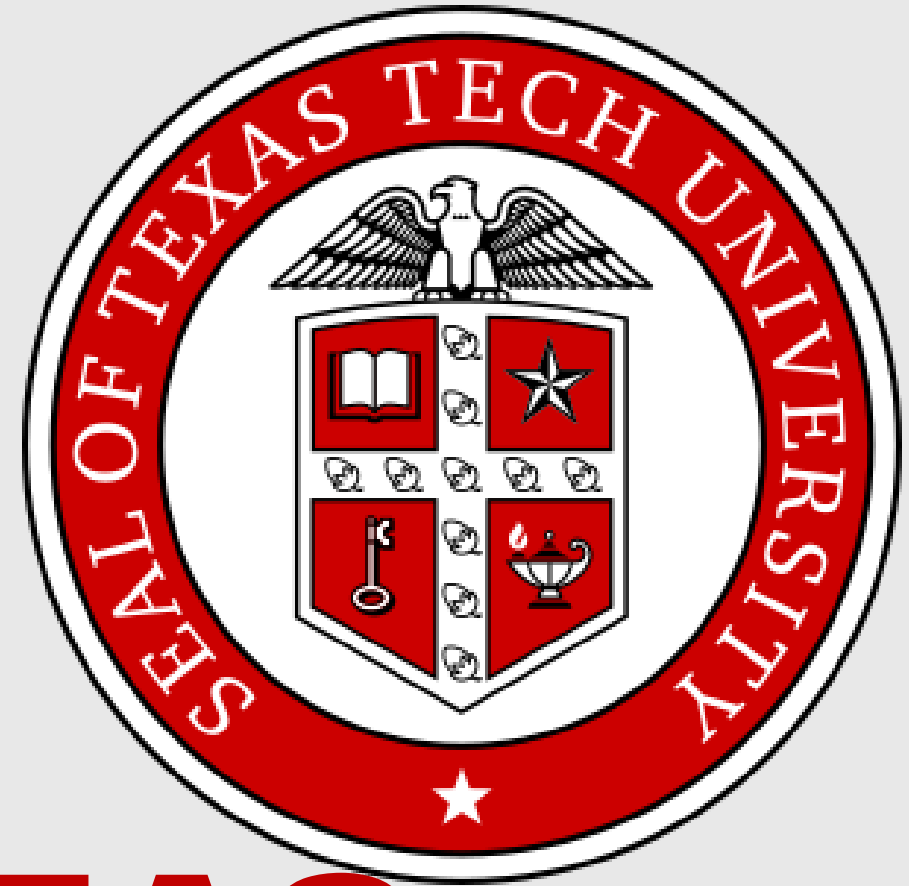


Travis B., Thompson, Ph.D

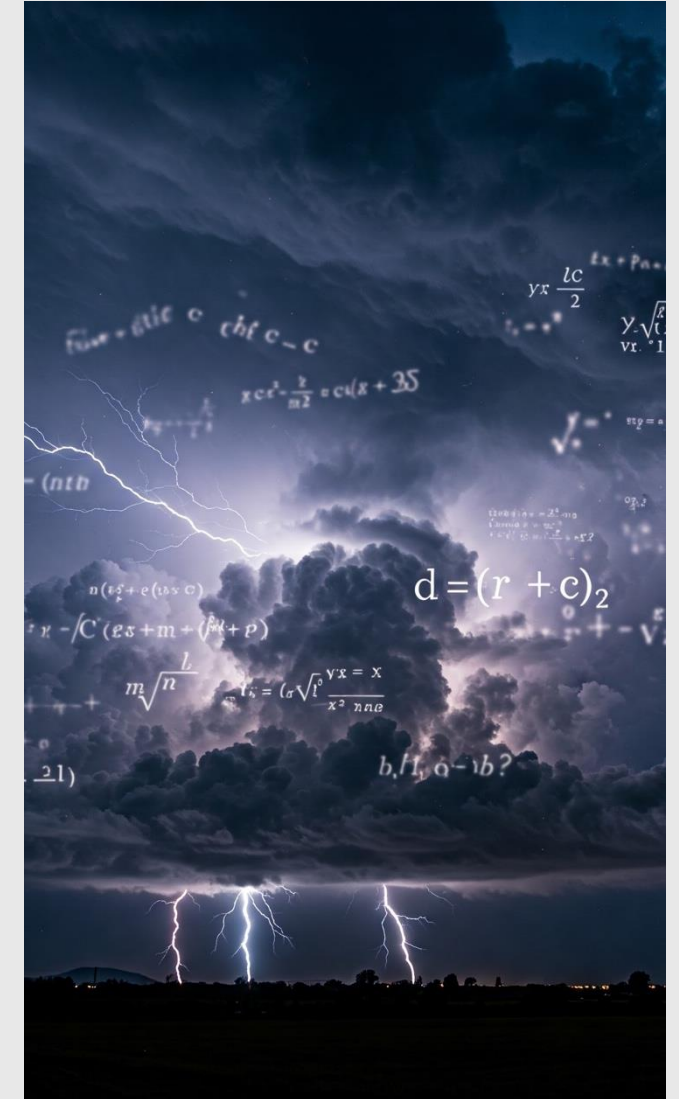
**STRATEGIC**  
**Cross-disciplinary**  
**RESEARCH**  
**AREAS**



