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BCC GEOSPATIAL CENTER OF THE CUNY CREST INSTITUTE NEWSLETTER

**DEVELOPING WORKFORCE SKILLS AND CAREER PATHWAYS
IN COLLABORATION WITH AN INDUSTRY CONSORTIUM**





Bronx Geospatial Center of the CUNY CREST Institute



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Promoting Geospatial Technology & Careers Newsletter

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Creating the Next Generation of Skilled Geospatial Technicians

The BGCCCI seeks to educate, train and prepare BCC students to enter the workforce or pursue advanced studies in geospatial technology. The Center seeks to achieve this goal by engaging in the following activities:

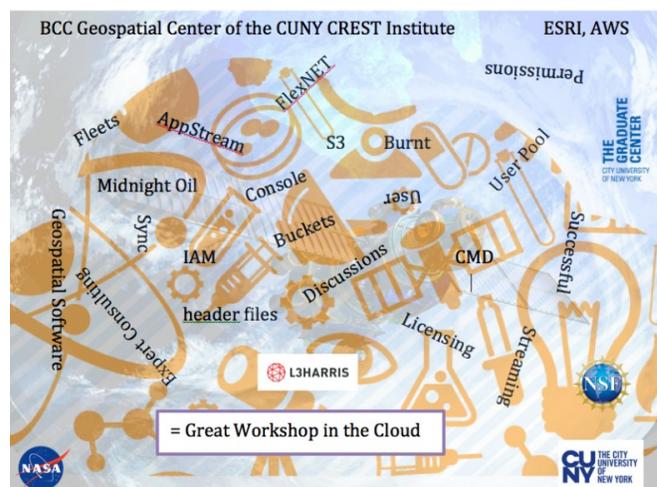
- Design, develop and introduce new and multidisciplinary courses/programs in geospatial technology at BCC.
- Conduct scholarly activities and cutting-edge research in areas of national priority.
- Design and develop training programs for middle and high school students and educators.
- Train BCC students, faculty, staff and local residents.
- Organize summer institutes for high schools and undergraduate students.
- Seek grants from private and federal entities.

Adapting During COVID-19

Switching to a distance-learning mode for delivering computer-based geospatial technology workshops was a challenge, especially during a pandemic like COVID-19. The ongoing National Science Foundation's Advanced Technological Education [NSF-ATE] project at the City University of New York [CUNY] focuses on creating skilled geospatial technicians and building career pathways. Since its inception in 2017 the project has impacted over 400 students, faculty and educators, and through its research internship program trained several interns in applying geospatial technology for their multidisciplinary projects.

The hands-on computer based workshops and research internships are usually held at the state-of-the-art geospatial computer center located on campus in the Bronx, New York City. However due to the pandemic we were unable to deliver it as planned, and were required to innovate in alternate modes of delivery. Inquiry based all year round workshops and research internships are an integral part of the project activities. The work-

shops and research internships involved the analyses of BIG geospatial satellite data that demanded a superior computing environment, which personal desktops or laptops don't possess. There were several workshops, professional development activities and research internships that remain to be conducted under the ongoing NSF-ATE project at CUNY [2017-2021]. The university had limited infrastructure to offer the project activities in the distance-learning mode. The solution to this was a server in the cloud that could remotely host geospatial technology



2020 Programs & Activities

Spring 2020

Cancelled

Summer 2020

In the summer of 2020 during the unprecedented times of the COVID-19 pandemic, through collaboration and support from the Industry Consortium, the Center was able to hold two virtual programs over the summer. Those were the Summer Workforce Internship Program for high school and university students, and the Professional Development Workshop for educators and teachers. These high school students, university students, and educators were afforded the opportunity to further their knowledge and understanding of geospatial technology with hands on activities and exercises.

SWIP

Over the course of several weeks during the 2020 Summer Workforce Internship Program, 21 interns at both the high school and university level were able to remotely research topics related to geospatial technology, which cumulated in technical reports, tutorials, and presentations. Because of industry collaborators like Amazon, L3 Harris Geospatial, ESRI, and BCC-CUNY, the internships were conducted virtually using the Cloud. Students were not only able to use state of the art geospatial technology from their own home and participate in research, but also present their findings through a recorded video, and learn how to write technical reports and journal articles. Students presented research that ranged from mapping vegetation and phenology using time series satellite data to aerial drone surveys with 3D models. The internship helped students build and develop their analytical and professional skills.

