NSF CISE Research Expansion Grantees Meeting

MEETING REPORT

ASEE | NSF

May 22 - 24, 2024 | Sonesta Denver Downtown | Denver, CO

ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Founded in 1893, the American Society for Engineering Education (ASEE) is a global society of individual, institutional, and corporate members. ASEE seeks to be the pre-eminent authority on the education of engineering professionals by advancing innovation, excellence, and access at all levels of education.

ASEE engages with engineering faculty, business leaders, college and high school students, parents, and teachers to enhance the engineering workforce of the nation. We are the only professional society addressing opportunities and challenges spanning all engineering disciplines, working across the breadth of academic education, research, and public service.

- We support education at the institutional level by linking faculty and staff across disciplines to create enhanced student learning and discovery.
- We support education across institutions by identifying opportunities to share proven and promising instructional practices.
- We support education locally, regionally, and nationally by forging and reinforcing connections between academia, business, industry, and government.
- We support discovery and scholarship among education researchers by providing opportunities to share and build upon findings.
- We support innovation by fostering the translation of research into improved practices.
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2024 NSF CISE Research Expansion Grantees Meeting: Meeting Report

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The Planning Committee for the 2024 NSF CISE Research Expansion Grantees Meeting provided valuable input and recommendations on meeting themes, agenda, and activities. The committee was composed of three CISE Research Expansion Principal Investigators (PIs): Renu Balyan (SUNY College at Old Westbury), Maria Laurent-Rice (Stillman College), and Marcelo Sztainberg (Northeastern Illinois University). ASEE staff members Alexandra Sharpe and Cathy Kouko served as committee liaisons.

Subrata Acharya, NSF CISE Program Director, provided guidance and feedback in the early planning stages of the meeting and helped inform the meeting structure and agenda. American Indian Higher Education Consortium (AIHEC) representatives Wendy Huntoon, Alex Grandon, and Shelly Knight further assisted with meeting planning and participant outreach and communications. Meeting speakers and attendees, with their contributions over two days of sessions and discussions, provided the substance of this report.

This meeting report was drafted by Mark Matthews and finalized by Alexandra Sharpe. Darcelle Larkin served as event photographer.

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EXECUTIVE SUMMARY

On May 22 – 24, 2024, in Denver, Colorado, the American Society for Engineering Education (ASEE) hosted the inaugural 2024 NSF CISE Research Expansion Grantees Meeting. This meeting brought together 59 grantees from NSF's Computer and Information Science and Engineering (CISE) Research Expansion Program (CISE MSI) for two days of networking, knowledge sharing, and collaborative problem-solving. Recognizing the value of Minority-Serving Institutions (MSIs) in nurturing innovation and cultivating current and future talent in science and engineering fields, the NSF CISE Research Expansion Program, established in 2021, aims to "broaden participation by increasing the number of CISE-funded research projects from MSIs and to develop research capacity toward successful submissions to core CISE programs" (National Science Foundation, n.d., para. 1).

Hosted by ASEE in collaboration with NSF and the American Indian Higher Education Consortium (AIHEC), the 2024 NSF CISE Research Expansion Grantees Meeting drew participants from Historically Black Colleges and Universities (HBCUs), Hispanic-Serving Institutions (HSIs), and Asian American and Native American-Pacific Islander-Serving Institutions (AANAPISIs).

Technical sessions and poster presentations spotlighted examples from dozens of research and education projects and institutional collaborations funded by the NSF CISE Research Expansion Program. Research topics ranged from artificial intelligence and cybersecurity to securing distributed energy, geospatial restrictions on airborne drones, communications in wearable devices, managing regional sustainability data, and a privacy-protecting health education system for low-literacy populations.

Keynote speaker Camille McKayle, Provost and Vice President of Academic Affairs and Professor of Mathematics at the University of the Virgin Islands, highlighted the attributes and practices that make for standout leaders at MSIs. NSF representatives described an array of funding opportunities in important areas of science and education, both within and outside the CISE Directorate. This meeting marked five years of initiatives led by ASEE and funded by NSF that sought to increase the capacity of computer and information science and engineering faculty at MSIs to better position them to compete successfully for federal grant funding, particularly funding through NSF's CISE Directorate.

A Brief History Of MSIs In The U.S.

Minority-Serving Institutions (MSIs) are integral to the U.S. economy and constitute a diverse sector within the nation's higher education system. According to the National Academies of Sciences, Engineering, and Medicine (2019), the U.S. is home to over 700 MSIs that enroll approximately 5 million students and represent nearly 30% of all undergraduate students in the country. MSIs play a crucial role in enhancing workforce preparedness and expanding access to post-baccalaureate opportunities for historically underrepresented populations (Rutgers Center for Minority Serving Institutions, 2014). MSIs are classified into seven distinct categories, as outlined in Table 1 below.

Table 1: Historically defined* and enrollment-defined** MSIs (adapted from Espinosa, et al., 2018).

MSI TYPE	DEFINITION
Alaska Native and Native Hawaiian-Serving Institutions (ANNH)**	Alaska Native-serving institutions have at least 20 percent Alaska Native students. Native Hawaiian-serving institutions have at least 10 percent Native Hawaiian students. Collectively, they are referred to as ANNH institutions.
Asian American and Native American Pacific Islander-Serving Institutions (AANAPISI)**	These institutions have at least 10 percent enrollment of Asian American and Native American Pacific Islander students.
Hispanic-Serving Institutions (HSI)**	These are institutions where Hispanic students make up 25 percent or more of total undergraduate full-time-equivalent enrollment.
Historically Black Colleges and Universities (HBCU)*	This designation refers to any college or university established prior to 1964 whose principal mission was, and is, the education of Black Americans.
Native American-Serving, Nontribal Institutions (NASNTI)**	These institutions have at least 10 percent enrollment from Native American students.
Predominantly Black Institutions (PBI)**	These institutions serve at least 1,000 undergraduate students; have at least 50 percent low-income or first-generation college-degree-seeking undergraduate enrollment; have low expenditure per full-time undergraduate compared with other institutions offering similar instruction; and enroll at least 40 percent African American students.
Tribal Colleges and Universities (TCU)*	These are institutions chartered by Indian tribes through their sovereign authority or by the federal government to provide higher education opportunities to Native Americans through programs that are locally and culturally based, holistic, and supportive.

HISTORICALLY BLACK COLLEGES AND UNIVERSITIES (HBCUs)

Historically Black Colleges and Universities (HBCUs) have provided a critical role in expanding higher education opportunities in the U.S., particularly for African Americans, since 1837. Following the Civil War, these institutions provided essential educational access to both free Black people and recently freed slaves and contributed significantly to national rebuilding during the Reconstruction era. The Morrill Land Grant Acts of 1862 and 1890 served as "pivotal legislation" in establishing and expanding Black colleges – "the 1890 act specifically allocated funding for the creation of 19 land-grant HBCUs and mandated that states with segregated college systems provide equitable institutional opportunities for Black and White students" (Rose, 2017, p. 2).

While the first half of the 20th century was seen as a golden age for HBCUs (Freemark, 2015), the 1950s – 1970s saw a decrease in Black student enrollment at HBCUs, a direct result of education desegregation legislation (most notably the landmark 1954 Brown v. Board of Education Supreme Court case). During this time, predominantly White institutions, including prestigious universities like University of Virginia, Princeton University, and Tulane University, became more accessible to minorities and began actively recruiting high-achieving students and standout athletes (The Journal of Blacks in Education, n.d.). This resulted in financial struggles for many private HBCUs, with some having to shut their doors permanently.

TRIBAL COLLEGES AND UNIVERSITIES (TCUs)

Tribal Colleges and Universities (TCUs), similar to HBCUs, were also established to educate a unique population of students for whom no other route to higher education was available. Specifically, as outlined in Marroquín (2019), "TCUs were chartered… (1) to facilitate nation-building through self-determination…; (2) to increase the completion rates of American Indian/Alaska Natives (AI/ANs); and (3) to counteract the forced assimilation policies and practices of the U.S. government and religious institutions" (p. 1). The tribal college movement began with the founding of Diné College, originally called Navajo Community College, in 1968. Since then, the number of TCUs has increased to 38 institutions, with campuses primarily located in or near reservations and rural areas. According to AIHEC (2018), TCUs serve communities in seven of the ten most economically disadvantaged counties in the nation. TCUs enroll highly diverse student populations and demonstrate strong economic benefits yet are consistently underfunded. "Despite…trust responsibility and treaty obligations," as noted in AIHEC (2018), "TCUs' primary source of…institutional operating funds, which comes from the federal government, has never been fully funded and funding from the USDA to the 34

TCU land-grant institutions lags very far behind that of state and historically black land-grants" (p. 2).

HISPANIC-SERVING INSTITUTIONS (HSIs) AND OTHER ENROLLMENT-DEFINED MSIs

Unlike HBCUs and TCUs, both of which are considered to be historically-defined MSIs, "the vast majority of [Hispanic-Serving Institutions (HSIs)] …emerged within the last 30 years due to a confluence of social, political, economic, and demographic factors" (Laden, 2004, p. 187). HSIs, along with Alaska Native and Native Hawaiian-Serving Institutions (ANNHs), Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs), Native American-Serving, Nontribal Institutions (NASNTI), and Predominantly Black Institutions (PBIs), are considered enrollment-defined MSIs, meaning that their "recognition is predicated on the institution reaching a certain enrollment threshold, as defined by legislation for each MSI type" (Espinosa, et al., 2017, p. 2). As noted in Espinosa, et al., 2017, "as the nation's citizenry grew more diverse, and more institutions were enrolling large numbers of students of color, subsequent iterations of the Higher Education Act (HEA) and other pieces of legislation established [these] additional MSI types" (p. 2).

HSIs began in the 1980s as a grassroots effort, with a number of Congressional hearings held on the topic of Latino access to higher education. These hearings homed in on two key themes, as noted in the 2019 Postsecondary National Policy Institute (PNPI) brief on HSIs: "Latino students lacked access to higher education and many who began degree programs did not complete them, and Latinos were concentrated at institutions of higher education that received limited financial support from the federal or state governments" (p. 3). HSIs received their official MSI designation under Title III of the federal Higher Education Act of 1992.