**TODAY'S CHALLENGES. TOMORROW'S SOLUTIONS. YOUR RESEARCH AREAS.**

# SYSTEMS **RESILIENCE**

# **& ADAPTABILITY**



# COMMUNITY **DEVELOPMENT**



# COMMUNITY **DEVELOPMENT**

Does your research idea relate to any of these topics?

## **Land use, Climate and Communities**

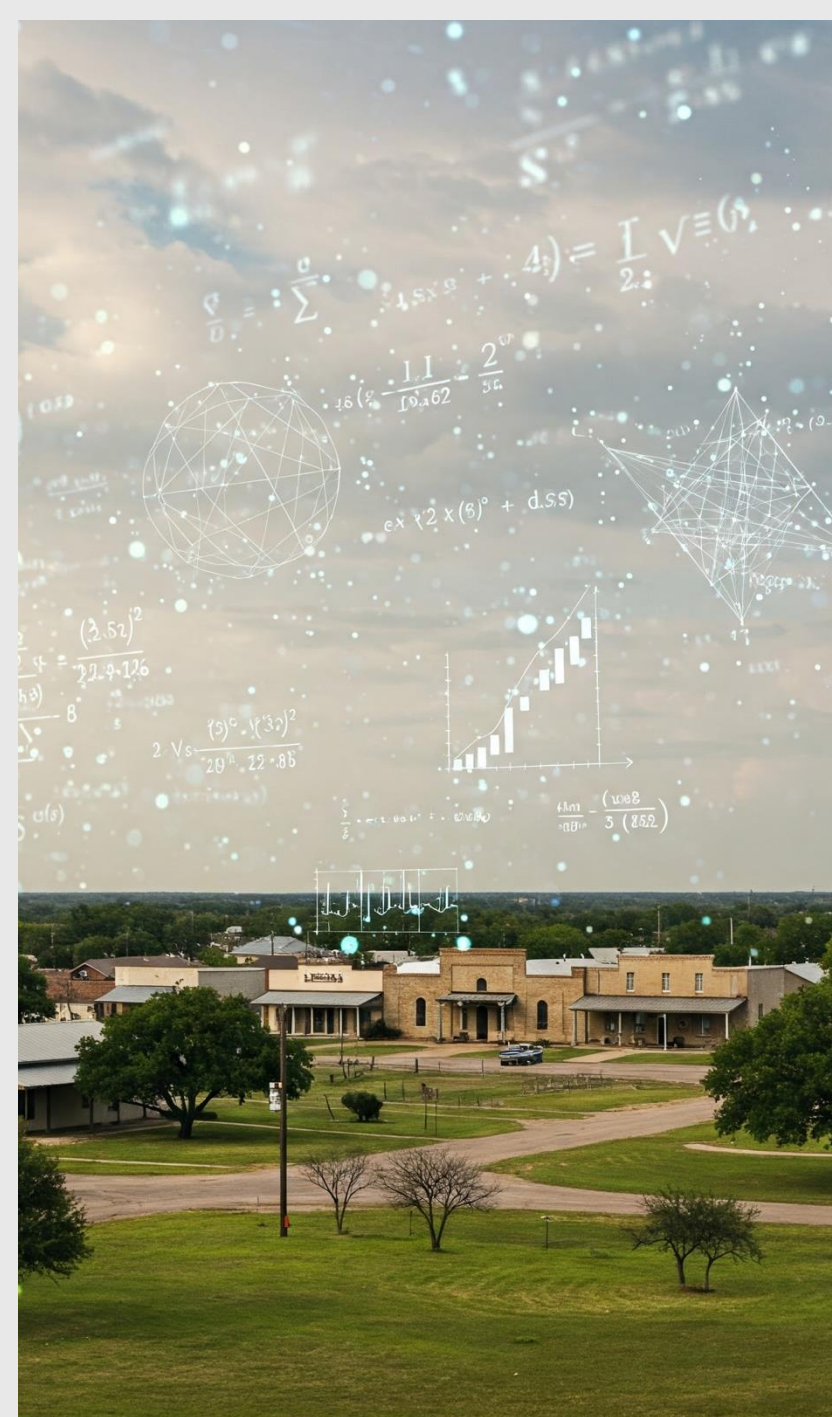
- Urbanization or changes in land use
- Modeling historic / future climate risk or past / future challenges
- Climate risk simulations to inform planning and policy

