. Allen, and Farrokh Mistree. The Impact of Artificial Lights at Night (ALAN) on Bird Strikes: Predictive Modeling for Public Policy Design, August 2024

ASME 2024 International Design Engineering Technical Conferences — *Aug. 26th, 2024*

PG3 : **Wesley T. Honeycutt**, Khosrow Namjou, Erkan Kayacan, Parisa M. Khiabani, Sean M. R. Crowell, Binbin Weng, and Chenghao Wang. Methane Emissions Monitoring Sensors, Platforms, and Networks, May 2024

OU's DOE: AOI4 Methane Monitoring All Team Half-Day Session — *May 16th, 2024*

PG4 : Binbin Weng, Ming Xue, Betty J. Harris, Farrokh Mistree, and **Wesley T. Honeycutt**. X-GEM: Enhancing Community Sustainability via Greenhouse gas Emission Monitoring: 2021-2023 Big Idea Wrap-Up Meeting, August 2023

OU Vice President for Research and Partnerships Big Idea Challenge 1.0 Wrap-Up Event — *Aug. 31st, 2023*

PG5 : Mayank Bhalerao, **Wesley T Honeycutt**, Ashok Das, Janet K. Allen, and Farrokh Mistree. Framing Wicked Problems Through Evidentiary and Interpretive Analysis, August 2023

ASME 2023 International Design Engineering Technical Conferences — *Aug. 23rd, 2023*

PG6 : Rachael Auth, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Methane Heatmap Distribution Modeling and Visualizations, July 2023

Flogistix OCAST Internship Presentation — *Aug. 18th, 2023*

PG7 : Elizabeth Spicer, Sean Crowell, Feng Xu, Nalini Krishnakutty, Xiao-Ming Hu, Nicole Jacobs, **Wesley T. Honeycutt**, Timothy Miller, Andrew Shearer, Vishnu Kadiyala, Elizabeth N. Smith, Conner J. Flynn, Elizabeth Pillar-Little, Petra Klein, Lucas Livingstone, James H. Flynn, Maria Eugenia Velasco Moreira, Tyler Bell, Evan Keeler, Jenni Kyrouac, and Brian Enmold. Urban and Industrial Carbon-Based Pollutant Monitoring Using EM27/SUNs in Houston, Texas During the Summer 2022 GeoCarb-TRACER Campaign: A Focus on Validation, January 2023

American Meteorology Society 103rd Annual Meeting — *Jan. 10th, 2023*

PG8 : **Wesley T. Honeycutt**. Instrumentation and Monitoring of Rural-Urban Gradients for Carbon Dioxide and Methane for Atmospheric Model Integration and Assimilation; Preliminary Results, October 2022 (LINK)

ACS 65th Annual Pentasectional *Oct. 8th, 2022*

PG9 : Zachary Fruits, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Methane Heatmap Distribution Modeling and Visualizations, August 2022

Flogistix OCAST Internship Presentation *Aug. 8th, 2022*

PG10 : **Wesley T. Honeycutt**. Drones, Trucks, and Grids: Development of a 4D Terrestrial Sensor Network for Data Assimilation, May 2022 (LINK)

NASA GeoCarb Science Team Meeting terrestrial equipment update *May 16th, 2022*

PG11 : **Wesley T. Honeycutt**. OU Coding Outreach for Data Education (CODE) Workshop Professional Career Mixer, August 2022

Offered perspective on non-traditional academic experiences to coding workshop geared towards underrepresented groups.

CODE Workshop 2023 *Aug. 4th, 2023*

CODE Workshop 2022 *Aug. 12th, 2022*

CODE Workshop 2021 *Aug. 6th, 2021*

PG12 : **Wesley T. Honeycutt**, Binbin Weng, Lee Fithian, Farrokh Mistree, Edward Sankowski, and Ming Xue. X-GEM: Enhancing Community Sustainability via Greenhouse gas Emission Monitoring – Quarterly Follow-Up Meeting and Workshop, December 2021

OU Vice President for Research and Partnerships Big Idea Challenge Quarterly Follow-Up Workshop *Dec. 7th, 2021*

PG13 : **Wesley T. Honeycutt** and Bill Bailey. EnLink Midstream and XGEM, 2021

Presentation given to executives of EnLink Midstream for partnership discussions *Feb. 2021*

PG14 : Alyse V. Heaston, **Wesley T. Honeycutt**, and Eli S. Bridge. Honors Thesis Defense, May 2019

Biology honors undergraduate thesis presentation by mentee. *May 10th. 2019*

PG15 : **Wesley T. Honeycutt**. OU Biologging Practicum, November 2017

Informal presentation of LunAero design and technical aspects encountered during volunteer phase. *Nov. 17th, 2017*