Over the next 15 years, the other four enrollment-defined MSIs received federal recognition—ANNHs through the Higher Education Act of 1998, AANAPISIs through the College Cost Reduction and Access Act of 2007, and both NASNTIs and PBIs through the Higher Education Opportunity Act of 2008. Espinosa, et al., 2017, notes that federal recognition as an MSI requires institutions to have low operating costs, which often equates to fewer resources for students. Furthermore, "the financial circumstances of the students MSIs serve limit their ability to raise tuition and endowment revenue in the pursuit of institutional mission" (p. 3). As such, "many MSIs are reliant upon federal, state, and local appropriations and contracts and grants as sources of revenue" (p. 3).

The Role Of MSIs In Cultivating The Future STEM Workforce

The 2007 National Academy of Sciences, National Academy of Engineering, and Institute of Medicine report *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* documented the growing global challenge to U.S. preeminence in science and engineering and called for increasing the talent pool through several recommended actions, including enhancing K-12 science and math education experiences, increasing federal investments in long-term basic scientific research, incentivize top scholars (both within the U.S. and globally) to pursue advanced science and engineering degrees at U.S. institutions, and incentivize innovation by creating high-paying jobs and investing downstream activities that support scientific innovation.

The subsequent 2011 National Academy of Sciences, National Academy of Engineering, and Institute of Medicine report *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads* focused on developing "a strategy to increase the participation of underrepresented minorities in science and engineering," which was deemed crucial to "sustaining [the nation's] research and innovation capacity" (p. 2). The report cited three central reasons for this push: the sources of the future science and engineering workforce are undefined; the nation's population demographics are undergoing drastic changes ("groups that are most underrepresented in [science and engineering] are also the fastest growing in the general population"); and diversity is a benefit to the talent pool, innovation, and facilitating global leadership (p. 3). Acknowledging that "little progress has been made to more than marginally improve educational outcomes for minorities [since the 1970s]," (p. 35) the report asserted that "the proportion of underrepresented minorities in S&E would need to triple to match their share of the overall U.S. population" (p. 36). The report puts forth several recommendations specific to MSIs:

1. The federal government should increase teacher education programs at MSIs to prepare exceptional teachers in STEM fields to educate underrepresented minority students.
2. The federal government should provide financial support to underrepresented students to incentivize their "participation in undergraduate STEM programs across institution types: community colleges, [MSIs], and majority-serving institutions" (p. 178).
3. Industry and federal laboratories should partner with MSIs to help increase their institutional research capacity and inspire innovative and multidisciplinary educational and training experiences for students.
4. The federal government should offer more financial support to TCUs, to offset their operating expenses and support their continued operation and growth.

Several years later, the 2019 National Academies of Sciences, Engineering, and Medicine report *Minority Serving Institutions: America's Underutilized*

Resource for Strengthening the STEM Workforce again asserted the urgent need to increase the number of postsecondary degrees in STEM attained by underrepresented minority students, stressing the "collective potential" of "the nation's more than 700 MSIs… to help strengthen, expand, and diversify the rapidly evolving STEM workforce" and help secure the nation's national security, economic growth, and global competitiveness in scientific fields (p. 2). The report shared a powerful statistic – that "more undergraduate students (from all backgrounds) are enrolled in STEM fields at four-year MSIs than at four-year non-MSIs, and when taken together, [HBCUs, HSIs, and AANAPISIs] produce one-fifth of the nation's STEM bachelor's degrees" (p. 2).

Recognizing MSIs as a valuable source for developing the current and future STEM workforce, the report also acknowledged the challenges that many of these institutions face—namely limited financial resources and a lack of infrastructure to support research. The report recommended several practices with the most promise for improving STEM education, research, and workforce preparation at MSIs: dynamic, multilevel, mission-driven leadership; institutional responsiveness to meet students where they are; supportive campus environments; tailored academic and social support; mentorship and sponsorship; availability of undergraduate research experiences; and mutually beneficial public- and private-sector partnerships. Further, the report stressed that "substantial resources are needed to help promote, sustain, and advance the success of MSIs and their students" (p. 6).

In 2025, more MSIs, including at least one HBCU, are expected to fit the criteria for R1 status under changes put in place by the American Council on Education, which manages the Carnegie Classification system (Basken, 2023). Achieving R1 status could allow more MSIs to retain and attract minority faculty members and researchers who might otherwise stay at or seek to join majority White institutions, along with the best and brightest students from under-represented minorities.

Key NSF Initiatives Targeting MSIs

NSF's engagement with MSIs goes back decades, beginning in 1972 with the establishment of the Minority Institution Science Improvement Program, which "supported long-range improvement in the teaching of science at these institutions" (National Science Foundation, Directorate for Science and Engineering Education, 1981, p. 1). Several new NSF programs were launched during this decade "with an initial strategy of providing targeted, set-aside programs for minority-serving institutions and minority faculty and

students," perhaps most notable the Minority Graduate Fellowship Program (MGFP) which ran in parallel to the preexisting Graduate Research Fellowship Program (GRFP) but focused on applicants from "racial or ethnic population[s] underrepresented in STEM" (Muller-Parker and Bourke, 2023, para. 6).

Established in 1980, the NSF Authorization and Science and Technology Equal Opportunities Act authorized the foundation to increase the participation of women and minorities in science and technology, resulting in the creation of the Committee on Equal Opportunities in Science and Engineering and the launch of new programs and policies that sought to "to increase substantially the contribution and advancement of women and minorities in scientific, professional, and technical careers, and for other purposes" (Muller-Parker and Bourke, 2023, para. 7).

Several early programs supporting MSIs remain durable pillars of NSF's portfolio, including the 1991 Louis Stokes Alliances for Minority Participation, which supports colleges and universities in efforts to help students succeed in STEM, the 1998 Alliances for Graduate Education and the Professoriate (AGEP), and the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP).

Besides legacy programs aimed at MSIs, NSF has frequently redesigned grant opportunities, staying abreast of trends and national priorities. The foundation currently offers no fewer than 12 programs targeting research and education at MSIs (National Science and Technology Council, 2024). NSF's strategic plan for Fiscal Years (FY) 2018 – 2022 set a goal of fostering the growth of a more capable and diverse research workforce and advancing the scientific and innovation skills of the nation. At the same time, it noted that the U.S. faces a demographic reality that indicates that it is critical to increase racial and ethnic representation in engineering programs at postsecondary institutions (National Science Foundation, 2018).

An Overview Of ASEE's Capacity Building Programs For MSIs

In February 2020, in collaboration with the NSF CISE Directorate, ASEE hosted the 2020 Conference on Increasing Participation of Minority-serving Institution in NSF CISE Core Programs (NSF Award No. CNS-1941329) in Arlington, VA. The overarching goal of this conference was to increase the number and competitiveness of MSI researchers' proposals to CISE core programs, by increasing attendee awareness about CISE core programs and developing a framework for more productive engagement of MSIs in NSF CISE core programs. The conference brought together more than 90 science, computing, and engineering faculty and researchers from MSIs.

In a pre-conference survey, respondents cited lack of time, often due to heavy teaching loads, as the most common factor preventing successful competition for NSF CISE funding. This factor constrained the whole grant-seeking process, including seeking out research opportunities, writing proposals, and conducting research. Other factors included not knowing the funding opportunities available within the CISE Directorate, lack of experience and knowledge in preparing federal grant proposals, and lack of infrastructure at their institutions necessary to support the submission of a federal grant. It is often up to MSI faculty to figure out how to navigate the rules and regulations of proposal submission and grant administration (Chavela Guerra and Wilson, 2021).

Conference discussions highlighted these constraints, and also noted poor salaries, and a shared sentiment among MSI faculty that pursuit of research opportunities brings limited rewards. MSI faculty who did secure funding tended to be part of large research collaborations with non-MSIs and their contributions tended to deal less with core research questions than fulfilling broadening participation mandates. Major themes that emerged from breakout group discussions included: the need for increased diversity in review panels; increased mentorship and training opportunities for MSI faculty; more financial and career support for both MSI faculty and students; and stronger collaboration structures for MSIs and partner institutions (American Society for Engineering Education, 2020).

The conference served to inform the development of a new solicitation (NSF-21-533), Computer and Information Science and Engineering Minority-Serving Institutions Research Expansion Program (CISE MSI Program), which continued the foundation's "support of research expansion for... MSIs" and sought to "broaden participation by increasing the number of CISE-funded research projects from MSIs and to develop research capacity toward successful submissions to core CISE programs" (National Science Foundation, 2021).

Several key recommendations for future events were put forth by attendees, namely (a) offer a session or workshop that addresses best practices for proposal preparation, including NSF Merit Review Criteria; (b) increase opportunities for informal and formal networking among MSI researchers and offer enhanced support to help MSIs build productive collaborations and partnerships; and (c) cultivate mentors and champions for MSI faculty researchers (American Society for Engineering Education, 2020). These recommendations informed the development and implementation of several NSF-funded ASEE projects that sought to build research capacity among faculty at MSIs, which are described below.