Professional Development Workshop

Over the course of 16 days, in our Professional Development Workshop, educators and teachers in STEM fields were remotely introduced geospatial technology. The participants were exposed to concepts in remote sensing, different types of satellite imagery, and were trained in image analyses through the cloud using Amazon's Appstream Console. Participants were encouraged to brainstorm new projects in geospatial technology and provided innovative solutions to beat challenges around acquisition of software and geospatial datasets. As a result of this workshop, the educators are now able to introduce these geospatial concepts to their respective students across the country and instill this knowledge in younger generations.

Fall 2020

During the Fall Workshops that began on September 26 and ended on November 28, these workshops funded by the National Science Foundation, our middle and high school students within the New York City Metropolitan area were afforded the opportunity to perform feature extraction from high resolution multispectral satellite datasets. At both levels, these workshops help to build a foundational knowledge of geospatial technology that can be built upon in college and later in life in professional settings. Over the course of the 10 week program that was held every Saturday, participants were remotely trained in image analysis and feature extraction, as well as supervised and unsupervised classification. The participants began as novices with little to no knowledge of geospatial technology, but through the workshop, they now have a fundamental understanding of geospatial technology. All participants completed their hands-on exercises using industry standard software through the cloud. They presented their respective projects on the final day of the workshop.

Events and Collaborations

Concluding the Workshops

The current fall 2020 geospatial workshops supported by both NSF-ATE and NASA-MISTC programs have generated tremendous curiosity in image analyses. Participants from middle and high schools have been glued to analyzing satellite data by accessing AWS console through an RDP. L3 Harris team have been supporting us steadfastly since 2010. The workshop focus is a key area of research in the U.S. - 'Feature Extraction'. The workshops provide exposure to participants and create '**Intellectual Curiosity**' which is the most important thing that the country needs to nurture. With adequate exposure and planned workshops we can better inform them and empower them to think about geospatial sector as a career possibility. All participants work for a total of 6 hours every weekend and they will show case their work through presentations on the 12th December, 2020. Our crusade through the BCC Geospatial Center started in 2010. We value '**TIME**' which is most precious asset and work round the clock to address all challenges. It is a great honor and privilege to just have the opportunity to do what we like the most - '**Foster Spatial Thinking**'

Conferences

Dr. Sunil Bhaskaran was invited to the International Conference (Online) Under the Aegis of UGC -DRS SAP-I Program On Building Resilient and Sustainable Societies: Emerging Social and Economic Challenges November 25-26, 2020, where he was a member of the advisory board.

Collaborations

On December 28, 2021, BGCCCI and the Digital University of Kerala met virtually to discuss future areas of collaboration. Presentations were given by both institutions regarding their mission, current areas of research, and future plans.



**BCC Geospatial Center of the
CUNY CREST INSTITUTE and
Digital University of Kerala
Collaboration Meeting**

December 30, 2021

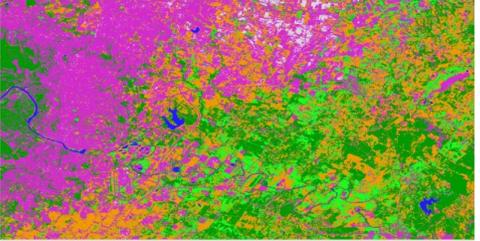
www.geospatialcentercunycrestinstitute.com

2021 Research Internships

Over the course of several weeks during the 2021 Research Internship Program, 16 interns at both the high school and university level can remotely research topics related to geospatial technology, which cumulates in technical reports, tutorials, and presentations. Because of industry collaborators like Amazon, L3 Harris Geospatial, ESRI, and BCC-CUNY, the internships are conducted virtually using the cloud. Students presented research that range from feature extraction with Sentinel 2 data to time series classification of cities across the world. This internship helps students build and develop their analytical and professional skills. All participants are required to submit daily evaluation reports.