PG16 : **Wesley T. Honeycutt**, Xiaodan Li, M. Tyler Ley, and Nicholas F. Materer. Discussion of Carbon Dioxide and Methane Concentration Spikes from an Airfield near Stillwater, OK and a Carbon Sequestration Site near Farnsworth, TX, March 2017 (LINK)

ACS 62nd Annual Pentasectional *Mar. 25th, 2017*

PG17 : **Wesley T. Honeycutt**, Christina Anaya, and John Nickel. Redcedar Products Business Plan Presentation, February 2017

Baylor 6th Annual New Venture Competition *Feb. 25th, 2017*

I2E Love's Cup Competition *Feb. 17th, 2017*

PG18 : **Wesley T. Honeycutt**, Evgueni B. Kadossov, Allen W. Apblett, and Nicholas F. Materer. Selectivity and kinetic behavior of heavy metal and radionuclides on supported ion-exchange adsorbant., March 2015 (LINK)

ACS 60th Annual Pentasectional *Apr. 11th, 2015*

ACS 249th Meeting-Uranium in Seawater *Mar. 23rd, 2015*

PG19 : **Wesley T. Honeycutt**, Hayden Hamby, Allen Apblett, and Nicholas F. Materer. Uptake kinetics of heavy metals from water using a high surface area supported inorganic metal oxide., April 2014 (LINK)

ACS 59th Annual Pentasectional *Apr. 12th, 2014*

PG20 : **Wesley T. Honeycutt**. Processing Aid Efficiency Evaluation, November 2011

Chevron Phillips Chemical Co. *Nov. 2011*

Posters

PP1 : Elizabeth Spicer, Petra Klein, Sean M. R. Crowell, and **Wesley T. Honeycutt**. Using Machine Learning to Benefit Oil and Gas Industry in Challenging Meteorological Conditions, August 2024 (LINK)

Energy and the Intersection of Technology, Markets, and Policy

OU Price College of Business Institute and the Baker Institute Center for Energy Studies *Aug. 29th, 2024*

PP2 : **Wesley T. Honeycutt**, Khosrow Namjou, Parisa M. Khiabani, Sean M. R. Crowell, Chenghao Wang, Erkan Kayacan, and Binbin Weng. Analysis of Networks for Methane Emissions Monitoring, August 2024 (LINK)

Closing the Gap: Strategies for Effective Methane Emissions Reduction Symposium, OU *Aug. 21st, 2024*

PP3 : Qingyu Wang, Xiao-Ming Hu, Petra Klein, Ming Xue, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, and Sean Crowell. Local Methane (CH4) Dynamics at the SGP ARM Site: Meteorological Influences and Source Attribution, August 2024 (LINK)

Closing the Gap: Strategies for Effective Methane Emissions Reduction Symposium, OU *Aug. 21st, 2024*

PP4 : Xiao-Ming Hu, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, and Ming Xue. Observation and Simulation of Methane (CH4) Plumes During the Morning Boundary Layer Transition, August 2024 (LINK)

Closing the Gap: Strategies for Effective Methane Emissions Reduction Symposium, OU *Aug. 21st, 2024*

PP5 : Xiao-Ming Hu, Qingyu Wang, **Wesley T. Honeycutt**, Chenghao Wang, Binbin Weng, and Ming Xue. Mobile CH4 Measurement and Inversion & an Interactive Visualization Platform, August 2024 (LINK)

Closing the Gap: Strategies for Effective Methane Emissions Reduction Symposium, OU *Aug. 21st, 2024*

PP6 : Khosrow Namjou, **Wesley T. Honeycutt**, Parisa M. Khiabani, Sean M. R. Crowell, Chenghao Wang, Erkan Kayacan, and Binbin Weng. A Comprehensive Survey of Methane Detection Technologies, August 2024 (LINK)

Closing the Gap: Strategies for Effective Methane Emissions Reduction Symposium, OU *Aug. 21st, 2024*

PP7 : Noah A. Schneiderman, Elizabeth Spicer, and **Wesley T. Honeycutt**. Comparison of Retrieval Algorithms for EM27/SUN Spectrometer Data, May 2024 (LINK)

FYRE Research Program Poster Celebration *May 6th, 2024*

PP8 : Katy Joyce, Timi Oduleye, Farrokh Mistree, Mayank J. Bhalerao, and **Wesley T. Honeycutt**. Designing a Smart, Modular Greenhouse for Rural India, May 2024 (LINK)

FYRE Research Program Poster Celebration *May 6th, 2024*

PP9 : Jet B. Flener and **Wesley T. Honeycutt**. Comparison of Rise Times across Different Optocouplers and Pull-Up Resistors for Designing a Level Shifter, May 2024 (LINK)

FYRE Research Program Poster Celebration *May 6th, 2024*

PP10 : Lucas J. Livingstone, **Wesley T. Honeycutt**, and Elizabeth Spicer. Detecting Fugitive Emissions at Well Sites Using EM27/SUN Data, April 2023 (LINK)

