

# NSF Spatiotemporal Innovation Center



April – May 2024

## Monthly Newsletter

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Content provided by Seren Smith & Shyra LaGarde

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May 15<sup>th</sup> – 16<sup>th</sup>

## Digital Twin IAB Planning Meeting

After a decade of innovative research at the Spatiotemporal Innovation Center (STC) under the NSF IUCRC program, Harvard's Center for Geographic Analysis (CGA), in collaboration with seven partner universities led by George Mason University, is proposing to establish a new IUCRC: the Center for Digital Twin Research, Innovation, and Collaboration Hub (DT-RICH).

To kickstart this initiative, CGA hosted a planning meeting on May 15th-16th at Harvard. 40+ participants from industry, government agencies, and NGOs joined virtual or in person. There are approximately 100 total participants to discuss the DT-RICH research roadmap and vet proposals. Membership in DT-RICH offers numerous benefits, including access to university research sites, networking opportunities, participation in idea development, and influence over the nation's digital twin research infrastructure. DT-RICH aims to be a leading force in digital twin research, fostering innovation and collaboration among academia, industry, and government agencies.

The meeting also served as the 21st semi-annual Industrial Advisory Board (IAB) meeting of the NSF Spatiotemporal Innovation Center in a hybrid format. Participants presented membership projects, this meeting reviewed ongoing projects and identified new collaborations. All research outcomes from the center are shared among members to catalyze the enhancement of products, services, and businesses. Companies or agencies interested in geospatial and spatiotemporal research themes participated.



*A warm welcome from Dr. Subu Subramanian & Dr. Elizabeth Jackson to set the expectation of the meeting and congratulate the success of the center.*



*Closing remarks from Dr. Yang. A special thanks to IAB members and meeting participants.*

## 9<sup>th</sup> Digital Twin webinar: Challenges and Opportunities for Digital Twins

A dynamic webinar delved into the challenges and opportunities of Digital Twin innovation on April 30, 2024, this webinar featured five experts sharing their insights.

Tony Duarte, representing Heavy.AI, showcased AI-accelerated digital twins for optimizing 5G network infrastructure, while Ruichuan Zhang, from Virginia Tech, explored enhancing building sustainability and intelligence. Yi Wang, from the University of Wisconsin-Madison, spotlighted AI-driven digital agriculture techniques, and Alex Liu, CEO of RMDS Lab shared insights into leveraging digital twins for knowledge discovery. Petros Koumoutsakos, Professor at Harvard discussed lessons from digital twin applications. The session concluded with a panel discussion moderated by Dr. Benjamin Lewis, Dr. Qunying Huang, and Dr. Mengxi Zhang, providing attendees with valuable insights into the evolving landscape of digital twin technology.

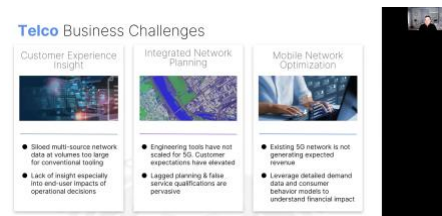
This webinar provided attendees with valuable insights into the evolving landscape of digital twin technology, Acknowledging the challenges and limitation in the newly emerging field.

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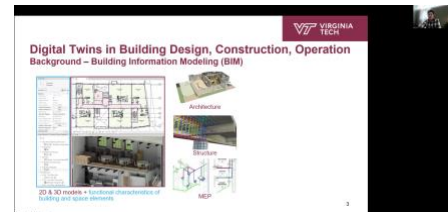
## Theodore Spanbauer participated in Vex Robotics World Championship

We're thrilled to share the remarkable achievements of one of our START interns and project leads, Theodore Spanbauer, who recently showcased his talents at the prestigious Vex Robotics World Championship. Theodore and his team earned their spot in the fiercely competitive VexU Division after a year of hard work and dedication. Participants in this division are challenged not only to design and build their own robots but also to program them and maintain a detailed engineering notebook, making their achievement even more commendable.

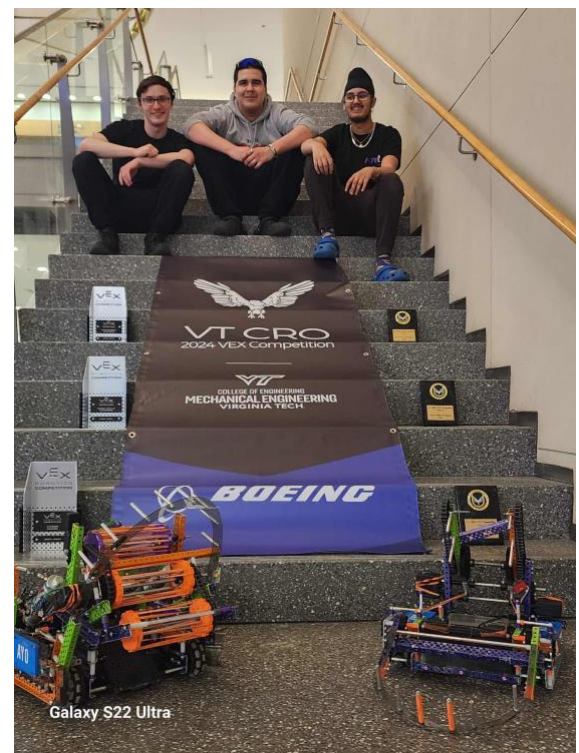
Their participation in this global event, which pits teams against each other in a strategic point-based match, highlights not only their technical skills but also their ability to innovate and solve complex problems under pressure. Congratulations to Theodore and his team for representing our organization on such an esteemed platform and pushing the boundaries of what we can achieve in robotics!