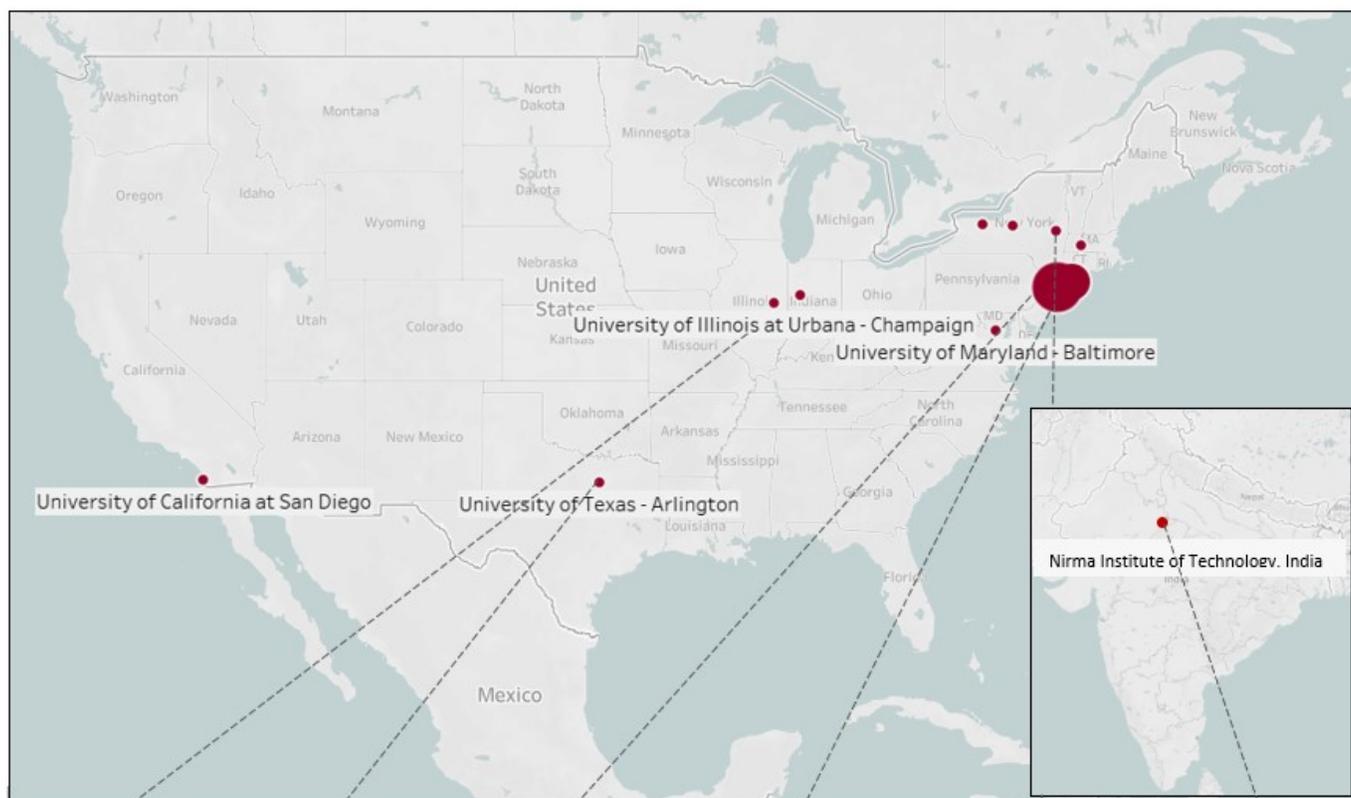
Our students typically come in with little to no understanding of geospatial technology, and we help them build foundational knowledge that they can use in academia and beyond. Our staff mentor and train them in their focused research in STEAM disciplines. The multitude of research that our interns take on expose them to geospatial technology and its applications. Research methodologies, intellectual property rights, ethics and research compliance standards are some of the many topics covered over the duration of their internship. The students learn valuable time management skills, as these internships are in addition to their regular studies. The culmination of their research is presented at conferences and published in academic journals. Their experience at BGCCCI and beyond helps them in furthering their career, whether it is in higher education, or professional fields.