## **Communities and Infrastructure**

- Aging infrastructure, missing infrastructure or services
- Equitable housing and disaster recovery
- Policy development for community disaster assessment and recovery

## **Community Health, Economy and Well-being**

- Technology for economic community development
- Community Education, Distance Learning, Evidence-based Education Policy
- Public health for aging or declining populations
- Public health and nutrition, obesity



# SYSTEMS **RESILIENCE** & **ADAPTABILITY**

Does your research idea relate to any of these topics?

## Water Use or Conservation

- Law and policy governing water resources
- Developing economic models for water use
- Water quality and remediation, Wastewater treatment
- Water-conserving technologies that
  - Enhance agricultural productivity
  - Extend aquifer and water resource lifetimes

## Agricultural Adaptation to Changing Challenges

- Improving the properties and the uses of biopolymers
- Climate-resilient agriculture
  - Addressing environmental stressors
  - Leveraging heightened levels of CO<sub>2</sub>
  - Using genomics, bio-stimulants and epigenetics to induce resilience
- Sustainable and integrated agricultural systems
  - Crop and livestock integration
  - Reducing agricultural water / energy consumption
  - Improving soil quality, preventing erosion
  - Autonomous agricultural sensor systems and data integration



A collage image titled "POWERING THE FUTURE" in large, bold, black and red capital letters at the top. The image is divided into three main sections by white diagonal lines. The left section shows a white wind turbine in a field of dry grass under a clear sky. The middle section shows an oil drilling rig in a desert landscape. The right section shows a large array of blue solar panels in a desert. Overlaid on all three sections are various mathematical formulas, graphs, and data visualizations in a light blue and white color scheme, suggesting a focus on technology, science, and energy.



# POWERING THE FUTURE

Does your research idea relate to any of these topics?

## Existing or Emerging Energy Sources

- Fossil based technologies
  - Reservoir Simulations, Phase flow, Porous media fluid mechanics
  - Well Production, Optimization and Management
  - CO2 sequestration
  - Uncertainty analysis
- Renewable technologies
  - Wind flow characterization, Turbine inflow/wake flow
  - Fluid dynamics, turbulence or high-energy fluid mechanics
  - Fixed or rotating blade aerodynamics
  - Solar Ponds
  - Thermochemical energy storage