Society of Petroleum Engineers *Apr. 19th, 2023*

PP11 : Lucas J. Livingstone, Lee A. Fithian, and **Wesley T. Honeycutt**. Study of CO2 Behavior in Simulated Urban Canyons, April 2022 (LINK)

FYRE Research Program Poster Celebration *Apr. 14th, 2022*

PP12 : **Wesley T. Honeycutt**, Nicholas F. Materer, M. Tyler Ley, and Taehwan Kim. Development of a Networked Sensor Array for Gas Microseepage Detection near Injection Well Sites, February 2016 (LINK)

ACS 61st Annual Pentasectional *Apr. 9th, 2016*

OSU Chemistry Open House *Feb. 20th, 2016*

OSU 27th Annual Research Week *Feb. 16th, 2016*

PP13 : **Wesley T. Honeycutt**, Evgueni B. Kadossov, Allen W. Apblett, and Nicholas F. Materer. Selectivity and kinetic behavior of heavy metal and radionuclides on supported ion-exchange adsorbant., April 2015 (LINK)

ACS 249th Meeting-SciMix *Mar. 23rd, 2015*

PP14 : **Wesley T. Honeycutt**, Hayden Hamby, Allen Apblett, and Nicholas F. Materer. Uptake kinetics of heavy metals from water using a high surface area supported inorganic metal oxide., March 2014 (LINK)

ACS 247th Meeting-Environmental Section *Mar. 19th, 2014*

ACS 247th Meeting-SciMix *Mar. 17th, 2014*

PP15 : **Wesley T. Honeycutt**. Methods of Environmental Tobacco Determination by Gas Chromatography, 2011

University of Oklahoma Chemistry Senior Thesis Presentations *May 2011*

Accolades

Awards

1st Place: ASME IDETC PechaKucha SciBuzz *2024*

Library Partner Award: University of Oklahoma Libraries (for LaTeX curriculum) *2019*

1st Place: Greater OKC Chamber Healthcare Award—I2E Innovation to Enterprise *Mar. 23rd, 2017*

1st Place: Baylor Power of Business Award—Baylor New Venture Competition *Feb. 25th, 2017*

Honorable Mention: Baylor New Venture Competition *Feb. 25th, 2017*

Fellowship: Creativity, Innovation, Entrepreneurship Scholar—Oklahoma State University *Aug. 30th, 2016*

1st Place: ACS 61st Annual Pentasectional—American Chemical Society *Apr. 9th, 2016*

2nd Place: OSU 27th Annual Research Week—Phi Lambda Upsilon *Feb. 16th, 2016*

Professional and Honorary Affiliations

American Chemical Society *Member*

Phi Lambda Upsilon Chemistry Honor Society *Member & Officer*

Chemistry Graduate Student Society *Member & Officer*

Boy Scouts of America *Eagle Scout Rank*

Funding (PI or Co-PI only)

FF1 : 2025 — **(Co-PI)** *DOE ARM Lead Mentor.* **DOE Argonne National Labs; $20,000 for 1 yr.**

FF2 : 2021 — **(Co-PI)** *Engineering Internships to Develop Regional-Scale Gas Modeling Added Value Product for Flogistix' Vapor Recovery Services.* **OCAST Intern Partnership IP21.2-016; $32,500 for 2 yrs.**

FF3 : 2021 — **(Co-PI)** *X-GEM: Enhancing Future Community Sustainability via Greenhouse Gas Emission Monitoring.* **OU Big Idea Challenge: $75,000/yr.**

FF4 : 2018 — **(PI)** *LunAero Crowdfunding.* **OU Thousands Strong; $2,000**

FF5 : 2017 — **(PI)** *Redcedar Products* - Business Proposal. **direct funding raised: $10,500 + $75,000 cost sharing**

FF6 : 2014 — **(Co-PI)** *The Degradation Products and Particle Aggregation Properties of Electronic Cigarette Vapor* - Approved for funding but below the pay line. **OCAST Health HR14-025; $135,000**

Proposals Currently Under Review

FF7 : **(Co-PI)** *Addressing Mass Balance and 3D Winds with Commercial Smallsat and Terrestrial Sensing in Atmospheric Models* **NASA ROSES A.48; $200,000** for 2 yrs.

FF8 : **(PI)** *Improving Commercialization Capacity of a Methane Source Attribution Model* **NSF ART $200,000** for 2 yrs.

FF9 : **(Co-PI)** *EAGER: Integrated Policy Design for Public and Private Interests* - Awaiting approval from Program Manager to submit. **NSF EAGER (ENG CMMI/OE); $300,000** for 2 yrs.

