NSF Supported Computer and Data Science Research in the CSU

Moderated by:
Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

https://www2.calstate.edu/impact-of-the-csu/research/stem-net
Speakers

Linda Bushnell, National Science Foundation
NSF Funding Opportunities in CISE/CNS Programs

Anand Panangadan, Cal State Fullerton
Benefits and Challenges of Using “Smart Home” Technologies in Permanent Supportive Housing

Tingting Chen, Cal Poly Pomona
Establishing a CISE REU Site program at a CSU campus

Yunfei Hou, Cal State San Bernadino
Data Science, Traffic Engineering and Many Other Summer Opportunities

Mohammad Husain, Cal Poly Pomona
Expanding Big Data and Cloud Computing Technology beyond Computer Science Discipline
NSF Funding Opportunities in CISE/CNS Programs

Linda Bushnell, Program Officer, NSF/CNS
January 27, 2023

Cal State University STEM-NET
National Science Foundation
NSF BY THE NUMBERS

- 94% Funds research, education and related activities
- $8.5B FY 2021 Enacted
- 43K Proposals evaluated
- 2K NSF-funded institutions
- 12K Number of awards NSF funds each year
- 307K People NSF supported
- 1.4B STEM education
- $200M To seed public/private partnerships
- 248 NSF-funded Nobel Prize winners

ADVANCING SCIENCE AND ENGINEERING RESEARCH IN THE U.S. AND ABROAD

- The U.S. National Science Foundation was created by Congress in 1950 to continue the U.S. science and technology enterprise began during World War II.
- NSF allocates 94% of its approximately $8.5 billion budget for...
The National Science Foundation is an independent federal agency created by Congress in 1950 to promote the progress of science; advance the national health, prosperity and welfare; and secure national defense. NSF is the only federal agency whose mission supports all fields of fundamental science and engineering disciplines, from mathematics, engineering and geosciences to biological, behavioral and computer sciences.
FALL 2022 NSF VIRTUAL GRANTS CONFERENCE

The National Science Foundation (NSF) hosted the Fall 2022 NSF Virtual Grants Conference the week of November 14 – 17, 2022. Visit the Resource Center to view event presentations and on-demand recordings. For information on upcoming events, sign up to Get Notified.

AGENDA RESOURCE CENTER GET NOTIFIED

Credit: Zhangxian Ouyang, University of Delaware
Overview of the CPS Program

The goal of the CPS program is to develop the core system science needed to engineer complex cyber-physical systems upon which people can depend with high confidence. Reveal cross-cutting fundamental scientific and engineering principles that underpin the integration of cyber and physical elements across all application sectors.

Multi-agency: DoT, DHS, NIFA, NIH
# Welcome to the home page of the Cyber-Physical Systems Virtual Organization

**nullcon berlin 2023**

Training: 6-8 March | Conference: 9-10 March
Venue: Novotel Berlin Am Tiergarten, Germany

Nullcon Berlin 2023

Nullcon since inception in 2010 has been successfully running the annual security conference in Goa. To give that same zeal & experience to our international community, We organized the 1st ever edition of Nullcon at Berlin in April 2022. The focus of the conference is to bring in the elite security researchers...

### Nullcon Berlin 2023

- **Date:** 6-8 March
- **Venue:** Novotel Berlin Am Tiergarten, Germany

### Nullcon Berlin 2023 Highlights

- Training
- Conference

### Upcoming Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIPEAC 2023</td>
<td>01/16/23 - 01/18/23</td>
<td>The HIPEAC conference is the premier European forum for experts in computer architecture. <a href="#">more</a></td>
</tr>
<tr>
<td>DeepLearn 2023 Winter</td>
<td>01/16/23 - 01/20/23</td>
<td>8th International School on Deep Learning DeepLearn 2023 Winter will be a research training event...</td>
</tr>
</tbody>
</table>
CPS Research Themes – Mining Past Awards

Autonomous Systems
Coordinated Control
Complex Systems
Real-time Systems
Event triggered Control
Supervisory Control
Formal Verification
Medical CPS
Energy Grid
Energy Harvesting
Cyber Infrastructure
Predictive Control
Machine Learning