1. ASEE facilitated the virtual 2021 NSF CISE Proposal Development Workshop: Increasing Participation and Competitiveness of Minority-serving Institutions (NSF Award No. CNS-2039244) in spring 2021, aligned to help prepare MSI teams submit proposals to the inaugural NSF CISE MSI program solicitation. This event brought together 12 research teams from MSIs for a workshop focused on learning strategies for writing NSF proposals within the CISE context. This interactive virtual workshop comprised five sessions that addressed best practices for preparing key proposal components (e.g., Project Description, Budget), NSF Merit Review Criteria, and the process that NSF uses to review and evaluate proposals. Feedback from participants, mentors, and NSF personnel expressed the need for more extensive engagement and support for participants throughout the entire process of forming teams, developing project ideas, and preparing proposals. They recommended support and training for team formation, an expanded mentoring program, and provision of seed funding.
2. The Capacity Building for Research at Minority Serving Institutions (CyBR-MSI) program (NSF Award No. CNS-2139136), aligned to the 2022 NSF CISE MSI program solicitation, expanded upon the scope of the 2021 workshop to provide more extensive engagement and support for participants. The program included: (1) a three-day Networking, Ideation & Team-building Workshop (NITW) in which researchers formed teams and collectively developed teamwork competencies; (2) a five-week Proposal Development Workshop (PDW) that provided research teams with instruction, writing labs, and expert feedback on the development of key proposal components; (3) a Mentoring Program (MP) that gave each research team experienced coaching; and (4) a Mini-Grant Program (MGP) that offered seed funding for research projects.
3. The Minority-Serving Institutional Readiness for Federal Grant Preparation Workshop (MSI-RFP) (NSF Award No. CNS-1941329) was a collaborative virtual workshop held in June 2022 that focused on institutional research readiness for 21 participants representing 9 MSIs. The workshop resulted in the development of the pilot Research Infrastructure Assessment Tool (RIAT), a self-assessment of one's understanding of Sponsored Research Office (SRO) services available at one's institution. RIAT has the potential to be used by SRO administrators to gauge faculty understanding of SRO services within or across departments. Deans and provosts can use the instrument to assess their institutions' capacity to support faculty in preparing federal grants, and/or educating them about resources available.
4. The FY23 NSF CISE Proposal Development Workshop: Increasing Participation and Competitiveness of Minority-serving Institutions (NSF Award No. CNS-2300410) was a five-part virtual proposal development workshop held in December 2022 – January 2023, designed to prepare researchers to develop and submit proposals for the

2023 NSF CISE MSI program solicitation. The proposal development workshop mirrored the format of that of the previous CyBR-MSI program.

5. The Capacity Building for Research at Minority-Serving Institutions: Infrastructure Research Readiness (CyBR-MSI: IRR) program (NSF Award No. CNS-2233087) launched in 2023 with the following goals: (1) to help participants assess their campuses' research infrastructure and prioritize improvements; (2) to form a community of practice among researchers and research infrastructure administrators from MSIs focused on capacity building of research infrastructure; and (3) to co-create, with campus leadership, an action plan for research ready infrastructure for strong grant proposals for NSF CISE Core programs. Two cohorts of teams participated in CyBR-MSI: IRR, one cohort in 2023 and another cohort in 2024.

Including the 2024 NSF CISE Research Expansion Grantees Meeting, ASEE's capacity-building initiatives for MSIs have directly engaged almost 400 participants across more than 150 unique institutions.

Meeting Overview

The NSF CISE Research Expansion Program is a program within NSF's Directorate for Computer and Information Science and Engineering (CISE) that seeks to increase the number of CISE-funded research projects from MSIs and develop research capacity among MSIs to facilitate successful submissions to CISE core programs.

Hosted by the American Society for Engineering Education (ASEE) in collaboration with NSF's CISE Directorate and the American Indian Higher Education Consortium (AIHEC), the purpose of the 2024 NSF CISE Research Expansion Grantees Meeting was to provide a forum for active CISE Research Expansion Program Principal Investigators (PIs) to learn, explore, and share ideas with a focus on engaging in collaborative problem-solving and disseminating promising practices. Specifically, the goals of the meeting were to (1) provide the opportunity for PIs to convene and interact with one another and NSF representatives to increase knowledge and (2) strengthen professional networks and collaborative relationships among PIs.

Furthermore, the meeting sought to establish the groundwork for a community of practice within which PIs are able to collectively further their respective project goals as well as the broader goals of the CISE Research Expansion Program.

This inaugural meeting, which was held May 22 – 24, 2024 in Denver, Colorado, convened 59 grantees from across the culturally and geographically diverse spectrum of MSIs: Historically Black Colleges and Universities (HBCUs), Hispanic-Serving institutions (HSIs), and Asian American and Native American-Pacific Islander-Serving Institutions (AANAPISIs).

Meeting Format

The 2024 NSF CISE Research Expansion Grantees Meeting program included concurrent sessions led by grantees and NSF representatives, keynote sessions, a grantee-led poster session, networking receptions, and additional opportunities for networking and knowledge-sharing.

One keynote session, led by Camille McKayle, Provost and Vice President of Academic Affairs and Professor of Mathematics at the University of the Virgin Islands, focused on leadership in broadening participation in STEM. Another keynote session, led by multiple NSF CISE Directorate representatives, acquainted grantees with the full range of CISE programs and funding opportunities, including those given added impetus and financial support in the landmark 2022 CHIPS and Science Act.

Opening remarks on day one were led by Dilma Da Silva, Acting Assistant Director of the NSF CISE Directorate and Subrata Acharya, Program Director for the NSF CISE Research Expansion Program, who spoke on the CISE Research Expansion mission and vision.

Two blocks of grantee-led technical sessions took place on Thursday, May 23. Each block was comprised of three unique sessions, driven by topic area. During these sessions, grantees led 10 – 15-minute presentations on their research projects. Technical session topics included Artificial Intelligence (AI), Collaborations and Partnerships, Cyberinfrastructure and Cybersecurity, and STEM Education and Student Success. Two sets of NSF rotating breakout sessions occurred on Thursday, May 23 and Friday, May 24—these sessions were led by NSF representatives and focused on critical topics for PIs, including managing budgets, interacting with NSF, additional funding opportunities for MSIs, and NSF CloudBank resources. One brainstorming session was held, during which Bevlee A. Watford, Emeritus Professor of Engineering Education, Associate Dean for Equity and Engagement, and the Founding Executive Director of the Center for the Enhancement of Engineering Diversity for the College of Engineering at Virginia Tech, guided attendees, through an activity with the goal of creating a post-award toolkit for new CISE Research Expansion Program grantees.

One poster session showcased research from attending PIs. Networking breaks and two formal networking receptions provided opportunities for attendees to discuss their work, share ideas, and form collaborations.

Closing remarks on day two were led by Jacqueline El-Sayed, who provided an overview of ASEE's five years of capacity-building initiatives for MSIs, which have reached close to 400 participants across more than 150 institutions.

Opening Remarks

Jacqueline El-Sayed, CEO and Executive Director, *ASEE*
Dilma Da Dilva, Acting Assistant Director, CISE Directorate, *NSF*
Subrata Acharya, Program Director, CISE Directorate, *NSF*

The first full day of the meeting commenced with a welcome by Jacqueline El-Sayed, who honored the original indigenous inhabitants of Denver, Colorado, the meeting location. El-Sayed acknowledged that Denver sits on the traditional homeland of the Ute, Cheyenne, Comanche, and Arapaho peoples, adding that 48 contemporary tribal nations are historically tied to territory that is now Colorado. Dr. El-Sayed's welcome preceded opening remarks presented by NSF.

In a virtual presentation, Dilma Da Silva acknowledged the difficulty researchers face in identifying "the best home" for their proposals among the array of programs in the directorate. She encouraged attendees to reach out to directorate staff with questions. CISE funds 80 percent of the federally-funded computer science research at U.S. academic institutions, supporting 371 institutions in 2023, including 89 MSIs, tapping a broad range of talent from multiple regions.

The CISE portfolio advances emerging industries key to economic and national security and climate resiliency and aims to strengthen research infrastructure. Da Silva's presentation listed major CISE-wide initiatives, including the CISE Research Expansion Program, and CISE-led multi-directorate efforts, such as Secure and Trustworthy Cyberspace (SaTC). She also described the National Artificial Intelligence Research Resource Pilot (NAIRR), a concept for democratizing access to infrastructure and connecting researchers nationwide to resources—computational, data, software, modeling, and training—that they need to participate in AI research. It means a wider participation of academic researchers. A two-year pilot, involving 13 federal agencies working together and 25 non-governmental partners, began in January 2024. Among CISE resources for instructors is the cloud-based Enabling Access to the Semiconductor Chip Ecosystem for Design, Fabrication, and Training (Chip Design Hub) that enables students at various levels to design and test integrated circuits. Advancing education for the future AI workforce (EducateAI) provides

AI instruction to students at all levels, from K-12 to post-graduates.

Da Silva pointed with pride to CISE's Quantum Information Science and Engineering programs, which include an effort to increase research capacity and broaden participation in the field.

Subrata Acharya, introduced members of the large NSF team at the meeting and then elaborated on some of the programs introduced in Da Silva's talk.
Acharya appealed to attendees for help in increasing the number of MSIs involved in CISE-sponsored research. While the number had risen to 89 from 78 the previous year, it needed to grow further. MSIs "are the cohorts and the incubators of talent." One way to accomplish that is institutional mentor-mentee relationships between R1 universities and emerging research institutions — those receiving less than $50 million a year in federal funding. The point of the Research Expansion Program is to provide "opportunities everywhere for everybody" and enable more MSIs to become successful in applying for research grants in core CISE programs.

Emerging research institutions that tap into the CISE Research Expansion Program need to build up sufficient infrastructure to continue strengthening their capability after the current funding ends. Sustainability requires providing time so faculty members can pursue research while carrying a teaching load, linking up with collaborators and partners, and equipping laboratories. "It's not going to happen in a year or two." While institutional and state government leaders should be engaged, "[faculty] have to be at the forefront," Acharya said. With about 180 CISE research and capacity-building awards, totaling over $40 million—the directorate's engagement with institutions in EPSCoR states—those historically underfunded by science agencies—is growing.

NSF's Historically Black Colleges and Universities - Excellence in Research (HBCU-EiR) program provides supplemental grants to institutions that need to increase their research capacity

and institutional infrastructure to be positioned to compete for grants from CISE's core programs. Acharya encouraged attendees whose schools are close to one of the 25 AI Research Institutes, or in a state that hosts one, to explore a partnership through the Expanding AI Innovation through Capacity Building and Partnerships (ExpandAI) program. She also highlighted the SaTC program, noting that cyberinfrastructure and cyber capacity are key to building and sustaining better partnerships.

NSF and CISE infrastructure programs provide important seed funding to build sustainable capacity, Acharya said. Some institutions that obtained those awards have moved on to seek grants of up to $4 million under the Major Research Instrumentation (MRI) program, which supports multi-user scientific and engineering instrumentation for research and research training.