*Tony Duarte discusses the Business challenges of Telco*



*Dr. Zhang discussed the construction of Digital Twins, referred to as Building information Modeling*



*Top steps: Theodore Spanbauer and his team. A banner for the competition that was sponsored by Boeing, with awards. Bottom steps: Designed Robots*

## 9 Presentors invited to 2024 AAG Annual Conference in Honolulu, Hawaii

Wendy Guan presented at the AAG 2024 Symposium on Geospatial Data Science for Sustainability, Series 1, on April 19<sup>th</sup>. Wendy's presentation, "Building a Robust Infrastructure for Geospatial Big Data Analytics," a project focused on developing a high-performance infrastructure capable of efficiently handling geospatial big data through advanced technologies and comprehensive analysis.

Other presentations included

1. *Joseph Holler, Middlebury College: "Replicability of social vulnerability indices over time"*
2. *Peter Kedron, Arizona State University: "Does protected area connectivity moderate the efficacy of protection on tropical biodiversity? Evidence from a replication of Brodie et al. 2023"*
3. *Lingbo Liu: "Enhancing Geospatial Analysis with AutoML and Explainable AI through Visual Programming Platform"*
4. *Siqin (Sisi) Wang: "Repeatable and reproducible workflow to examine the human-environmental interaction: a spatially explicit GeoAI method"*

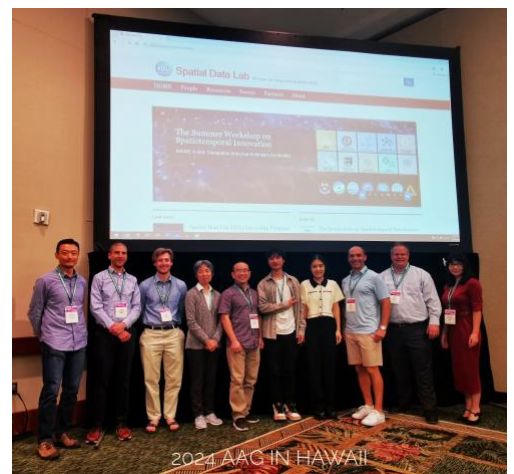
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Xiaokang Fu presented "Digital humanities infrastructure based on open-source executable workflows—A case study of spatial mobility of pre-modern Chinese literati." His research delves into the intersection of technology and humanities, focusing on the development of comprehensive resources and collaboration frameworks.

[Read more](#)

1. *Cheng-Zhi Qin: Intelligent determination of spatial extents of input for geographical analysis workflow*
2. *Jason Tullis, University of Arkansas: Provenance as a record in the study of Mars' south polar cap*
3. *Ru Wang: Parsing human mobility in daily life circle with machine learning and Monte Carlo simulation*

Both sessions focused on the development and application of repeatable, reproducible, and expandable frameworks integrating GeoAI and spatiotemporal simulation. Emphasizing the importance of proper data collection, management, and documentation including the need for repeatable and reproducible analysis to enhance confidence in research findings.



Presenters for AAG 2024 Symposium on Geospatial Data Science for Sustainability

## The Summer Training Workshop on Spatiotemporal Innovation 2024

Date: Tue – Fri, Jul 16 to Jul 19, 9:00am – 4:00pm



## Spatial Data Lab (SDL) Internship and Fellowship Program

The SDL internship program offers high school, undergraduate, and graduate students hands-on experience in spatial data science. Interns receive tailored training in open-source tools, geospatial data, and spatial modeling, with applications in public health, business, social media, remote sensing, and environmental studies. Outstanding interns will be invited to Harvard's summer workshops and the annual SDL symposium.

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The SDL Fellowship Program offers scholars and graduate students an online collaborative learning experience in spatial data science. Participants receive professional training in open-source tools, geospatial data, and spatial modeling, enhancing their technical skills and research networks. Outstanding researchers may be recommended for an onsite visiting scholar position at Harvard's Center for Geographic Analysis.

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## Call for Papers: Replicability and Reproducibility of GeoAI Models in Social Science

This special issue aims to delve into the burgeoning field of GeoAI, focusing on its applications in social sciences. We are

## Call for Participation: The International Symposium on Spatiotemporal Data Science

**Date:** July 22 · 8:30am - July 24 · 5pm EDT

**Location:** 900 N Glebe Rd, Arlington, VA 22203, USA

Join us for The International Symposium on Spatiotemporal Data Science, co-hosted by Virginia Tech and George Mason University. A pre-conference workshop on July 22 will cover topics such as Geospatial Analytics with KNIME, developing GeoAI tools using ChatGPT, cloud computing with Google Earth Engine and GeoAI, and geospatial methods for healthcare accessibility. Key dates include the abstract submission deadline on March 30, 2024, and acceptance decisions by April 15, 2024.

[Learn More](#)



**GEORGE MASON UNIVERSITY**      

**The Symposium on Spatiotemporal Data Science:  
GeoAI for Social Sciences**

**Co-Hosts: Virginia Tech & George Mason University**

Virginia Tech Research Center Alington & George Mason Square

July 22-24, 2024

## Recent Publications by CGA Staff and affiliates

Subramanian SV, Patnaik A, Kim R: [Call for action: presenting constituency-level data on population, health and socioeconomic wellbeing related to 2030 Sustainable Development Goals for India](#)

Kinne J, Resch B, et al.: [The digital layer: alternative data for regional and innovation studies](#)