## Grid Integration and Resilience

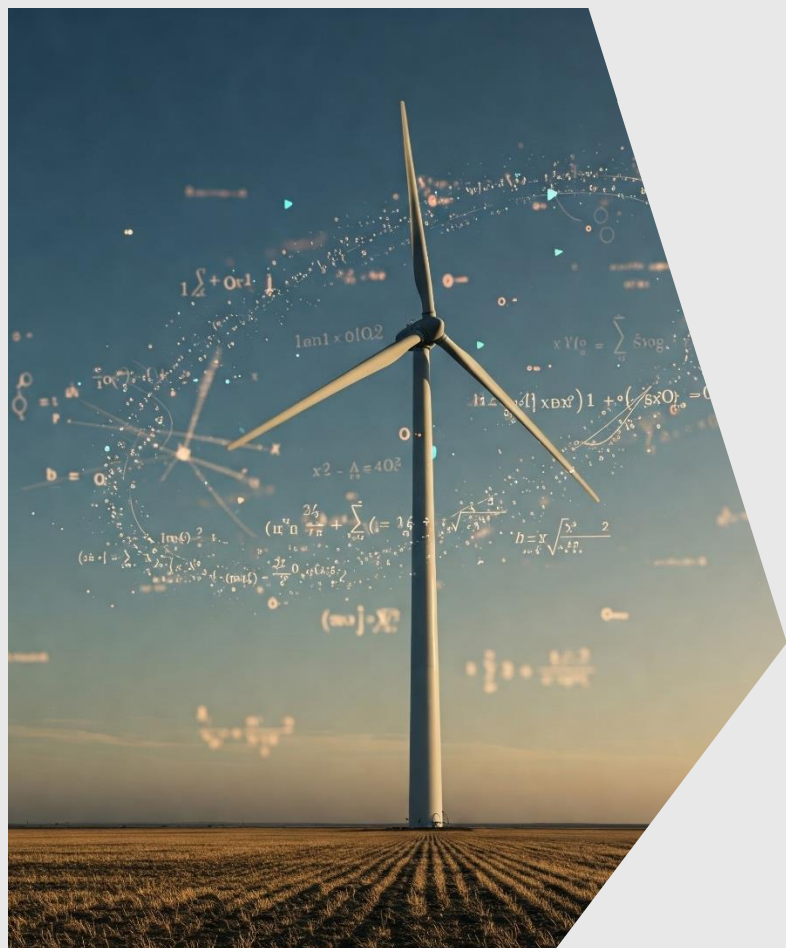
- Integrating Wind, Solar and Battery Storage
- Innovative battery, solar and fuel cell material technologies
- Grid and Microgrid Control, both *conventional* and *AI-based*
- Grid monitoring, deficiency characterization and modeling



# POWERING THE **FUTURE**

Get ***connected*** to existing Strategic Research Hubs

Strategic Research Hub	Director / Contacts
Texas Tech Energy Institute	<ul style="list-style-type: none"><li>• Dr. William Keffer – Legal <a href="mailto:William.keffer@ttu.edu">William.keffer@ttu.edu</a></li><li>• Nikki Kantelis – Energy Commerce <a href="mailto:Nikki.kantelis@ttu.edu">Nikki.kantelis@ttu.edu</a></li><li>• Dr. Marshal Watson – Petroleum <a href="mailto:Marshall.watson@ttu.edu">Marshall.watson@ttu.edu</a></li><li>• Dr. Suhas Pol – Renewables <a href="mailto:Suhas.pol@ttu.edu">Suhas.pol@ttu.edu</a></li></ul>
National Wind Institute	Dr. John Schroeder <a href="mailto:John.Schroeder@ttu.edu">John.Schroeder@ttu.edu</a>
Hurricane Resilience Research Center	Dr. John Schroeder, Dr. Andrew Swift <a href="mailto:Andy.swift@ttu.edu">Andy.swift@ttu.edu</a>









# CYBERSECURITY & NATIONAL SECURITY

Does your research idea relate to any of these topics?