Acharya ended her remarks by pointing to the Campus Cyberinfrastructure program, a science-driven approach to build regional innovation centers and networks, geared for institutions that are not R1s. Finally, Acharya expressed that CISE hopes more MSIs, from a diversity of geographic regions, and non-R1s, will apply for grants under the new Engineering Research Initiation (ERI) program.

NSF-Led Rotating Breakout Sessions

OPPORTUNITIES FOR INTERACTING WITH NSF

Michelle L. Rogers, Expert, CISE Directorate, *NSF*

Michelle Rogers opened this session by introducing the primary CISE Program Officers and staff members, many of whom were in the room, and encouraged MSI researchers to reach out to them. Seeing multiple opportunities available, some researchers may feel overwhelmed, she noted. Rogers drew attention to programs that attendees might not be familiar with, such as the Civic Innovation Challenge (CIVIC), and NSF-wide cross-cutting research areas (materials and robotics, for example). If a particular topic is offered in another office at NSF, "we're a way that you can get to those organizations," she said. Besides research and education awards, universities can seek funding for infrastructure. Rogers suggested that attendees take slides presented at the meeting back to their campuses and share them with colleagues. "We're deputizing you to become our ambassadors on your campus." Explaining the application process for the HBCU-EiR program, Rogers clarified that it offers financial support for faculty to "buy down" their high teaching loads or administrative responsibilities by up to 50 percent so they can devote more time to research. A university can use the funds to hire adjunct instructors as

substitutes. This plan was developed as a result of outreach to MSIs that sought to learn what they needed in order for their researchers to apply successfully for CISE core funding.

"Remember, the goal of [the CISE Research Expansion] Program is that eventually, we will no longer be needed—that everybody can get into the core, because they will have received funding to build the necessary research foundation," Rogers told attendees. In further pursuit of the same goal, a fourth thread was added to the CISE Research Expansion Program's three existing threads— research capacity building projects (RCBP), research demonstration projects (RDP), and research partnership enhancement projects (RPEP). The new thread is research planning projects (RPP), which are funded at up to $200,000 per project. CISE has also removed the five-year cap on institutional funding from the CISE Research Expansion Program, recognizing that some institutions may not be ready after five years to seek a grant from one of the core programs. In its place is an overall funding cap of $2 million. Rogers ended on a note of satisfaction, saying, "We've been able to grow, we've been able to demonstrate more interest, … to fund more CISE MSI proposals, (and) to increase EIR funding so that there are more HBCUs being engaged." She and other NSF Program Officers noted that they are excited to see that projects funded in the first three years are now progressing to CISE core applications.

MANAGING A BUDGET

Janele Gosey, Grants Management Specialist, Division of Grants Administration (DGA), *NSF*

In this session, Janele Gosey explained important aspects of award administration, including PIs' key responsibilities, reporting, site visits, do's an don'ts, and where to go for help. She stressed that CISE staff are available to answer queries. Grantees should consult and follow the award solicitation and familiarize themselves with information contained in NSF's comprehensive Proposal & Award Policies & Procedures Guide (PAPPG), but when in doubt, seek help. Her office's mantra: "Ask early, ask often." At their institutions, PIs deal with a sponsored research officer, who is in touch with a grant and agreement officer at NSF. A PI's main contact at NSF is the Program Officer. PIs bear full responsibility for adhering to conditions of a particular award, managing expenditures prudently, and ensuring that they are allowable, allocable, reasonable, and necessary.

An annual report is due to NSF 90 days prior to the end of the budget period. The last annual report constitutes the final project report. Prior approval is required to change a project's objective or scope, expiration date, to change a PI or co-PI, or to adjust by a significant amount the time a PI devotes to a project. Weeklong site visits by a cost analyst and grants specialist may be done in person or

virtually. They are decided upon using a risk-assessment algorithm. Grantees receive a confirmation letter, and should use that as a guide in collecting information the NSF team will want, such as documentation of expenditures and time spent on the project. Grantees are encouraged to subscribe to NSF's program announcements and updates and look for periodic FAQ's that may be relevant, such as those on cash management.

ADDITIONAL FUNDING OPPORTUNITIES FOR MSIs

James L. Moore III, Assistant Director, Directorate for STEM Education (EDU), *NSF*

James L. Moore III opened his session by asserting that "NSF wants to make a difference, and the only way that we can make a difference is to be in close proximity with the people who are on the ground doing the work on a day-to-day basis." One of the agency's pillars, he noted, is to create opportunities. While talent exists everywhere, "opportunity does not prevail, and we see that across the United States and beyond." He noted that the concept of broadening participation has come under challenge in some states, but said, "We want to keep our foot on the accelerator, because it's in the best interest of our nation [and] an economic and national security imperative that we bring everyone to the fold to ensure that . . . individuals across the [nation] can participate in the new frontier of STEM."

Moore's directorate, the Directorate for STEM Education (EDU), provides over 45 percent of the federal funding that goes to HBCUs, over 40 percent that goes to HSIs, and over 80 percent of the federal funding that goes to TCUs.

The EDU Directorate doesn't flinch at big numbers. Moore noted that a month earlier, NSF had awarded $90 million to Rice University, the largest grant in the school's history and NSF's largest educational infrastructure grant, for SafeInsights, "a national R&D infrastructure that will support transformational learning research" coordinated among more than a dozen securely connected digital learning platforms (DLPs) (National Science Foundation, 2024). EDU also makes "immense investments" in HSIs. One school, the University of Texas at El Paso, has built capacity to the point where "they're getting the big grants, and the big opportunities." Moore encouraged his listeners to check out a new EDU solicitation focusing on instrumentation to support student success.

Pointing to a slide for the Louis Stokes Alliances for Minority Participation (LSAMP), Moore said "there's no program in the agency, arguably in the country that has impacted more students getting STEM degrees," but "we're constantly thinking about what's the 2.0? If you ask anybody about me, I'm always looking for the 2.0, 3.0—what's the next version?"

On the subject of AI research, Moore said that as "the creators, the innovators in this space," researchers should try to co-create with communities. He cited examples of algorithm bias that have resulted in flaws, caused by limited databases, that have harmed cultural and ethnic minorities. "If we don't co-create with communities . . . we will produce even greater disparities," he warned.

Just as it's important for minorities, women, and people with disabilities to be represented in research, funders must look for geographical diversity, so people with talent aren't forced to leave their communities, Moore said. The Centers of Research Excellence in Science and Technology (CREST Centers) act as a bridge to prepare MSIs for eligibility for major NSF opportunities; for example, North Carolina A&T University's establishment of an engineering research center. But it must be remembered that MSIs vary in size and strength. "We put our HBCUs in the same pot. And they're not all in the same." For the smaller schools lacking Ph.D. students, "we have to think about... the synergistic, mutually beneficial collaborations that we can harness and develop."

He encouraged institutions with well-equipped labs to apply for Research Experiences for Teachers (RET) grants as a way of improving K-12 education and broadening horizons among youth in their surrounding communities. He cited the example of Harmony Charter School in Houston and its remarkable record of preparing a largely minority student body for college.

Among the more than 30 EDU programs that Moore touched on in his presentation, there were a number especially relevant to MSIs. They included Research Experiences for Undergraduates (REU), which Moore suggested could help MSI faculty provide the mentoring needed to groom students for the highly competitive Graduate Research Fellowships Program (GRFP). Another was the Research Traineeship (NRT) program.

Among its advantages, Moore said the NRT program allows graduate students to pivot to a new field. Another related program is the Research Traineeship Institutional Partnership Pilot

(NRT-IPP) Program, which supports efforts to develop and implement innovative STEM graduate education models that lead to industry-relevant graduate programs at non-R1 universities.

A true "game changer," in Moore's view, is CyberCorps(R) Scholarship for Service (SFS). "This program pays for tuition, fees, professional development, and some other things. But you have to give the federal government three years. It helps you get a clearance." He encourages interest from MSIs: "I think we only have five HBCUs. Some HSIs but not as many as I would like."

NSF CLOUDBANK RESOURCES

Deepankar Medhi, Program Director, CNS, *NSF*
Rob Fatland, Director of Cloud and Data Solutions, *University of Washington and CloudBank*

Attendees may gain access to public data-storage clouds such as Amazon Web Services, Google Cloud Platform, Microsoft Azure, and IBM Cloud through CloudBank, a platform designed to simplify the use of these services and provide additional tools and help to researchers.

Organized around a powerful portal, CloudBank grew out of a CISE-funded project begun in 2019 by researchers at the University of California, San Diego, the University of California, Berkeley, and the University of Washington.

Besides access to multiple public clouds, CloudBank offers account management tools, help with financial operations, classroom tools, training, and help desk support. It can also save researchers money on indirect costs.

One of the problems researchers face with the cloud is how to use it to implement their research. "That's what CloudBank is here to help with," Fatland said. The platform provides a basic understanding of how the cloud can be useful even for some complicated technical issues. "My experience is that I can figure something out on the cloud and solve the problem in the moment and then get on with my life." CloudBank can also play a middleman role, connecting researchers to the appropriate cloud platform and training materials they may want. Certain projects may be granted Cloud Credits, equivalent to dollars but spent on the cloud.

CloudBank staff have assisted instructors; for instance, by taking over a data science course temporarily to teach students about use of the cloud. Students learned, among other things, how they could use their browser to talk to a database that they had set up on the cloud. CloudBank staff would like to expand the tool's applicability to other NSF directorates, as well as its connections with MSIs.

Keynote Sessions

KEYNOTE SESSION I – LEADERSHIP FOR BROADENING PARTICIPATION IN STEM: AN HBCU PERSPECTIVE

Camille McKayle, Provost and Vice President of Academic Affairs and Professor of Mathematics, *University of the Virgin Islands*

Camille McKayle is lead PI for the NSF-funded Center for the Advancement of STEM Leadership (CASL), which seeks to identify leadership qualities that have led to successes in producing quality STEM graduates at HBCUs. She has also directed multiple grants from NSF, NASA, Department of Defense, and the Mathematical Association of America. From 2005 to 2008, she served as Program Officer for NSF's Historically Black Colleges and Universities Undergraduate (HBCU-UP) Program.