FF10 : **(Co-PI)** *Methane Sensor Grids for Capped Orphan Well Monitoring* - Private industry collaboration/contract. **Rebellion Energy Solutions; $50,000 for 2 mos.**

Service and Leadership Roles

Reviewer: Measurement (Elsevier) *2024–present*
Reviewer: EPA Proposals *2023–present*
Reviewer: HardwareX (Elsevier) *2022–present*
Reviewer: MDPI Journals (∼1 article/month) *2021–2023*
Reviewer: NASA Proposals *2019–present*
Panelist: What to Expect After Graduate School — NSF Research Traineeship *2017*
President: Phi Lambda Upsilon Chemistry Honor Society *2016-2017*
President: OSU Chemistry Graduate Students Society *2016-2017*
Treasurer: Phi Lambda Upsilon Chemistry Honor Society *2014-2016*
Production Assistant: ACS 59^{th} Annual Pentasectional *2014*

Technical License

FAA: Remote Pilot/Small Unmanned Aircraft System License *Granted 2022*
License No: 4638964
ARRL: Amateur Radio License-Technician *Granted 1999*
FCC Registration No: 0018507079 — KD5HBR

Skills Matrix

Projects linked in numbered examples are not exhaustive but reflect what is shareable.

	Level	Skill	Comment (Link to Project)
Language	■■■□□	Arduino-C	*Multiple projects based on this platform. (1),(2),(3)*
	■■■□□	Bash	*Exclusively uses Linux kernels since ca. 2015.*
	■■□□□	C	*For cases when Arduino is not enough. (1)*
	■■□□□	C++	*For high-speed and multi-core processing. (1)*
	■□□□□	CRBASIC	*Specialty variant of BASIC for Cambell Scientific loggers.*
	■□□□□	DOS	
	■□□□□	FORTRAN	
	■■■□□	LaTeX	*Used for this document, papers, and OSU's dissertation template (1),(2),(3),(4)*
	■■■□□	Python	*Preferred scripting language. Used in many projects for data processing. (1),(2)*
	■□□□□	Processing	*A scripting language to create animated graphics.*
	■□□□□	R	*(1)*
CAD	■□□□□	EagleCAD	
	■■□□□	FreeCAD	*Preferred 3D GUI CAD program.*
	■■□□□	Fusion360	*(1),(2),(3)*
	■■■■□	KiCAD	*Preferred electronics CAD program. (1),(2)*
	■■■■□	LibreCAD	*Preferred 2D CAD program. (1),(2),(3)*
	■■■■□	OpenSCAD	*Preferred programmatic 3D CAD program. (1),(2)*

■□□□□ basic knowledge
■■□□□ intermediate knowledge with some project experience
■■■□□ extensive project experience
■■■■□ deepened expert knowledge
■■■■■ expert / specialist

References

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Research Statement

Sensing and Making Sense

RS-1 Overarching Research Goals

With the long-term goal of establishing a self-sustaining, inclusive, transdisciplinary research group to holistically address problems in multiple sub-fields, I will leverage my prior experience to pursue topics which ask fundamental research questions with applied methods. I am interested in problems related to sensing and how we make sense of what we sense. I believe that this is possible by addressing certain Research Themes:

RT1 **Developing new sensing tools and information streams for machine interaction;**
RT2 **Environmental sustainability and energy transitions modeled as Wicked Problems;**
RT3 **Addressing transdisciplinary challenges with emergent methods.**

In my previous research working with a transdisciplinary approach to applied projects, I have demonstrated my commitment to core values and effort being grounded in theoretical bedrock. Now I am ready to build upon this foundation, focusing on more traditional scholarly products, to create new knowledge at the system level to address "big picture" issues by addressing parts of the system networked together as a whole. As I mentioned at the OU VPRP Big Idea Challenge 1.0 Wrap-Up Event (**PG4**), learning the language of other disciplines allows me to be transdisciplinary glue, able to help others achieve their climate justice, energy transition, and environmental sustainability research goals. I seek to apply my translational capability projects while working to create the high-level connectivity that enables greater knowledge creation.

RS-2 RT1–Developing new sensing tools and information streams for machine interaction

As Industry 4.0 pushes the limits of traditional sensing and computing, we must create better tools to meet needs in key areas. For example, a manufacturing facility may benefit greatly from creating a digital twin/cyber parallel of their process with live information streams from the physical factory floor, but the quality of information fed to the model depends heavily on the sensor capability and characterization. Failure to obtain complete information for the process and environs creates an uncertainty gap between the model and reality, potentially introducing errors and biases as an "intelligent" system tries to fill in gaps itself. By engineering a useful system for this example, we need to look to the sensor capabilities to quantify uncertainty, reduce process risk, and increase utility of the cyber-physical interaction. Depending on the specifics in our example problem we can modify machine-mind or the sensor system to achieve better results.