Sample of 2021 Research Reports

<p>Spatial Analyses of Graduation attainment and Employment rates in the U.S.</p>   <p>Nikhil Dev Research Intern 2021</p> <p>Mentor: Dr. Sunil Bhaskaran</p>	<p>DETECTION OF LAND COVER CHANGES WITH TIME-SERIES SATELLITE DATA</p>   <p>Devrina Chidambaram NASA-MISTC Research Internships 2021</p>	<p>Extracting terrestrial features from time-series Sentinel 2 data.</p> <p>NASA-MISTC RESEARCH INTERNSHIP PROGRAM</p>  <p>Sumedha Srikonda</p>  <p>Mentor Dr. Sunil Bhaskaran Copyrights BGCCCI [2021]</p>
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2021 Research Internships Cont.

Where are our participants are from?



Kath Nancy Paul
Loyola University Chicago



Neha Shinde
UT Arlington, Texas



Shan Jiang
Stevens Institute of Technology,
New Jersey



Mayuri Raganathan
NYU, New York



Cray Case
Union College, NY



Yashvi Shah
Nirma Institute of Technology,
Ahmedabad, India

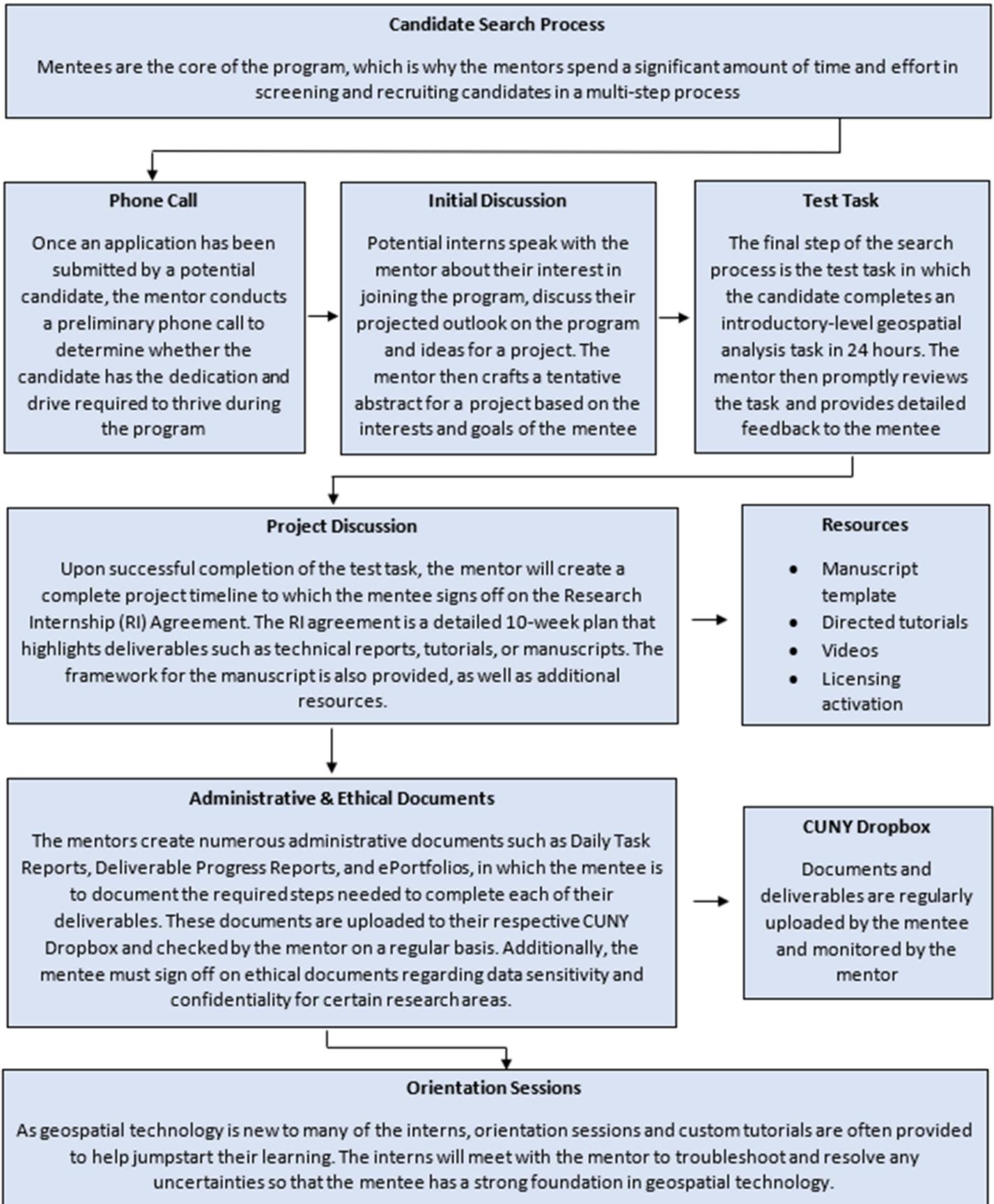
Sampling of 2021 Interns

Above is a selection of our 2021 research intern cohort. We are proud to host students from across the nation and internationally at BGCCCI. Along with their respective research, six of our interns have been selected to publish their works in academic journals. The interns have been mentored in research methodology, manuscript writing, the creation of study maps, ethics, and many more research principles that they can use as a foundation in their future endeavors.