McKayle began her talk by asserting that much can be learned from HBCUs, which have long been a force in broadening participation in STEM. These institutions confer a quarter of the STEM bachelor's degrees earned by Black students and provide the undergraduate education for 28 percent of Black computer science Ph.D.'s. They really do more with less, she said.

In its research on leadership in broadening participation in STEM, the CASL, led by McKayle, found considerable material on K-12, but little on higher education. Center researchers proceeded to fill the gap by studying STEM leadership at HBCUs. They interviewed 136 HBCU STEM leaders representing 67 of the 89 four-year institutions, hoping to capture through the leaders' voices the main elements of STEM education success. Interviewees included presidents, provosts, deans, chairs, faculty, program directors, leaders throughout the campus, not just leaders by role. The effort identified six dimensions of leadership for broadening participation in STEM as evidenced on HBCU campuses:

1. STEM advocacy — Leaders used their voices and actions to promote STEM, resulting in STEM showing up in places where one might least expect it.
2. Seeing leadership in others and sharing the stage — Leaders valued mentorship and coaching and demonstrated care, kindness, and inclusivity. McKayle recalled times during her own journey when she wasn't seeking a leadership role, but someone saw that capability in her and "paved the way for [her] to create [her] leadership pathway."
3. Resource identification — Leaders were consistently seeking resources to support students and faculty in STEM, were proactive and solution-oriented, and able to channel resources to advance STEM on their campus.
4. Displaying creativity and leadership — Leaders recognized that ideas could come from anywhere and created the type of environment that encourages others to come forward with ideas.

Furthermore, the leaders were not afraid to try innovative approaches and were agile and adaptable.

5. Being conscious of one's role as leader — Leaders were deliberate and self-aware in their approach to leadership, understanding the importance of being in that role. "I believe this comes out of being (at) an HBCU," McKayle said. "They're aware of their place in HBCU history."
6. Lead with cultural intentionality — The soul of their institution is reflected in their leadership. They honored and celebrated the traditions of their HBCU and its students. They were aware of the HBCU in the community, both locally and nationally, and often used STEM as a way to engage with the local community.

"There is no one size fits all," McKayle said of these findings, but one constant was evident throughout the series of interviews: Students are not just important, but central, no matter who was being interviewed and regardless of the question being asked. From presidents to provosts, to deans, to chairs or faculty, many started from the point of view of the student and the importance of ensuring that students were given every opportunity to excel, regardless of background or circumstances.

McKayle noted that a number of single institutions receive more government research funding than all the HBCUs put together, but added, "Something's going to have to give to get more." HBCUs, collectively, might improve their own capacity to apply for grants by creating virtual sponsored research offices that serve more than one institution. In a similar vein, emerging scientists of various disciplines in the Caribbean formed an umbrella group to collaborate.

Recruitment of computer science faculty is already hard and likely to get more so, McKayle said, because graduates with bachelor's degrees can earn more in industry than as a faculty member. One way she found to encourage more under-represented minority computer scientists to enter academe is to demonstrate to their parents and communities the importance of their research. But McKayle does not think students, or their mentors, should consider it a failure if

a graduate strives to achieve success in industry instead of pursuing a Ph.D. "So, we have to remember that each student might be on a different path. The nation might need stuff, but the students need stuff too."

KEYNOTE SESSION II – CISE RESEARCH EXPANSION LANDSCAPE

James E. Fowler, Program Director, CISE Division of Computing and Communication Foundations (CCF), *NSF*
Sharon Geva, Program Director, CISE Office of Advanced Cyberinfrastructure (OAC) – NAIRR Pilot, *NSF*
Sharmistha Bagchi-Sen, Program Director, CISE Office of Advanced Cyberinfrastructure (OAC) – Cyber Training, *NSF*
Dillon Watring, AAAS Science & Technology Policy Fellow, CISE Division of Information and Intelligent Systems (IIS) – ExpandAI, *NSF*

James E. Fowler introduced this session by explaining the purpose of the CISE Directorate's Computing and Communication Foundations (CCF) Division, which provides essential support, not only for work in other CISE Divisions, but for cross-cutting research involving other NSF Directorates. Design of computing systems must be well-grounded in theory, but important theoretical concepts can only emerge through protracted exposure to application. Applications drive theory, but theory drives the application, in a continuum. CCF is divided into four technical clusters: the Software and Hardware Foundations (SHF), Algorithmic Foundations (AF), Communications and Information Foundations (CIF), and the Foundations of Emerging Technologies (FET). The Education and Workforce (EWF) program has recently been added to CCF.
CCF's traditional areas include information theory, signal processing, image processing, signal processing for communications, communications, error correcting, and coding. In the last decade, machine learning, algorithms, and data have played a big part in the proposals that CCF funds. The Foundations of Emerging Technologies (FET) program focuses on three main topics: quantum computing, biological systems, and neuromorphic computing—that is, fundamental research in these disruptive technologies, and models in computing and communication.
"These are things that are not ready for primetime yet in terms of going into one of the other clusters, but these are things that we hope will eventually pay off and become core areas funded out of CISE."
The Software and Hardware Foundations (SHF) program "supports potentially transformative research in the design, verification, operation, utilization, and evaluation of computer software and hardware through novel approaches, robust theories, high-language tools, and lasting principles."

Proposals funded in CCF typically make some fundamental advances in theory, "but then they touch upon one or more of these application areas as a way of grounding that theory in something

that's pragmatic, something that's useful, and usually something that illustrates substantial gains over established techniques in those application areas." Cross-cutting programs that CCF participates in include designing accountable software systems, principles and practices of scalable systems, mathematical foundations of artificial intelligence, artificial intelligence formal methods and mathematical reasoning, design for environmental sustainability in computing, correctness of scientific computing systems, predictive intelligence for pandemic prevention, future of semiconductors and expeditions in computing. "The ramifications of what we do in the foundations touch on many, many different areas, not only in size but elsewhere at NSF as well."

Sharon Geva began her presentation by describing the National Artificial Intelligence Research Resource (NAIRR) Pilot Program. NAIRR is envisioned as "a widely accessible national research infrastructure" for discovery and innovation, providing a diverse set of users with computing data sets, testbeds, educational materials, training tools, and user support mechanisms. It is intended to provide academic and other noncommercial researchers—only U.S. nationals—with the kinds of facilities and tools that only industry had in the past. Beyond spurring innovation, its goals include increasing the diversity of talent in AI—"a very important part"—as well as improving U.S. capacity for AI R&D, advancing trustworthy AI, and training the next generation of researchers and AI leaders.

The pilot currently has 26 private sector partners that have contributed in-kind resources and will be offering researchers access to agency datasets and the chance to license software. NAIRR uses a non-government portal, nairrpilot.org, run by an NSF awardee, Science Gateways SGX3. The pilot currently operates NAIRR Open, which doesn't require secure computing. The Department of Energy (DOE) and the National Institutes of Health (NIH) are setting up NAIRR Secure. Workshops are underway on a stack of software for NAIRR Software. Another section, NAIRR Classroom, will have the ability to reach new communities. NAIRR is intended only to provide access to its resources, including 10 advanced computer systems—not funding. Researchers will need to obtain funding from other NSF programs or elsewhere. Geva urged attendees to inform their communities about NAIRR. "The word 'democratization' is critical here for us."

Sharmistha Bagchi-Sen introduced attendees to the Office of Advanced Cyber Infrastructure (OAC). OAC stays abreast of community needs through workshops, advice from external advisory committees and different reports and experts in the field. Its portfolio includes Advanced Computing Systems and Services (ACSS), which supports cyberinfrastructure in production operations and computational and data-intensive research; the Leadership-Class

Computing Facility (LCCF) based at the University of Texas at Austin; the Major Research Instrumentation Program (MRI), which provides non-profit institutions and colleges and universities with access to multi-user scientific and engineering instrumentation for research and research training; Campus Cyberinfrastructure (CC), which improves cyber connectivity, particularly at schools in areas with limited or no access; International Research and education Network Connections (IRNC), which funds high-performance network connectivity required by international collaborations; and Strengthening the Cyberinfrastructure Professionals Ecosystem (SCIPE), which integrates these experts into the research enterprise.

Speaking of her own area of cyber training, Bagchi-Sen said the long-term vision is to have computational and data-driven science for all scientists and engineers. “We want to ensure broad adoption of CI [Cyber Infrastructure] tools, methods, and resources, and integrate CI and computational and data-enabled science and engineering skills into undergraduate and graduate curriculum and also broaden CI access and adoption by varied institutions, scientific communities, and underrepresented groups.” The solicitation has the details needed to prepare a proposal, but Bagchi-Shen offered additional guidance: Assure that you will be broadening the use of CI resources. Identify challenges in research workforce development. If you’re writing a small proposal, you have to address scalability and sustainability. Focus on both scalability and sustainability.

Dillon Watring works with the National AI Research Institutes, part of the national strategy to maintain U.S. leadership in AI, and the ExpandAI program. The core mission of the National AI Research Institutes is to increase the U.S. AI workforce and build pathways for students from diverse backgrounds. ExpandAI, an outgrowth of the institutes, provides funding opportunities for MSIs either to build capacity or to partner with an institute. The capacity track, intended for schools with little or no AI infrastructure, research, or education, offers institutional-level changes. Funding

can be used for any combination of education, research, workforce development, or infrastructure, as long as it's AI-related. Partnership with an institute is appropriate for schools with some existing AI capacity—either in infrastructure, research, or education. It allows an MSIs and one of the 25 institutes to collaborate on research that would benefit them both, while also integrating the MSI into the AI research ecosystem.