Ex. 1 A factory process manufactures widgets where designers could train an AI/ML to adapt the process to create bespoke widgets at scale to maintain competitive advantage. This may be achieved by parameterizing widget forms through programmatic CAD rather than GUI implementations (consider (https://www.thingiverse.com/thing:6033460) from my portfolio) which is more readily accessed by a large-language model retrieval automated generation than an equivalent from AutoCAD.

Ex. 2 A chicken slaughterhouse works with squishy, articulated, and variable feedstock. Two methods to part and pack the meat employed today are either poorly-compensated manual labor or machines which assume a uniform broiler. If we can model the carcass with articulation using computer vision as part of the dis-assembly line (evolving my work with birds with the Oklahoma Biological Station esp. **AJ5** and **AJ6**), a digital twin could more effectively position blades to separate the parts at articulation points, reducing bone shards in food.

These sub-examples serve to illustrate the potential at approaching challenges which push the edge of existing cyber-physical capabilities.

RS-2.1 Potential Future Partners for RT1

Industrial Assessment Center Updates to the IAC program's scope include evaluation of smart manufacturing techniques for small to medium industries. I believe my expertise could pair well with **Prof. Boubekri's** management of this center and recent abstracts on smarter supply chains.

Prof. Heng Fan I would like to foster a partnership with **Prof. Heng Fan** on topics related to computer vision with robotics. Specifically, I believe we could explore the information models connectivity between machine-vision and robotics with complicated and imperfect subjects.

RS-2.2 Funding Options for RT1

These industrial, digital twin problems may create new knowledge about the interface of sensors and a mind making them likely to receive funding from **NSF Electrical, Communications and Cyber Systems** or mission supply chain priorities through individual **DOD** grants. Since research on cutting edge examples of processes in Industry 4.0 has the potential to change how we educate engineers, I believe it would be an appropriate target for applications for an **NSF CAREER** grant. Individual, targeted projects aimed at improving manufacturing may involve **industry partnerships**.

RS-3 RT2–Environmental sustainability and energy transitions modeled as Wicked Problems

A Wicked Problem is a challenge which arises from multiple, nested stakeholders with conflicting needs and views complicated by many origins. These Wicked Problems are inherently insoluble as they are irreducibly complex, present no options for optimization, have impermanent solutions, and each fix is irreversible. Rather than attempting to find a panacea for sustainability and energy transitions, these problems may be constrained to reduce the complexity as much as possible to provide stakeholders with options to address, even if we are unable to truly solve, the contextualized problem.

When we constrain a Wicked Problem related to sustainability or energy transitions, we must think spatially to consider the scale and scope of the problem. For example, energy extraction sites in Texas vary greatly with the transitional phase of the industry *e.g.* disproportionate impact in regions due to the shale gas revolution. We know the legacy of early production exists as orphan wells and hazardous leaks. While efforts to fix these symptoms are underway, the Wicked Problem which drives energy extraction abandonment remains.

Using modeling techniques which assess the drivers of actions across major stakeholder groups *e.g.*, government, industry, and community, we can constrain the system with a framework describing conditions which create similar sites. Assessing the geographic drivers such as access to parts suppliers, production conditions in the region, *etc.*, we can model the system to predict and mitigate risk by proposing policy options to stakeholders.

RS-3.1 Current Partners for RT2

Prof. Janet K. Allen and Prof. Farrokh Mistree This is an early-phase project to model airborne pollution in formerly redlined districts as a Wicked Problem to propose policy alternatives to the governance councils. Funding for this project is currently under review (**FF9**) and has yielded a paper (**AC6**) and several opportunities for public outreach (**PS4** and **PS6**). I would bring this project and collaboration with me to a new position.

RS-3.2 Potential Future Partners for RT2

Center for Energy Accounting and Sustainability Addressing solutions to joint technical problems and business challenges creates interesting partnerships, and I believe that a collaboration with corporate accounting experts like **Prof. Gorvind Iyer** could yield a path to introduce process design for industry improvement.

Prof. Richard Zhang Based on his insulation materials research, I would like to explore a potential project to model architectural design in urban heat islands with emerging insulating materials. I think there is a niche to treat buildings as design challenges for heat retention and deflection at the city-block scale, and I would seek out ways to find novel solutions.

RS-3.3 Funding Options for RT2

Treating policy problems as Wicked Problems and applying theory from engineering design is a novel approach such that it makes it difficult to obtain traditional funding. Instead, I will first target seed funding for this research theme such as the **NSF EAGER** program, internal programs at UNT, and **NGO partnerships**. Similarly, small grants through directorates such as the **NSF Cyber Physical Systems** group will be targeted. As the program gains traction, I will begin to seek funding from agencies interested in the basic research such as **NSF Engineering Design and Systems Engineering** and groups interested in implementation such as the **Robert Wood Johnson Foundation: Evidence For Action** grant or similar (foundation grants are subject to frequent change).

