



TAYLOR GEOSPATIAL INSTITUTE POSTDOC PROGRAM

NOTICE OF OPPORTUNITY

APPLICATIONS ARE ACCEPTED ON A ROLLING BASIS

To be submitted via Workday Application

Questions or inquiries regarding this RFP can be directed to: TGI@slu.edu

BACKGROUND

The Taylor Geospatial Institute (TGI), the nation's leading academic center for geospatial science, is committed to making St Louis a global center of excellence in geospatial science research, education, and innovation. The St. Louis region is well-positioned to become the nation's geospatial 'Silicon Valley' as laid out in the June 2020 "GeoFutures Strategic Roadmap," a plan for strengthening St. Louis's competitive advantage in geospatial research and technology. For more information on the Institute please visit www.taylorgeospatial.org.

To achieve this goal, the Taylor Geospatial Institute is announcing a Postdoc program that is designed to support local faculty in their research projects in core geospatial science and applied domains (www.taylorgeospatial.org/research/). Saint Louis University envisions building a world-class, interdisciplinary geospatial science research collaborative to address scientific and societal grand challenges (e.g. food security, supply chain resilience, health equity, and national security). The purpose of the Taylor Geospatial Institute postdoctoral program is to bring distinguished researchers in geospatial science core or adjacent fields to the St. Louis region, develop the next generation of scientific leaders, and catalyze regional collaboration to accelerate the St. Louis region's development as a global geospatial center of excellence.

This program is another step to demonstrate our commitment to advancing the geospatial sciences.

APPLICATION PROCESS

Applications are accepted on a rolling basis. Please apply to the Postdoc position on the [Saint Louis University Careers](https://www.slu.edu/careers) website (search for geospatial and find the postdoc position).

The applicant must complete the requested application information and must also include the following as one pdf attachment:

- 1) a cover letter
- 2) a resume/curriculum vitae
- 3) 3-page research project proposal (title, contact info, project summary, research plan including specific aims, preliminary work, potential outcomes, and potential faculty advisor at Saint Louis University or the affiliated institutions)
- 4) 1 letter of recommendation from the applicant's Ph.D. mentor.

After completing the online application, please email your cover letter, resume/CV, and research project proposal to TGI@slu.edu.

RESEARCH PRIORITIES AND SCOPE

The Taylor Geospatial Institute aims to address grand societal challenges in food systems, health systems, and national security using cutting-edge geospatial technologies, data, and analytics and to build upon the broad existing research strengths in the St. Louis region. The goal is to advance core geospatial science and adjacent fields while fostering research that can improve food security, advance health and social equity, and strengthen supply chains, smart cities, and resilient communities.

Applicants are encouraged to read the research priority areas provided in Appendix A.

Postdoc proposals should have a strong geospatial component that should include:

- 1) developing new geospatial tools (software, algorithms) that advance geospatial science,
- 2) designing and developing sensors or robotic platforms to generate new data, or
- 3) using location-aware datasets to address societal and scientific challenges.

Proposals that aim to conduct applications, projects, or fundamental research that do not require geospatial data or tools will be deemed noncompliant and either returned without review or declined after review.

DETAILS OF THE POSTDOC PROGRAM

Postdoctoral researchers are the cornerstone of a university's research portfolio and important for producing future prominent scholars. To accomplish its vision of advancing geospatial science, the Institute is looking to fill six postdoctoral positions through a competitive evaluation process. The postdocs are expected to support collaborations with partner universities, industry, and other relevant entities.

The successful candidates are expected to work with the faculty, principal investigators, and students in the Institute to lead research activities, collect and analyze data, draft manuscripts for publication, and contribute to proposal writing and the Institute's research mission.

The top applicants to the postdoc program will be matched to the most TGI associates from the eight partner institutions. The Taylor Geospatial Institute has a growing list of TGI associates that can be found at this link: www.taylorgeospatial.org/tgi-associates/. The content of the applicant's research project proposal will be used to match the winning candidates to a faculty mentor.

Ideal candidates will have a Ph.D. in geospatial science, or a related field, applied to one of the priority research areas outlined in Appendix A (food systems, health systems, and national security).

The successful candidates will be employed by Saint Louis University and receive visitor credentials at affiliated institutions. The postdoctoral fellows will work among faculty collaborators from partner institutes and are expected to spend time at different campuses as needed during their residence.

The position is for 12 months, with the possibility of extension based on satisfactory performance and funding availability. Upon completion of the program, the Taylor Geospatial Institute in collaboration with their faculty mentors will help with the postdoc fellows' transition to a career pathway that is in line with the fellow's professional development and interest. The position start date is Summer or Fall 2022 but could be sooner if the candidate is available.

The successful candidate will be part of a cohort of six postdoctoral researchers that will meet periodically (regardless of their final institution) to take part in professional development activities, career mentorship, tours of research facilities, industry visits, and interactions with the St Louis region's academic research ecosystem.