Technical Sessions

ARTIFICIAL INTELLIGENCE (AI) PART I

Speaker: Shakil Akhtar, Professor, IT and Computer Science, *Clayton State University*

Project Title: Efficient System Design for Next Generation of Medical Imaging for Skin Cancer Detection (NSF Award No. CNS- 2318574)

Skin cancer is the most common form of cancer in the U.S. The most serious type, melanoma, claims more than 100,000 lives each year. Recent advances have produced wide-ranging applications of machine learning to solve multi-disciplinary problems in cancer cell growth detection, modeling of cancer growth, and treatments. However, their effectiveness in cancer detection has been hindered by imbalanced datasets and standard image resolutions. Shakil Akhtar led a collaborative project between his institution and Jarvis Christian University using cell analysis and image recognition in an effort to achieve more efficient detection of skin cancer. His team compared ML-based software methods and analyzed their detection accuracy. Drawing on publicly available data of cancer cell image files, they used deep-learning algorithms to detect benign and suspicious image samples. They also built a smartphone app to apply patterns matching algorithms and study the available data to arrive at possible diagnoses of cancer types.

Speaker: Qi Lu, Assistant Professor, Computer Science, *The University of Texas, Rio Grande Valley*

Project Title: Towards Scalable, Resilient and Robust Foraging with Heterogeneous Robot Swarms (NSF Award No. CNS-2318682)

Robotic drones have been developed to mimic insect behavior not only in their ability to form swarms for such foraging tasks as search and rescue, but in the way swarms mimic insect communication. Swarm members coordinate their actions with a virtual version of pheromones, the scents that some insects give off to cooperate with others in the same colony, for coordination. But as with insect pheromones, the virtual kind are prone to interference and exploitation by an adversary. For instance, an opponent might create false pheromone trails to deceive and trap foraging robots.

Besides malicious system attacks, mechanism failures and sensor malfunctions can cause robots to fail or gradually lose control.

Qi Lu's research aims to ensure that robotic swarms can operate effectively even under adversarial conditions. In a pair of studies (Luna and Lu, 2024), his team simulated an interference attack, evaluated its impact on a foraging mission, and designed two different defenses: distance-based clustering (DBSCAN) along with a cluster grouping method to isolate the attackers, and quarantine zones (QZs) to prevent robots from retrieving resources from designated locations where an attack might occur. Both defensive measures were effective in protecting the swarm's mission. Lu ended his presentation by sharing student achievements associated with his project. One graduate student and one undergraduate student received Outstanding Graduate and Undergraduate student awards in March. Two Hispanic graduate students earned master's degrees, and one Hispanic undergraduate student will pursue a Ph.D. at UTRGV under Lu.

Speaker: Marcelo O. Sztainberg, Professor; Interim Dean Graduate Studies, Analytics and Research, *Northeastern Illinois University*

Project Title: IS-CUCO: Information Systems meet Cultural Competencies (NSF Award No. CNS-2131291)
Marcelo Sztainberg's project develops culturally relevant public information systems that inform underserved Hispanic populations about local sources of food. The work addresses both widespread food insecurity in these populations and the need for improved methods to alert underserved communities about local food pantries and other sources of available food. The U.S. Department of Agriculture defines 'food insecurity' as a household's inability or uncertainty about its ability to acquire enough food for all its members.

To reach these communities, software engineers must learn how Hispanic populations use information systems, identifying cultural and linguistic data,

and infrastructure factors, and then develop systems that incorporate those factors. Besides responding to a clear social need, the project serves to build research capacity at collaborating MSIs (New York City College of Technology; California State University, Dominguez Hills; Northeastern Illinois University; and the University of Texas at El Paso) and train the next generation of professionals skilled in developing inclusive information systems.

ARTIFICIAL INTELLIGENCE (AI) PART II

Speaker: Bin Tang, Professor, Computer Science, *California State University, Dominguez Hills*

Project Title: Truthful and Optimal Data Preservation in Base Station-less Sensor Networks: An Integrated Game Theory and Network Flow Approach (NSF Award No. CNS- 2131309)

Sensor networks often rely on high-power, high-storage data-collecting base stations located nearby. This is feasible for tasks performed in challenging environments, such as monitoring volcano eruptions and exploring underwater. Base station-less sensor networks must therefore store collected data among their sensor nodes, each of which has limited storage capacity and needs to conserve power to keep operating. This situation creates a tension between data preservation and survival that Bin Tang's team is working to resolve. Doing so is important, since base station-less networks "provide a comprehensive view of scientific frontiers including scientific exploration, disaster warning and climate change," the team asserts (Ly, et al., n.d.).

A tension scenario is particularly likely in emerging global-scale Internet of Things sensing applications, with sensor nodes controlled by different self-interested entities. Using game theory and network flow software, Tang's team worked out a way to preserve the largest amount of data and still keep the system running. The point of using game theory is to ascertain the optimal strategies for data storage and power supply preservation and seek an equilibrium between them. The team came up with the Data-VCG (for Vickrey-Clark-Groves) Game, which integrated the data values with the VCG mechanism, "a generic truthful mechanism for achieving a socially-optimal solution." To provide a performance guarantee, they designed a performance metric to quantify the game's efficiency.

Speaker: Francisco Iacobelli, Associate Professor, Computer Science, *Northeastern Illinois University*

Project Title: Privacy Preserving Tutoring System for Health Education of Low Literacy Hispanic Populations (NSF Award No. CNS- 2219586)

Francisco Iacobelli's project aims to "develop an Intelligent Tutoring System (ITS) for low literacy Latina breast cancer survivors." Proven to be

effective in teaching certain subjects, such computerized systems can now be created much more rapidly than in the past thanks to AI. However, people who have difficulty reading and writing are often unable to use them. This poses a hardship for breast cancer survivors in marginalized communities. They often experience ongoing diagnosis and treatment-related symptoms that negatively impact their quality of life. Education can result in a better health care experience (Cao, et al., 2024).

This research has followed two tracks: Iacobelli's focus is the computerized avatar, which mimics a human tutor teaching about breast cancer and skills for survival. This work requires knowing how the intended audience deals with technology, designing interactions that model those of Hispanic breast cancer survivors, and training natural language algorithms with an understanding of and accurate adaptation to code-switching, in which individuals in multi-lingual communities transition between languages.

A second track, led by Zechun Cao, Assistant Professor of Computational, Engineering and Mathematical Sciences at Texas A&M University–San Antonio, responds to the need to protect patients' private medical information. It involves developing algorithms with end-to-end encrypted communication that can encrypt and decrypt distributed data rapidly and in real time. Cao explained his research during a separate technical session.

Speaker: Sanjay Madria, Curators Distinguished Professor, Computer Science, *Missouri University of Science and Technology (S&T)*

Project Title: Event Classification for Disaster Management via Social Media Data (NSF Award No. CNS- 2219615)

Sanjay Madria has developed methods to extract the most up-to-date, accurate, and contextually useful information from social media during natural disasters. Such efforts are likely to grow in importance as climate change makes calamities such as hurricanes, wildfires, and floods more frequent and dangerous. Social media platforms like X provide a crucial real-time communication tool, and a means to identify events before, during, and after disasters, along with signals that designated authorities can use in response. Madria outlined several systems his team developed that use machine learning and-or transfer learning (in which a model pre-trained on one task is fine-tuned for a new, related task) to help sort and classify information, add relevant context, and determine an event's urgency. Future plans include enhancing the systems by incorporating major media and a fact-checking mechanism.

COLLABORATIONS AND PARTNERSHIPS

Speakers:
Kinnis Gosha, Hortinius I. Chenault Endowed Associate Professor and Division Chair for Experiential Learning and Interdisciplinary Studies, *Morehouse College* & Laura Sams Haynes, Director, Office of Outreach, School of Electrical and Computer Engineering, *Georgia Tech*

Project Title: An HBCU Program Strategy for Broadening Participation in Computing through Local Collaboration to Increase CHIP Related Professions (NSF Award No. CNS-2318703)

In a mutually advantageous partnership, computer science majors at Morehouse College earn a second BS—in electrical and computer engineering—from Georgia Tech with a specialty in microchip production. Besides access to Georgia Tech's top-notch electrical engineering faculty and labs, they acquire skills to enter a cutting-edge industry considered vital to U.S. national security. For its part, Georgia Tech gains more African American students, bringing needed diversity to its Atlanta campus. While highly selective, the school's computer engineering program accepts many more black male students than it ends up enrolling. The program includes academic support, including a summer bridge program for entering students keyed to research and engagement of students in exploring post-graduate pathways. Computer science faculty members from minority-serving Spelman College and Clark Atlanta University will be invited to collaborate on future NSF proposals.

Speaker: Kewei Sha, Associate Professor, Information Science, *University of North Texas*

Project Title: EdgeRobot: An Edge-Based Approach to Robust Multi-Robot Systems in Dynamic Environments (NSF Award No. CNS-2240513)

Kewei Sha's project aims to develop an efficient, robust, and secure multi-robot system used by colleagues at six universities spread across the country. This collaboration involves new edge computing-based architecture and theory along with an algorithmic framework to facilitate multi-robot coordination in dynamic environments. The edge computing infrastructure allows for

location awareness. Coordination, scheduling, and routing among multiple robots is aided by reinforcement from learning-based algorithms.

In tasks requiring collaborative actions, such as cooperative target tracking, multi-agent reinforcement learning enables teams of robots to operate, learn, and adapt in dynamic and human-populated environments robustly and safely. Integrating modern cryptographic and security primitives secures the collaboration among edge nodes in multi-robot systems. Sha reports that the interface between EdgeRobot and its human team members builds a shared autonomy model.

This project builds research capacity for training underrepresented students at participating MSIs: the University of Houston–Clear Lake, the University of Michigan–Flint, New York City College of Technology, Morgan State University, San Francisco State University, and California State University, Dominguez Hills. Sha says the cross-institutional collaboration not only boosts research capacity in all participating institutions but also provides integrative research and education experience to their underrepresented minority students. Ultimately, this project establishes and exemplifies an effective collaboration model for training and educating underrepresented students from geographically diverse minority-serving institutions.

Speaker: Carlos Monroy, Assistant Professor, Computer Science, *University of St. Thomas*

Project Title: celtSTEM Research Collaborative: Catapulting MSI Faculty and Students into Computational Research (NSF Award No. CNS-2131293)

Carlos Monroy tapped Rice University biologists to help him develop a project for University of St. Thomas students to identify viruses carried by mosquitoes, based on genetic analysis of samples and comparison with viral sequences. Recent computing advances allow analysis of genetic sequences in 30 minutes that not long ago would have taken 243 years.