RS-4 RT3–Addressing transdisciplinary challenges with emergent methods

As a transdisciplinary researcher, my work depends heavily on forming strong partnerships with colleagues. My broad experience allows me to work as the transdisciplinary glue which ties technical and social fields

together by identifying emergent research opportunities as the partnership matures. Research institutions often tout crossing disciplines to produce stronger results but offer few methods to instruct or advise others on how to create and foster these transdisciplinary projects. I would like to investigate high-level representations of transdiscplinary groups within particular projects and expound upon the general tools used to attain success in that project to create a new methodology of collaboration. Specifically, I would like to investigate the barriers in communication between disparate research silos as learned languages which could be superseded by a new ontology, which can be modeled to increase the likelihood of project cohesion. This high-level research would be conducted across many smaller projects.

RS-4.1 Potential Future Partners for RT3

Prof. Kamesh Namuduri Many of the research interests between Prof. Namuduri and I align, especially in his involvement with the Center for Integrated Intelligent Mobility Systems (CIIMS). I would like to explore collaboration possibilities with him which consider how sensed information could guide autonomous response of an airborne vehicle *e.g.*, gas plume mapping, or other analytes which merge sensed information with autonomous agents and modeled predictions.

Prof. Harry Williams and Prof. Jihoon Jung These faculty members have research interests aligning with remote sensing and geographic change following natural disasters. I believe there exists a niche to create novel scouting UAS capable of adaptive sensing of impacted areas with multi-sensor payloads to adaptively address boundary conditions of mixed-impact events *e.g.*, pollutant leaks after major flooding.

Prof. Hsia-Ching Chang Knowledge systems are set to evolve with advancing generative large language models, and my research has previously demonstrated the opportunities in applying engineering design methods to information systems. Based on Prof. Chang's research output, I believe she would be an interesting partner to explore novel methods of organizing information such that models may autonomously identify and fill in gaps by recommending human interaction with the model.

RS-4.2 Funding Options for RT3

I would seek project-specific funding which builds the research portfolio as a first step. Discussions with program managers at **NSF Civil, Mechanical, and Manufacturing Innovation** lead me to believe that they are interested in applications of engineering tools for policy challenges I have used in my previous research (see **FF9**), and I would target other sources which recognize the potential growth of engineering research. Research on the transdisciplinary methods used to make these cross-cutting projects a success should first be determined through project-specific funding mechanisms as an added-value research product. Transdisciplinary topics also seem to be appropriate to **NSF Office of Emerging Frontiers and Multidisciplinary Activities**, and I will endeavor to form relationships with Program Managers there to understand their vision.

RS-5 What I Offer...

RS-5.1 What I Offer My Students

Opportunities to Publish High-Quality Journal Articles I plan to offer my research projects (**RT1**–**RT3**) to my graduate students as the directors of their own future so they learn how to create knowledge. Taking the role of guide, I will break projects into digestible portions *e.g.*, individual experiments, literature reviews, *etc.*, providing technical expertise, real-world experience, and resources to achieve their goals. I take greater pride in a student's publication with leading authorship than my own, and I want to reward my students with recognition of their achievements.

Collaborate and Network All of my projects arose from or require significant collaboration and networking, so I will offer my students a seat at the table during collaborative efforts. Whether they go into industry, government, or academia, my students will be prepared to partner with others to achieve greater goals.

Articulate Ideas I will offer my unique experience in theater as a tool to train students on how to effectively articulate their ideas, research methods, and results to any audience. Through dialog and elevator pitches, detailed in **Research Statement**, I will prepare my students to influence their community through action by communicating their expertise.

Create Their Own Path Each of the research themes listed above represents a starting direction to take my research group, and I will engage with future students to establish research paths which meet with their needs. I tailor projects to individual students, and I will help each identify what they believe will grow their experiences.

RS-5.2 What I Offer Stakeholders

I believe that solutions to grand challenges must involve inclusion across industry, government, and community. Consider my achievements in GHG monitoring:

Industries I have partnered with multiple oil & gas industry companies through studies on GHG emissions. By understanding the drivers of industry action, I can offer continued support which produces value through sustainable action.

Communities For years, I have been developing a relationship with the Cheyenne-Arapaho Nation's Tribal EPA to establish a dialog through sharing technical resources and learning about some of the projects the Tribe is considering. My goal is to form strong working relationships with Tribes built on respect, reciprocity, and transparency.

Government Additionally, I have worked with the Oklahoma governance councils on policy assessment and the DOE Atmospheric Radiation and Measurement Southern Great Plains site to provide meaningful data to agencies. Through this combination, I want to provide the government with the best information to make just and informed decisions.