STIPEND AND ALLOWANCES

The position provides a nationally competitive salary, fringe benefits, and funding to support their research including travel support. The total fellowship amount is \$81,000 per year consisting of three components:

- A stipend of \$57,000 per year paid directly to the postdoctoral fellow on a monthly schedule;
- Fringe benefits of about \$18,000 per year (varying annually), which covers the expenses for health insurance, dental and/or vision insurance, retirement savings, and dependent care;
- Research allowances of \$6,000 per year intended to cover expenses related to supplies, computing resources, minor equipment (e.g., laptop), travel, publication charges, subscription fees, or data collection.

The Taylor Geospatial Institute will provide the fellows with a modern office, research facilities, workstations, and access to data collection and analytics services as needed.

FREQUENTLY ASKED QUESTIONS

Question: Can I apply if I am currently a postdoc at SLU or an affiliate institution?

Yes. Your work does have to be related to the research focuses described in Appendix A.

Question: Does my research project have to match the research focuses in Appendix A?

Yes, but we are open to unique projects that use geospatial technologies in novel ways or focus on developing geospatial tools (software or algorithms) that advance geospatial science.

APPENDIX A – RESEARCH FOCUS AREAS

OVERVIEW

Building upon the St. Louis region’s competitive strengths, the Geospatial Institute will address grand societal challenges in food systems, health systems, and national security with cutting-edge GeoAI and data analytics techniques. The Institute will generate research to improve food security, health and social equity, and build smart cities and resilient communities, and promote economic development through translation to commercial application and by training the next generation of the workforce (Figure 1).

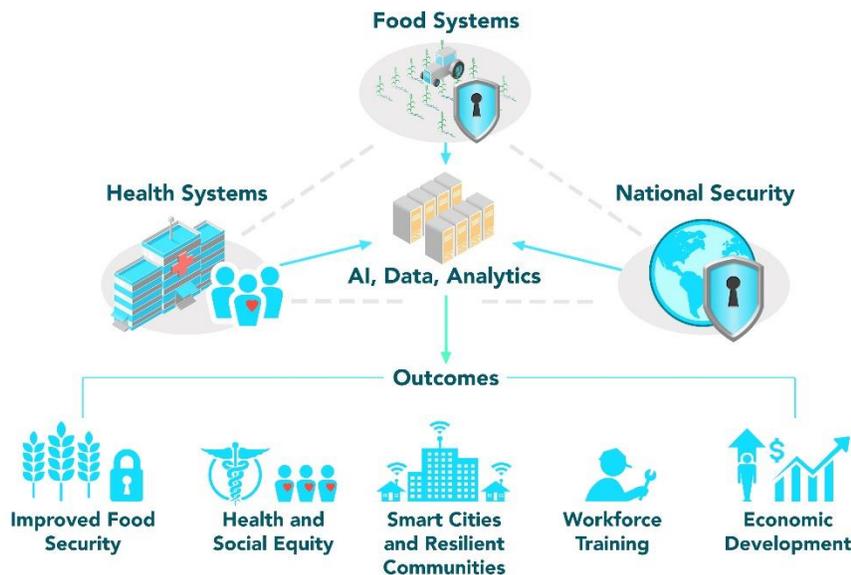


FIGURE 1. ADDRESSING GRAND SOCIETAL CHALLENGES AND OUTCOMES.

FOOD SYSTEMS

Everything comes from plants, not just the food on our dinner table, but everything from medicine, meat, to the strongest rubber used in spaceships.

One of the most challenging global problems today is feeding the growing global population, which will require increasing agricultural output by 70% in the next several decades. Food security is also an important national security issue and a major cause of social instability in many parts of the world. To address this challenge, we need to revolutionize the way we grow crops. We need to: create better crops that can thrive in the future climate with less water; utilize big data, advanced algorithms, and cloud computing at scale so we can monitor crops to improve yield and optimize resource use; and develop geospatial artificial intelligence to teach crops how to adapt to changing environments. To accomplish these goals, we must develop the capability to effectively harness big data and turn that into actionable crop intelligence with precision and speed. This important technology should help address our societal needs and improve our quality of life.

Geospatial science is fueling innovation and adaptation in food security and agriculture ecosystems by enhancing efforts to develop new crops and improve existing ones that meet both economic demands and ecological requirements. Data-driven AI, multi-scale imaging from satellites, drones, and ground robots have pushed the envelope of technological developments. These advances can automate crop monitoring and compute precision farm directives for every farm in the world every week, covering about 1.76 billion hectares, and show farmers when to plant, fertilize, and harvest, as well as what their crop needs to improve yields and reduce input costs. With this technology, farmers can increase yields as much as 35% while lowering costs up to 25% using precision fertilization.

The St. Louis region boasts more than 1,000 plant science Ph.D. researchers, extensive research infrastructure, and a booming agtech sector, and thus is widely recognized as an international epicenter of agriculture research. The Geospatial Institute will build on this strong foundation, expanding on existing partnerships with regional institutions including the Donald Danforth Plant Science Center and regional universities, to address key challenges in food and ecosystem security including crop adaptation to changing climates and enhanced ecosystem functioning of our agricultural systems. Geospatial science is a powerful tool that is required to leverage agriculture as a means to combat climate change, regenerate soils and water systems, and reduce human impacts on biodiversity, while simultaneously producing food.