University of St. Thomas students brought prior experience with distributed computing, plus a desire to learn, contribute, impact, and create. Rice contributed datasets and research questions. Access to a top tier research university allowed the project to overcome the students' limited bioinformatics knowledge and the University of St. Thomas's relatively weak computing power and lack of Ph.D. students to lead research. Using distributed client-server architecture on an AWS-powered cloud, the team could process 1 million sequences in about 15 hours.

CYBERINFRASTRUCTURE AND CYBERSECURITY

Speaker: Taesic Kim, Assistant Professor, Electrical Engineering and Computer Science, *Texas A&M University-Kingsville*

Project Title: Resilient Cyber-Physical Security for Distributed Energy Resources at Grid Edge (NSF Award No. CNS-2219733)

Taesic Kim sees the nation's electric power grid being transformed, with distributed energy resources (DERs) assuming a larger role. DERs include photovoltaic systems, wind energy systems, energy storage systems, and electric vehicle charging systems. Numerous DERs are already integrated into electric power grids, leading to a future "DER-rich power grid." With this complexity has come a growing vulnerability to malicious tampering. A number of renewable energy sites have been victims of ransomware attacks. DER devices are exposed to various intrusions and damage in the supply chain and during testing, installation, and maintenance. Encrypted networks and firewalls are useless; industry antivirus programs might only detect known malware. Blockchain and quantum advances add to the concern.

Kim's research aims to develop a resilient cyber-physical security framework. His team at Texas A&M University-Kingsville collaborates with colleagues at the University of Illinois Chicago, and Sandia National Laboratories. His team is developing a blockchain security governance model for DER systems operating under multiparty and system-of-systems environments; a quantum secure DER network by studying a lightweight post quantum cryptography against quantum computing attacks; hardening DER inverter hardware by investigating a new DER smart inverter security design; and controlling resilience at the edge of the grid.

Speaker: Carlos Rubio-Medrano, Assistant Professor, Computer Science, *Texas A&M University-Corpus Christi*

Project Title: No-Fly-Zone: Dynamically Enforcing User-Oriented Geospatial Restrictions for Drone Fly-Overs (NSF Award No. 2131263)

The skies above populated areas are becoming crowded with drones, to the point of raising serious concerns not just about collisions, but also over high-definition cameras and Light Detection and Ranging (lidar) used to spy on sensitive facilities and activity, invasions of privacy over homes, schools, hospitals, and restricted areas, and cyberattacks from airborne platforms. Threats can work both ways.

The term "no-fly zone" recalls a tactic adopted by the United Nations Security Council in the 1990s to prevent Saddam Hussein's forces from attacking Kurdish areas in northern Iraq from the air. For Rubio-Medrano, it's a means of

regulating drone flyovers by setting up boundaries around sensitive spaces and enforcing limits on drone use of airspace. Tools used in Rubio-Medrano's project include lidar, Interferometric Synthetic Aperture Radar (InSAR), and cloud architecture based on distributed hash tables. Methods include studying existing fly-over policies and formulating new ones, developing navigation plans for drones, and modeling risks based on weather conditions, occupancy limits, and population density.

Speaker: Ava Hedayatipour, Assistant Professor, Electrical Engineering, *California State University-Long Beach*

Project Title: Enhancing Chaos Synchronization with Machine Learning (NSF Award No. CNS-2131156)

Chaotic systems' behavior can be, as Ava Hedayatipour says, random, nonperiodic, unpredictable, and indeterministic. Yet these systems can be helpful in encryption, using chaos theory "to encrypt messages communicated between a transmitter and a receiver, making them extremely difficult to decipher without the correct decryption key" (Hwong, et al., 2023). They are also used in medical testing technology like electroencephalograms and electrocardiograms.

Machine learning can make these systems work better. Hedayatipour explained her research goals using various ML algorithms on a chaos system, developing new methods with higher accuracy, and improving efficiency and then described an experiment using machine learning.

In the published study cited above, Hedayatipour's team performed an error correction test for chaotic synchronization using conventional methods, achieving accuracy of 86%. "We then use machine learning algorithms to reduce the error of the decrypted message extracted by learning patterns in the encrypted message and adjusting the encryption parameters accordingly." Using linear regression, k-mean, and DB-Scan, the team showed an increase in the original accuracy achieved by the decrypted message. They also used machine learning algorithms to detect anomalies in encrypted messages. The team concluded: "The use of machine learning in chaotic encryption has the potential to greatly improve the security of encryption algorithms."

STEM EDUCATION AND STUDENT SUCCESS

Speaker: Shweta Jain, Professor, Mathematics and Computer Science, *John Jay College of Criminal Justice*

Project Title: Cultivating and Developing Research Talent to Support Research in Cyber-Security (NSF Award No. CNS-2131182)

Shweta Jain's objective is to develop research talent among undergraduates by making research a part of computer science, applied mathematics, criminal justice, cybercrime, and related curricula.

With this training, undergraduates will help fill a research productivity gap at John Jay College. As is the case at other MSIs, John Jay faculty have high teaching loads and little opportunity to travel, and experience relatively low success in securing research grants.

Jain's answer was to draw students from non-STEM degree programs—criminal justice, security, fire and emergency management, and forensic psychology—into a five-year BS-MS program that would allow them to earn a bachelor's degree in their major and a master's in digital forensics and cybersecurity.

The program includes a "cyber bridge" with a number of courses related to cybersecurity as well as computer science, research methods, and precalculus. During their fourth and fifth years, students are immersed in research while completing an undergraduate capstone and a master's thesis.

The program also included a forum on such topics as mobile browser security, cryptocurrency, quantum computing, and machine learning for cyber-safety. Jain said the program can serve as a model for increasing undergraduate research participation at other MSIs but stressed that it "needs community support and mentors to make a larger impact," along with participation by MSI faculty in research.

Speaker: Widodo Samyono, Associate Professor, Mathematics, *Jarvis Christian University*

Project Title: Efficient System Design for Cancer Detection and Treatment (Award No. CNS-2318573)

An applied mathematician, Widodo Samyono explores new directions using machine learning (ML) and Internet of Things (IoT) in cancer detection, predictions, and treatments. These directions include software developed with ML-based algorithms, infusing algorithms with IoT hardware to enable data collection, and developing smart camera-based apps for visual skin cancer data collections and analysis. In one recent example, his team drew on detailed records of breast cancer cell proliferation under various conditions to work on developing a simplified yet effective model for predicting tumor growth. The experiment called for training machine-learning algorithms on cell counts and such variables as time, treatment exposure, and cell line characteristics. Constructing a Bayesian network—an ML tool for risk estimation in medicine—the team can capture the causal relationships between those variables and cell proliferation (Samyono, 2024).

Besides his research funded by the CISE Research Expansion Program, Samyono is among the co-PIs for a five-year $2.25 million project entitled "Interdisciplinary Research Infusion into STEM Education Undergraduate Program," funded

by NSF's HBCU-UP program and led by Jarvis Christian College biologist Shakhawat Bhuiyan.

Speaker: Edgar Rojas Muñoz, Assistant Professor, School of Performance, Visualization, and Fine Arts, *Texas A&M University*

Project Title: Buenas - Giving All a Seat at the Table Using Mixed Reality (NSF Award No. CNS-2318658)

Students feel disconnected from their classmates and instructors, and study groups—an important element in undergraduate education—have been difficult to replicate online. Videoconferencing is inadequate for dynamic dialogue and good eye contact. Edgar Rojas Muñoz's solution is the Buenas project. It uses mixed-reality headsets, which immerse remote students into local study groups as if all members of the group were in the same place. Video "sprites" (life-sized videos with the background deleted) of the remote students are projected onto cardboard screens in unoccupied seats. Remote students can visualize the other students' video sprites in mixed reality, integrated into their office spaces via virtual floating panels. The format allows for situation awareness, depth perception, and increased sense of presence. As asserted by Muñoz, "the project has the potential to advance the effectiveness of small group meetings with hybrid local and remote attendance, especially for under-represented members of society, and will involve students from [MSIs] in research endeavors."

POTPOURRI — COMBINATION OF TOPICS

Speaker: G. Kumar Venayagamoorthy, Duke Energy Distinguished Professor of Power Engineering and Professor of Electrical and Computer Engineering, *Clemson University*

Project Title: Cellular Computational Networks and Smart Grid Applications (NSF Award No. CNS-2131070)

G. Kumar Venayagamoorthy, who founded the Real-Time Power and Intelligent Systems Laboratory at Clemson University in 2013, has been working on cellular computational networks (CCNs) for a number of years. He defined CCNs as distributed and scalable computational frameworks for large dynamic systems. A CCN consists of interconnected cells, each of which represents an individual component or a measurement unit in the system (Jayawardene, et al., 2022). In this session, Venayagamoorthy focused on "the potential and promises of CCNs for intelligent data analytics and decision-making (modeling, prediction, and control), especially for smart grids." In such complex systems, with many components, behavior is intrinsically difficult to model due to the dependencies, relationships, or other types of interactions between their parts or between a given system and

its environment. Yet, "models are the heart and lungs of advanced analytics," he says. CCNs are suited to model complex systems with temporal and spatial dynamics. They can be used to break down the complexity of a system or problem and offer a scalable and sustainable framework for AI computing and minimizing environmental impact.

Speaker: Daniel Pittman, Assistant Professor, Computer Science, *Metropolitan State University of Denver*

Project Title: Sustainability Hub - A Community Data Hub for Sustainable Regional Systems Research in Colorado (NSF Award No. CNS- 2318730)

The Sustainability Hub is a comprehensive online platform jointly operated by five public universities, led by the Metropolitan State University of Denver, that aims to aggregate sustainability and well-being data in Colorado from various sources, making it accessible to communities, researchers, and policymakers. Advanced data aggregation and machine learning techniques provide a user-friendly interface. It's intended as a community asset, and an effort is made to engage with different Colorado communities to ensure that it meets end-user needs and expectations. For undergraduates at the partner institutions, it offers real-world application of their classroom learning and fosters a culture of data democracy, "which supports diversity and inclusivity in research and decision-making." The hub uses machine learning algorithms to uncover trends and insights from sustainability data, aiding in more informed decision-making. Natural language processing, combined with large language models and retrieval augmented generation systems will allow users to query complex sustainability databases using natural language, enhancing user interaction.