## National Security and Defense

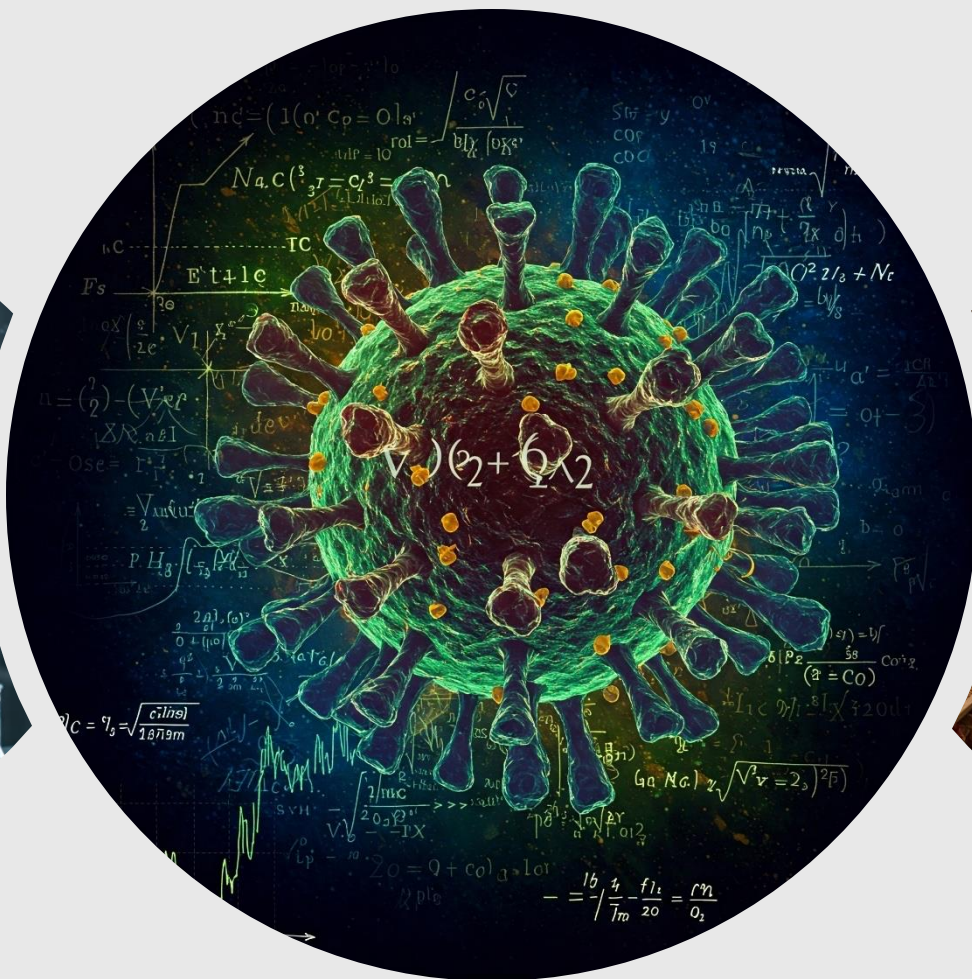
- Cyber-physical testing and Systems
  - Energy security, Power grid defense
  - Attack detection and prevention
  - Impact Analysis and Recovery Plans
  - Cyber-physical device testing and network infrastructure simulations
- Cyber-security of energy systems
- Security failure integrated with UAV-based systems
- High-powered microwaves and directed energy systems
- Defense Materials Science and Manufacturing
  - Aging civilian and military aircraft
  - Computational methods for fluids, solids and structures
  - Engineered structural and functional macro- to nano-materials
- Military Law
  - Laws of Armed Conflict
  - National Security Law
  - Courts-Martial
  - Uniform Code of Military Justice





**ONEHEALTH**  
CREATING INNOVATION TOGETHER

# ADVANCING **ONEHEALTH**



**HUMAN HEALTH. ENVIRONMENTAL HEALTH. ANIMAL HEALTH.**



# ADVANCING **ONEHEALTH**

Does your research idea relate to any, *preferably more than one*, of these topic areas?



## **Human Health**

- Cardiometabolic Health and Disease – Nutrition, Obesity, Diabetes
- The ageing brain
  - Ageing and molecular damage
  - Neurodegenerative diseases
  - Memory care for persons with Dementia and their caretakers
- Molecular mechanisms of human oncogenesis

## **Animal Health**

- Mechanisms of animal oncogenesis
- Vector borne and zoonotic diseases
- Comparative cancer in different animal species

## **Environmental Health**

- Environmental toxicology
- Rangeland and ecosystem management
- Water use and conservation, Water quality

# **BE STRATEGIC**

# **GO INTERDISCIPLINARY**

Rural & Urban Development   Powering Our Future   Advancing One Health  
Systems Resilience & Adaptability   Strengthening National Security

# **THANK YOU**

**TODAY'S CHALLENGES. TOMORROW'S SOLUTIONS.**

**YOUR RESEARCH.**