Teaching Statement

TS-1 Teaching Experience

To me, working with students is the most rewarding part of the academic profession. I want to imbue my students and mentees with the same values and challenges I learned from my mentors, guiding them with an empathetic style which tailors to individual student needs.

TS-1.1 Mentoring Experience

To date, I have mentored 20 students (details in **Mentoring**). While some were associated with a paid research position, the vast majority mentored on a voluntary basis without ties to a funded projects through programs like OU's First Year Research Engagement for students in the Honors College. I have committed a large amount of time to *pro bono* mentoring and developing mentorship resources, as I personally believe that student growth and achievement through experiential learning on problem-based projects is the academic pinnacle of social benefit. While many students are advised as in-person experiences, a growing number (8) were remotely mentored including Harshit Gupta (Delhi Technological University), Joey Paul Eli Haynes (Southern New Hampshire University), and Ariyana Chadha (Leland High School), mediated by modern collaborative tools like Zoom.

TS-1.2 Teaching Experience

I have taught a broad spectrum of university courses, including guest lectures for **METR 2613** Meteorology Instrumentation, and instruction of **CHEM 1314** Chemistry I, **CHEM 1414** General Chemistry for Engineers, and **CHEM 5260** Foundations of Inorganic Chemistry. I have instructed in-person, hybrid, and online-only courses. My teaching experiences range across both academic disciplines and scholar experience levels. Stylistically, I adapt my instruction to the audience based on previous theatrical training. While performance of instruction varies wildly across segments—freshman laboratory courses in person require a different approach than online programming workshops targeted to graduate students—my core teaching values remain constant.

TS-1.3 Curriculum Development Experience

I have developed new curriculum for technology-assisted, active-learning workshop courses including **Introduction to LaTeX**, **LaTeX Workshops**, and **Introduction to Ti*k*Z** , scaffolded in that order to introduce students to progressively challenging topics. These Software Carpentries-style courses are offered through the OU Libraries on a yearly basis for the primary LaTeX code-along workshop or as-needed for the introductory sessions. All course materials are open source, and instructors outside the OU system have reported their use at other institutions. My efforts developing this new curriculum were acknowledged by OU with the Library Partner Award in 2019.

TS-2 Purposeful Teaching and Mentoring

Many sources stress the importance of training The Next Generation of Scholars, but fewer of those sources articulate what that education should look like. For students venturing into a world with increasing pressure to perpetually innovate, AI tools hanging like a Sword of Damocles over traditionally stable careers, and a globalized economy in which to compete, we must instruct students in a way which prepares the student to stand out as an irreplaceable, thinking member of their field. I believe that means the following for education:

TS-2.1 Teaching Must Prepare

If the instructor has a responsibility to prepare students, then the postgraduate education system is a service industry. The instructor must perform their duties with empathy to the desires of the pupil and guide the student on a path to achieve those goals. Some students may prioritize career results, some may desire understanding of the world, and still others might arrive at the university completely lost and in search of growth. The latter applies to my own freshman experience. This presents a complicated challenge since students may fail to articulate their needs, let society speak for them, or change priorities as they mature. The instructor must, acting as a guide, carefully select what constitutes preparation for both the student body and the individual mentees they lead, even in the face of large undergraduate classes, conflicting priorities, and the focus on research during mentorship engagement.

Students Teaching Students It is now commonly accepted that students learn better by teaching, as evidenced by constructivist techniques in lab courses, peer-review of essay assignments in writing courses, rubber-duck debugging in the computer sciences, *etc.* From personal experience, I remember far more from lessons I taught to others than I do from lessons taught to me. So, **I encourage students to become teachers from the first lesson**. I ask my students to instruct classmates on it, a practice which lends itself to team-building on a project, presentation experience, and deeper understanding of the topic.

Students Should Become As Equals The university environment should be treated as a stepwise path which prepares the student for, among other practical skills, the equality afforded a colleague. When mentoring, I start with the assumption that **my student is my equal because that is what I am training the student to become**: a student must rise to their excellence. Only one in a place of power can "step down" to equality, thereby subverting traditional hierarchies to invite the student to take initiative on projects, professionally disagree with your assessments, and assume ownership of their future. Abdication of traditional power to meet the student enables students starting from different circumstances. I inherited this approach from my PhD advisor who allowed me to pursue an independent project for my candidacy exam based on an academic disagreement, this idea eventually turned into a proposal accepted by OCAST (**FF6**). A mentee grows to independence as the metric for their maturity, and I believe that we must posture as mentors for that outcome from the start.

TS-2.2 Mentoring Should Push Beyond a Single Problem

Higher education should offer means for students to reach beyond the problem, and the university system offers this through mentoring. As students advance, professors should inquire of them: why they are learning and learn why what they learned occurs. While instructing with industry standard tools, an instructor should focus on teaching students the meaning of techniques agnostic to current paradigms. Thus arises the remedy to rote techniques, salient as AI tools gain foothold, through experiential and generative learning.