Team Building Activity: Brainstorming For A Post-Award Toolkit

Bevlee Watford, Associate Dean, Equity and Engagement, College of Engineering and Executive Director, Center for Enhancement of Engineering Diversity, *Virginia Tech*

This team-building activity focused on how to best prepare yourself to successfully manage a grant after you receive funding. A leading champion of diversity in engineering, Bevlee Watford brought to this session decades of experience with NSF as a grant recipient, program director, and, most recently, a member of the National Science Board (NSB), NSF's policy-setting body.

After introducing the session, Watford first presented a series of questions intended to prompt attendee reflection on their proposal and grant application processes and experiences. Attendees broke down into small groups to discuss their responses to these questions and

jot down their key takeaways on large sticky notes. Questions posed included: How hard was it to write and submit the proposal? What do you wish you had thought to include?

In terms of difficulties in preparing and submitting proposals, multiple groups cited time as a major issue – with one team citing competing priorities (e.g., teaching loads and committee responsibilities). Another team mentioned the unexpected challenge of staying focused and managing expectations – they had to spend time getting to know each other and manage inexperienced co-PIs. Another team also mentioned the challenge that collaboration posed – particularly with regard to finding a good tool to collaboratively write the proposal (Google Docs was abandoned in favor of MS Teams and OneDrive). Other issues mentioned included: lack of internal support, technical issues, and struggles to develop budgets.

Later in the session, the discussion turned to grant management. Participants recalled the first task they set out to do, issues they faced and how they handled them, and what they considered to be their own responsibility in the project.

First tasks for multiple teams including securing course release and hiring students. One team reported that re-reading their proposal was an important initial task – to recall what they "promised." Getting budgets set up to allow for spending was also key. In terms of post-award issues, teams cited course release, budget management, managing high teaching loads, equipment purchases, and student recruitment and commitment. Some teams had roles and responsibilities well-established, while others reported uneven contributions among project personnel.

Turning reflective again, Watford ended the session by asking attendees for their "wish lists" regarding both proposal development and post-award grant management. Responses included:

- Increased institutional support for proposal preparation – e.g., internal grant-writing assistants, a single SRO admin to manage all paperwork for a group of faculty members, mentoring support for proposal review prior to submission.
- More grantee meetings and professional meetings/conferences/workshops for new PIs.
- Smoother processes for hiring students and postdocs.
- Improving the SciENcv system.
- Adding an interactive chat bot to the PAPPG.
- Teaching load policies established by NSF, so PIs can have course release guaranteed.
- Buyout time provided by institutions to faculty who receive grants.

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APPENDIX A

MEETING AGENDA

WEDNESDAY, MAY 22, 2024	
5:30pm – 7:00pm	**Opening Networking Reception**
THURSDAY, MAY 23, 2024	
8:00am – 9:00am	**Welcome and Opening Remarks** • Jacqueline El-Sayed, CEO and Executive Director, *ASEE* • Dilma Da Silva, Acting Assistant Director, CISE, *NSF* • Subrata Acharya, Lead, CISE Research Expansion, *NSF*
9:00am – 10:30am	**NSF-Led Rotating Breakout Session** • Managing a Budget - Jannele Gosey, Grants Management Specialist, *NSF* • Opportunities for Engaging with NSF - Michelle Rogers, Expert, CISE Directorate, *NSF*
11:00am – 12:00pm	**Keynote Session I – Leadership for Broadening Participation in STEM: An HBCU Perspective** • Camille McKayle, Provost and Vice President of Academic Affairs and Professor of Mathematics, *University of the Virgin Islands*
1:00pm – 2:00pm	**Technical Sessions I** **Artificial Intelligence (AI) Part I** • Shakil Akhtar, *Clayton State University* • Qi Lu, The University of Texas, *Rio Grande Valley* • Marcelo O. Sztainberg, *Northeastern Illinois University* **Collaborations and Partnerships** • Kinnis Gosha, Morehouse College & Laura Sams Haynes, *Georgia Tech* • Kewei Sha, *University of North Texas* • Carlos Monroy, *University of St. Thomas* **Cyberinfrastructure and Cybersecurity** • Taesic Kim, Assistant Professor, *Texas A&M University-Kingsville* • Carlos Rubio-Medrano, *Texas A&M University-Corpus Christi* • Ava Hedayatipour, *California State University-Long Beach*

MEETING AGENDA

THURSDAY, MAY 23, 2024	
2:00pm – 3:00pm	**Technical Sessions II** **Artificial Intelligence (AI) Part II** • Bin Tang, Professor, *California State University, Dominguez Hills* • Francisco Iacobelli, *Northeastern Illinois University* • Sanjay Madria, *Missouri University of Science and Technology (S&T)* **STEM Education and Student Success** • Shweta Jain, *John Jay College of Criminal Justice* • Widodo Samyono, *Jarvis Christian University* • Edgar Rojas Muñoz, *Texas A&M University* **Potpourri — Combination of Topics** • G. Kumar Venayagamoorthy, *Clemson University* • Daniel Pittman, *Metropolitan State University of Denver* • Zechun Cao, *Texas A&M University-San Antonio*
3:15pm – 4:45pm	**Team Building Activity: Brainstorming for a Post-Award Toolkit** Bevlee Watford, Associate Dean, Equity and Engagement, College of Engineering and Executive Director, Center for Enhancement of Engineering Diversity, Virginia Tech
4:45pm – 5:00pm	**Day 1 Wrap-Up** • Jacqueline El-Sayed, CEO and Executive Director, *ASEE*
5:00pm – 6:30pm	**Networking Reception**

APPENDIX A

MEETING AGENDA

FRIDAY, MAY 24, 2024	
8:00am – 9:00am	**Keynote Session II – CISE Research Expansion Landscape** • James E. Fowler, *NSF CISE CCF (CISE CORE)* • Sharon Geva, *NSF CISE OAC (NAIRR Pilot)* • Sharmistha Bagchi-Sen, *CISE OAC (Cyber Training)* • Dillon Watring, *NSF CISE IIS (Expand AI)*
9:00am – 11:30am	**NSF-Led Rotating Breakout Session** • Additional Funding Opportunities for MSIs — James Moore, Assistant Director, Directorate for STEM Education (EDU), *NSF* • NSF CloudBank Resources — Deepankar Medhi, Program Director, CNS, NSF & Rob Fatland, Director of Cloud and Data Solutions, *University of Washington and CloudBank*
11:30am – 12:00pm	**Closing Remarks** • Jacqueline El-Sayed, CEO and Executive Director, *ASEE*

MEETING ATTENDEES

NAME	INSTITUTION OR ORGANIZATION
Imtiaz Ahmed	Howard University
Shakil Akhtar	Clayton State University
Hilton Alers-Valentin	University of Puerto Rico at Mayaguez
Md Tanvir Arafin	George Mason University
Renu Balyan	SUNY University at Old Westbury
Sherrene Bogle	California State Polytechnic University, Humboldt
Chutima Boonthum-Denecke	Hampton University
Hacene Boukari	Delaware State University
Zechun Cao	Texas A&M University-San Antonio
Tingting Chen	California State Polytechnic University, Pomona
Anitha Chennamaneni	Texas A&M University - Central Texas
Gonzalo De La Torre Parra	University of the Incarnate Word
Felicia Doswell	Norfolk State University
Sagnika Ghosh	Tennessee State University
Uttam Ghosh	Meharry Medical College
Kinnis Gosha	Morehouse College
Kamrul Hasan	Tennessee State University
Laura Haynes	Georgia Institute of Technology
Ava Hedayatipour	California State University, Long Beach
Liang Hong	Tennessee State University
Francisco Iacobelli	Northeastern Illinois University
Murtuza Jadliwala	University of Texas at San Antonio
Shweta Jain	John Jay College of Criminal Justice
Soo-Yeon Ji	Bowie State University
Kanwalinderjit Kaur	California State University, Bakersfield
Taesic Kim	Texas A&M University-Kingsville
Daehan Kwak	Kean University
Maria Laurent-Rice	Stillman College
Ha Le	California State Polytechnic University, Pomona
Dongwon Lee	Pennsylvania State University

APPENDIX A

MEETING ATTENDEES

NAME	INSTITUTION OR ORGANIZATION
Yanyan Li	California State University, San Marcos
Wei Li	Texas Southern University
Marie Lluberes-Contreras	University of Puerto Rico at Río Piedras
Qi Lu	The University of Texas Rio Grande Valley
Lili Ma	CUNY-New York City College of Technology
Sanjay Madria	Missouri University of Science and Technology (S&T)
Idongesit Mkpong-Ruffin	Florida A&M University
Carlos Monroy	University of St. Thomas
Hoang Long Nguyen	Meharry Medical College
Chen Pan	Texas A&M University-San Antonio
Ahmad Patooghy	North Carolina A&T State University
Daniel Pittman	Metropolitan State University of Denver
Voicu Popescu	Purdue University
Umesh Reddy	West Virginia State University
Edgar Rojas-Munoz	Texas A&M University
Carlos Rubio-Medrano	Texas A&M University - Corpus Christi
Morteza Safaei Pour	San Diego State University
Widodo Samyono	Jarvis Christian University
Kewei Sha	University of North Texas
Sharad Sharma	University of North Texas
Mehdi Sookhak	Texas A&M University - Corpus Christi
Marcelo Sztainberg	Northeastern Illinois University
Hao Tang	Borough of Manhattan Community College
Bin Tang	California State University, Dominguez Hills
Shuang Tu	Jackson State University
Ganesh Venayagamoorthy	Clemson University
Xiwei Wang	Northeastern Illinois University
Jeff Weber	University Corporation for Atmospheric Research
Fan Wu	Tuskegee University
Jeong Yang	Texas A&M University-San Antonio

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