HEALTH SYSTEMS

Human health is largely determined by where we were born and live. From the air we breathe to the water that we drink, these resources are the building blocks of our health. Geospatial health builds on these very complex, and now easy to measure, air quality and water access and cleanliness concepts, to enhance what we know about where we work, live, and play. Geospatial technology and science have grown our opportunities in measuring location and its influence each day as we travel through our communities. Data from smartphones and watches, activity trackers, social media, and satellite imagery can better inform the drivers of community health throughout the world. Some examples of how we continue to grow the knowledge and application of geospatial tools in health include developing and implementing multi-sensor infectious disease prediction modeling, perception health, and extended e-health tools such as telehealth and app and sensor-based tools.

Through advancements in technology, nontraditional public health and healthcare data from disparate sources can be combined to inform an early sensing system that would provide real-time COVID-19 risk assessments. The data sources include measures of community mobility such as app-based symptom tracking and contact tracing, anonymized smartphone data, geolocated social media mentions,

satellite imagery analyses to identify vehicle traffic patterns of health care locations, and geolocated search terms. Synchronizing these data sources and fusing them to develop real-time models provide insights into community-level COVID-19 risks. There is great value in having this type of real-time risk assessment that can be used to identify health-related risks including risks related to the global COVID-19 pandemic, and other, more local examples like food poisoning from a restaurant. This type of early sensing system can enhance health equity by providing continued real-time data and analytics to devise needed real-time interventions.

"St. Louis region has substantial and highly specialized healthcare industry sector with significant activities and opportunities for innovation. Geospatial visualization and analysis is critical for improving healthcare delivery and health outcomes as demonstrated by use of spatial analysis in helping to guide health responses to COVID-19 pandemic, including identifying hotspots down to specific streets." – Geofuture Roadmap

Geospatial health research informs opportunities for workforce training in disaster preparedness and linking a trained workforce to locations where there is a need for healthcare workers. The tools we are devising will assist in growing, training, and preparing a workforce prior to arrival in locations that are experiencing disasters and other needs. The COVID-19 pandemic highlighted the lack of infection control preparedness. These tools and skills are necessary to have comprehensive response plans for a diverse workforce. For example, advanced supply chain management techniques for diverse health-related needs can also be explored. In addition to training and linking the workforce to locations in need, we are conducting a vaccine optimization study that leverages community mobility as a predictive and prioritized variable in the way vaccination allocation decisions are made. These types of analyses can be applied to many other challenges as well.

NATIONAL SECURITY AND GEOINT

Geospatial technologies are the new macroscope to execute on NGA's vision of "Know the Earth...Show the Way...Understand the World".

In 2017, the U.S. Department of Defense (DoD) decided to locate the new \$1.75 billion National Geospatial-Intelligence Agency West (NGA-W) facility in North Saint Louis. When NGA-W opens in 2025, it will directly employ thousands of highly skilled employees. More importantly, a "geospatial ecosystem" of new knowledge-

intensive businesses is expected to grow and generate thousands of new high-skill jobs in the surrounding area.

As the home for NGA-W, St. Louis has a strong legacy in mapping, geospatial analysis, and

research and development primarily related to national security and defense. With over 350 companies in St. Louis supporting the NGA's mission with technologies involving advanced computing and geospatial analytics, national security is an anchor for regional geospatial research, training, and innovation.

National security and GEOINT encompasses all aspects of a geospatial science core, adjacent fields, and application domains from food security, political unrest, public health, environmental hazards (droughts, earthquakes, wildfires), and climate change. It includes but is not limited to the analysis of literal imagery, geospatial data, and information derived from the processing, exploitation, literal, and non-literal analysis of spectral, spatial, and temporal fused products utilizing computer vision, AI/ML, cloud computing, cyber-physical systems/IoT, and autonomy, among other critical technologies. These types of data can be collected on stationary and moving targets by electro-optical, synthetic aperture radar (SAR), related sensor programs, social media, mobile devices, and non-technical means (including geospatial information acquired by personnel in the field).

U.S. National Security research aims to maintain a leading edge over adversaries in digital revolution and cutting-edge technologies such as GPS, GPS alternatives, GeoAI, etc. The lack of talent with deep expertise trained through years of research in geospatial core has been recognized as a major national security threat as revealed in a recent article from NGA Director Vice Admiral Sharp¹. Through the nexus of industry-university-government-community engagement around geospatial science and technology and research in food systems, health systems and application areas such as climate, water, and environment, the Geospatial Institute will make a significant impact on the national security complex through innovation and by creating tomorrow's highly skilled workforce required to keep America safe.

¹ <https://www.c4isrnet.com/opinion/2021/08/01/geomatics-is-vital-to-us-national-security-our-advantage-is-at-risk/>