Experiential Learning: Reflection on Doing I believe that "why?" matters more than "how?," and I strive to impart that to my students. Environmental Sustainability courses are emergent and their options are more flexible than many other programs, creating an opportunity to unlearn old standbys. Students should both understand why they are learning and learn why what they learned occurs. It is our job as educators to give the curriculum meaning. A student should not learn the rote fact that *heat flows from warm to cold, resisted by insulation reported in R-value* and be satisfied; a student should instead want to learn that *changes in flow from warm to cold should be controlled by the one expending energy—often mediated through increased R-value.* I strive to achieve this by establishing a **progressive dialog of questioning** which asks each student to: **1)** answer a simple question **2)** explain the context of that answer **3)** explain how that knowledge is generalized.

Generative Learning: Transitioning Unconscious-Conscious Connections Walking students through the process of attentive, experiential learning should extend beyond the classroom. My goal for such an experience is that each student learns more about the subject at hand and ingrains that pattern for new problems. I recognize that not all students want to learn like this, so my process takes a subtle approach. By establishing the progressive dialog, my goal is to **elicit the unconscious understanding and bring it to light**. I can only lead the student toward understanding by challenging the way they currently generalize patterns.

TS-2.3 Students Must Learn to Articulate

I firmly believe that communicating ideas to any audience is equally important as performing research. The most influential experiences in my life never came from the lab but instead arise from my theater background. Anchoring my method to achieve student articulation, I have recently codified in my instruction as a dedicated slide deck titled "Greek Tragedy and the Art of the Narrative" which explores scholarly oration through the lens of Aristotle's *Poetics* and the comedies of Aristophanes.

Articulation as Outreach One of the potent memories which has stuck in my head for years is the clear memory of a certain poster presentation (**PP12**) at the ACS Pentasectional meeting: A family was touring the posters in which their child was presenting. I hooked them in to come look at my poster (that carnival barker routine gets a lot of use) and the mother demurred, saying she was not a scientist and would never understand it. I invited her over and adjusted my poster discussion to use language more accessible to a lay audience. In her thanking me for my clear explanation, I gained a greater reward than the formal

award I received for the poster. Regardless of academic level, **I want my students to articulate eloquently and accessibly**—thorough enough to win awards but empathetic enough to explain to anyone.

Articulation as Growth I learned how to implement this well with my first undergraduate student at the Oklahoma Biological Survey who was a bright but quiet senior. I required her to deliver an elevator pitch on her own research each week and gave feedback to iteratively improve. At the end of the semester I asked her to shadow me at a departmental gathering and afterwards told she me about how confident she felt when explaining her research and answering questions while socializing with professors and scientists in the department as an emerging equal. Use of the **elevator pitch to iteratively improve articulation** allows students practice to a safe and friendly audience.

TS-3 Courses at University of North Texas

TS-3.1 Existing Courses I Am Capable of Teaching

I am qualified and willing to teach courses suggested through UNT's engineering program but not recently offered including:

ELET 4330 Instrumentation System Design;

MEEN 4500 Introduction to Mechatronics and Automation;

MEEN 4740 Feedback Controls of Dynamic Systems;

MEEN 4030 Product Design and Development.

Additionally, I can co-teach or fill in as needed on other courses currently offered including:

ELET 3750 Embedded C-Programming;

ELET 4720 Control Systems;

ENGR 1030 Technological Systems;

ENGR 2720 Digital Logic;

MEEN 4332 Fundamentals of Air Pollution Engineering.

TS-3.2 New Courses I Would Like to Create

I would like to introduce one or more courses beyond what is already offered by the department:

UAS for Engineering This would be a middle- to upper-level course intended to prepare students for engineering tasks in the increasingly crowded skies. Students would learn flight-school content to prepare them for their Part 107 license exam while simultaneously engaging with open-source UAS hardware to produce an airframe and payload capable of performing a novel task.

Green Transitions This discussion course for upper-level undergraduates would explore "green" alternatives to processes and the challenges of implementing them. Beyond energy transitions, students would understand how changes to processes and designs *e.g.*, switching to green industrial solvents, fly ash additives to concrete, etc., would impact the social, economic, and ecological realms.

STEM Communication This practical course or workshop for upper-level undergraduate and graduate students ideally would be partnered with the UNT's Department Communication Studies to train more effective communication and engagement techniques. Guided by my experience as an entrepreneur and public speaker, I recognize the challenges associated with engaging stakeholders, investors, and the public. Students would learn to elucidate their work with thorough feedback loops on elevator pitches, 3-minute thesis presentation, and short seminar exercises, better preparing them for the practical or "soft" skills required for success, detailed in TS-2.3.