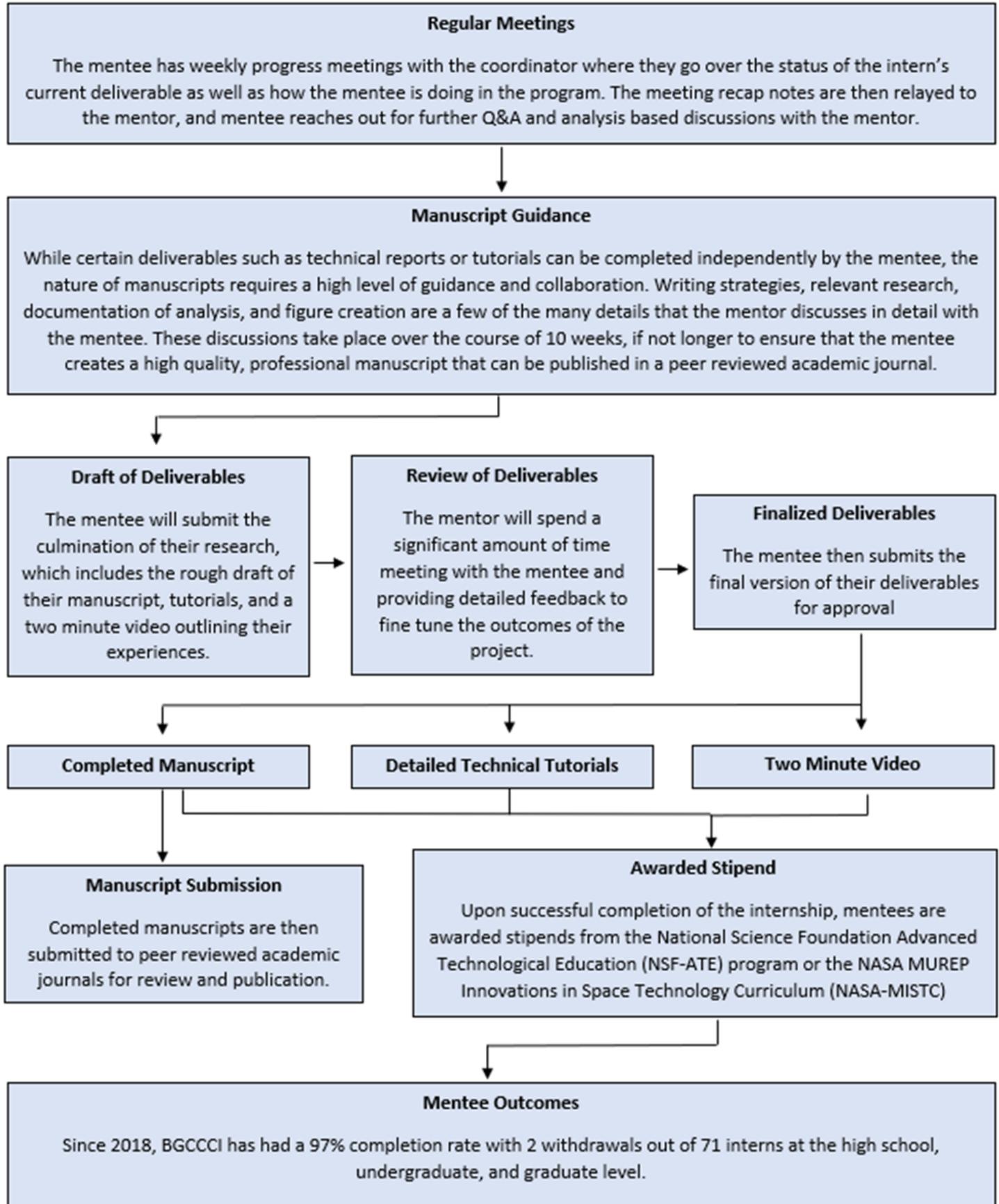
Research Highlights

Intern	Research Project
2021	
Chayti Biswas	Sentinel 2 Data Analysis
Devrina Chidambaram	Spatial and Temporal Image Analyses of Satellite Imagery – Visualizing Changes Over Time for Cities Experiencing Fast Growth
Hemwattie Ramper-saud	Spatial and Temporal Image Analyses of satellite imagery – Educational Materials for promoting geospatial technology at universities.
Laticia Long	Development of Geospatial Learning Material for K-6
Mayuri Ranganathan	Report of Growth and Development of Geospatial Technology
Srewashi Mondal	Sentinel 2 Data Analysis
Yu Jie Chen	Spatial and Temporal Image Analyses of satellite imagery – Educational Materials for promoting geospatial technology at universities
Anya St. Martin	Analysis of Change in Permeable Land Cover in Lake Como
Sanjana Sunder	Development of Learning Material for Geospatial Education from US Census Data
Nikkhil Dev Murthy	Graduation Rates in the US and a GIS model to plan for improvements
Sumedha Sirikonda	Spatial and Temporal Image Analyses of satellite imagery – Educational Materials using SageMaker for Spatial Analysis
Shan Jiang	Mapping Global Land Cover Patterns with Moderate Resolution Multispectral Satellite Datasets
Vishaak Raghupathy	Modeling Growth Patterns of Medium Level Global Cities
Subashchandra Madineni	Extraction and Classification of Key Climate Metrics using Satellite Data
Neha Shinde	Automation of Satellite Data Download using Python
Kath Nancy Paul	Data Analysis and Visualization on COVID-19 Data in New York City and CUNY
Sumedha Sirikonda	Spatial and Temporal Image Analyses of satellite imagery – Educational Materials using SageMaker for Spatial Analysis
Shan Jiang	Mapping Global Land Cover Patterns with Moderate Resolution Multispectral Satellite Datasets
Cray Case	Animations of Geospatial Concepts and Analyses
