The Secret Sauce of Science: SGCI

ECSU Students Gain Valuable Experience in Science Gateway Design benefiting major researchers from a wide range of disciplines.

Dr. Linda Bailey Hayden
SGCI CO-PI
ECSU CERSER Director

Science Gateways are often called the secret sauce of science, a simple ingredient that boost scientific discovery across domains.

Science gateways are accelerating research and democratizing scientific discovery by bringing easy access to advanced computing and big data tools. That is exciting news to scientist who want to take their research farther faster. We are talking about high-performance computing (HPC), and it can boost scientific discovery many times over. Research and analysis that once took months can be performed in weeks or even days.

Science gateways are user-friendly interfaces that simplify access to advanced computing resources. For people who are not command-line savvy, but have some very complex requirements, science gateways solve a wide range of problems by allowing science & engineering communities to access shared data, software, computing services, instruments, educational materials, and other resources specific to their disciplines. Leading the Nation in gateway design is The Science Gateways Community Institute (SGCI http://sciencegateways.org). SGCI was one of the first two software institutes funded by the National Science Foundation's Office of Advanced Cyberinfrastructure in August, 2016. SGCI is organized into five service areas: Incubator (Purdue University),

"I went into the SGCI Coding Institute not knowing what to expect and it provided me with a structure that gave me a career focus and access to invaluable networking across the country. I'm grateful for the exposure this gave me to HPC and gateway design, things that I can see myself pursuing further. Overall, the Coding institute has left an impact that can help shape my academic focus and future career."

Walter Asbell
Junior, Computer Science
Elizabeth City State University

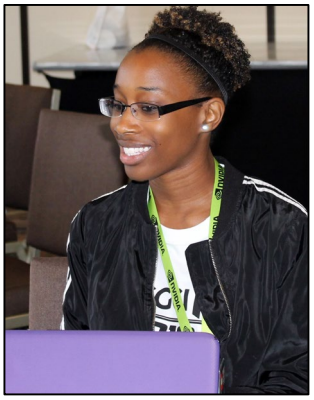
Extended Developer Support (Indiana University), Scientific Software Collaborative, Community Engagement and Exchange (University of Michigan), and Workforce Development (Elizabeth City State University). The institute is led by San Diego Supercomputing Center (SDSC).

Workforce Development

The ECSU Center of Excellence in Remote Sensing Education and Research (CERSER) designs and implements Workforce Development programs for the Science Gateways Community Institute (SGCI). For SGCI to transform the frontiers of science demands users and developers who are trained and motivated to tackle the difficult challenges of working in uncharted territory. Through ECSU, SGCI works to build the nation's capacity to generate the workforce needed to meet these challenges.

"Being a part of the Coding Institute was an eye-opening experience. This program helped me learn technical skills such as programming in R, Python, Java, and Unix, and also to network with many people from different countries and states. This was my first time away from home and I honestly loved it. Sometimes I wish I could go back to that experience because I have learned so much that will guide and help me in my future career. I have also developed friendships with people that I continue to connect with from time to time. This experience has taught me to not be afraid and to think about the big picture."

Alexis Martin
Senior, Computer Science
Elizabeth City State University



We provide NSF-funded, online and in-person resources and services. Our goal is to facilitate—at little or no cost—the sharing of experiences, technologies, and practices of those working with science gateways.

If you're conducting technically-advanced science or engineering research, there's a good chance that you use or will need to use a science gateway. Whether you call it a gateway, hub, virtual research environment, or one of the many other terms used, a gateway is essentially a web-based, streamlined, user-friendly portal that provides access to advanced, often shared, resources for science, engineering, and beyond. Our student-focused programs run by Workforce Development offers students access to the mentoring, career development, internships, and workshops that students need for pursuing a career building or using science gateways.

During the academic year, gateway training is available to ECSU faculty, staff and students on Tuesday and Thursday evenings from 5pm to 7pm in the CERSER laboratories. A Training schedule is available online at http://nia.ecsu.edu under upcoming events. Workforce Development offers workshops

and other programs geared toward teaching students and educators about the use or development of science gateways. Some workshops are hosted at national conferences such as ADMI and PEARC and our own Gateways conference, while others are offered during the summer.

Each summer, we offer workshops that provide instruction about building and using gateways. In 2017, 2018, and 2019 we offered a four-week Coding Institute on the campus of Elizabeth City State University. The workshop covered the core skills needed to be productive in the design and maintenance of science gateways. The program was presented as short tutorials alternated with practical experiences, and all instruction was done via live coding.

Eligible applicants are undergraduate students majoring in computer science or computer engineering (or related fields) who have an interest in the design and maintenance of science gateways. Participants of the Coding Institute receive a weekly stipend plus funding for transportation and housing.

"The Coding Institute can be described as being thrown into the deep end with lifeguards watching over you. I would honestly suggest this type of experience for any and every computer science major. It was such a cool experience to learn skills that can be traced back to the workplace. We learned about things like GitHub and Slack early in the month, things you probably won't use in school, but are tools that are used daily in a professional environment. We learned Python and command-line skills directly from a software developer at Intel, who taught us through weekly exercises and group reviews. During the next part of the program, we learned from a professor at Indiana University about more advanced skills such as Python Flask and science gateways. I am sure that I will use all the lessons and skills I learned at the Coding Institute in my future career."

John Senegal
Senior, Computer Science
Winston-Salem State University

ECSU's Office of Sponsored Programs provides training on Ethics for all Coding Institute participants. The Coding Institute students also learn other non-technical skills including orientation to the science gateway community; mentoring and oral/written communication skills.

Our Workforce Development team offers eight-week summer internships for students interested in developing their gateway development skills. The summer internship is intended to provide hands-on experience and to provide a unique opportunity for student engagement with the community. Participants are placed at one of the seven universities that form the SGCI partnership, or a specific site may be suggested by an SGCI client, partner, or others who are interested

"I really learned a lot during the four-week Coding Institute. I was able to learn about things that I was unfamiliar with, such as programming languages like Python and how to analyze data using R Studio. Thanks to the Coding Institute and being given the opportunity to attend PEARC18 and to participate in the SGCI's Hackathon, I was also able to grow my network since I connected with people who can help me build my career in the technology world."

Solomon Gebrhana
Sophomore, Computer Science
Mississippi Valley State University

in hosting a student intern.

Interns are graduate students majoring in computer science or computer engineering (or related fields) at any level and undergraduates majoring in computer science or computer engineering (or related fields) who demonstrate strong programming and software engineering skills. Participants receive a stipend, plus housing and transportation. Interns are encouraged to participate in the annual Gateways conference, where they will report on their internship experience.

Working closely with the SGCI Hackathons was Je'aime Powell, a Senior Systems Administrator on The Large Scale Systems Group with the Texas Advanced Computing Center (TACC). TACC is the hub for the SGCI's Scientific Software Collaborative component lead by Maytal Dahan. Je'aime completed his Bachelor of Science and Master of Science from Elizabeth City State University. During that time, he worked in the CERSER laboratories on High Performance Computing projects. Je'aime makes significant contributions to the SGCI Workforce Development efforts by coordinating the SGCI Hackathons at PEARC and Supercomputing conferences. Je'aime Powell is an excellent example of the hundreds of CERSER students who are now at the cutting edge of High Performance and Cloud Computing and who continue to give back to their communities.