Jayant Kumar	Carbon Reduction from Buildings in New York City

Internship Process Flow Chart



Internship Process Flow Chart Cont.



Growth of BGCCCI

In 2001, a proposal led by the City College of New York was submitted to the NOAA-CREST program for funding. Bronx Community College was one of the partners on the proposal, which was funded by NOAA.

In 2010, Dr. Sunil Bhaskaran spearheaded the development and efforts in geospatial technology at BCC, leading to the formation of the first ever CUNY Geospatial center.

Since then, we have had over two dozen workshops, hundreds of participants, and an fantastic success ratio in securing grants. Even throughout the COVID-19 pandemic, the center has provided free workshops and geospatial resources locally, regionally, and nationally.

Furthermore, the center is now recognized as a national center of excellence. A major grant was awarded by the National Science Foundation's Advanced Technological Education Program and NASA in 2020, which were

- Planning for the Post COVID-19 disaster. Cloud-computing solutions for delivering technology courses and workshops in the distance learning mode [Collaboration with Amazon Web Services] [\$63,173] NSF-ATE.
- Planning for the POST COVID-19 disaster. *Cloud computing solutions for delivering technology courses and workshops in distance learning mode. [Collaboration with Industry - Amazon]. (\$58,000) NASA.

The program is designed specifically to heighten awareness about geospatial technology and its application to STEM, increase and diversity the number of young adults interested, and academically prepare them to enter into the field. It is a partnership between the Bronx Community College and York College, who work in collaboration with the industry and federal agencies to train participants in geospatial technology.