Mobile Robotics
Markov Chain
Modular Robotics
Robust Control
Situation awareness
Optimization
algorithms
Time Synchronization
Cyber security
Wireless sensing
Wearable CPS
Safety Critical
System Infrastructure
GPU Performance &
System Integration

Fault detection and
health monitoring
Intelligent transportation
Mobile agents
Security usability
Situational awareness
Energy Grid
SCADA Systems
Resilience
Game Theory
Intrusion Detection
Machine learning
Cyber-enabled Manuf.
Design Optimization
CPS Proposal Types

- **Small** – Budget ≤ $500,000, typically single investigator. Frequently more focused research and sometimes higher risk
- **Medium** – Innovation at the intersection of multiple disciplines, to accomplish a clear goal that requires an integrated perspective. Budget between $500,001 and $1.2M
- **Frontier** – Critical CPS challenges that cannot be achieved by multiple small projects. Budget < $7M
- **Also** – CRII and CAREER for CPS program

*No Deadline*
Important Information for Proposers

A revised version of the NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 22-1), is

Synopsis

The NSF Directorate for Computer and Information Science and Engineering (CISE) seeks to award grants intended to support research independence among early-career academicians who specifically lack access to adequate organizational or other resources. It is expected that funds obtained through this program will be used to support untenured faculty or research scientists (or equivalent) in their first three years in a primary academic position after the PhD, but not more than six years after completion of their PhD for proposals submitted in 2022, and not more than five years after completion of their PhD for proposals submitted after 2022. Applicants for this program may not yet have received any other grants or contracts in the PI role from any department, agency, or institution of the federal government, including from the CAREER program or any other program, post-PhD, regardless of the size of the grant or contract, with certain exceptions as noted below. Serving as co-PI, Senior Personnel, Postdoctoral Fellow, or other Fellow does not count against this eligibility rule.

Upcoming due dates

Full proposal

2022

September 19 - Deadline date
Third Monday in September, Annually Thereafter

Program guidelines

Award information
CISE uses a total funding cap to ensure funding is distributed across the full span of the program. The number of awards is determined on an annual basis to ensure funding can be distributed equitably across the full span of the program. Once the cap is met, no additional awards are provided.
NSF CISE CAREER Workshop 2022

We welcome you to the 2022 NSF CISE CAREER Proposal Writing Workshop, to be held via Zoom from the NSF headquarters in Alexandria, Virginia on Monday, April 4 and Tuesday, April 5. This event will introduce junior faculty to the NSF CAREER program, and help them prepare their CAREER proposal. The NSF CAREER program serves a critical role in the National Science Foundation’s efforts to identify, foster and support the nation’s most promising junior faculty in both research and education. Junior professors who are just starting their careers often have limited experience with grant writing and evaluation. They also have little or no interaction with the program directors at NSF. In this workshop, early-career faculty members will have the opportunity to improve their skills in proposal writing, to interact with NSF program directors from different divisions (OAC, IIS, CNS, and CCF) and to meet recent NSF CAREER awardees. The workshop is also open to multidisciplinary researchers with a CISE-specific focus, including cyberinfrastructure. The major components of the workshop include presentations on proposal writing and opportunities for Q&A in specific divisions and clusters within CISE.

This workshop is being organized by Dr. Jack Snoeyink, supported by National Science Foundation and the Department of Computer Science at UNC-Chapel Hill. Because the workshop will be held virtually as a Zoom teleconference, this will allow us to open the sessions to all who wish to view them.

Please come back to see a revised agenda, and links to presentations, as we update this site.

The workshop will offer an opportunity for the junior faculty members to have office hours with NSF CISE Program Directors from their primary research programs. If you are interested in this opportunity, please indicate so in the application form (to be shared soon).
Smart & Connected Communities

NSF 22-529
Overview of the S&CC Program

Use-inspired, community-focused research to improve quality of life.

Fundamental technological and social science dimensions of smart and connected communities.

Pilot research activities together with communities.

Scalability and transferability of research outcomes; sustainability beyond the life of the NSF award.
THE NATIONAL SCIENCE FOUNDATION’S
SMART & CONNECTED COMMUNITIES VIRTUAL ORGANIZATION

Pushing the Boundaries of Scientific Innovation to Create a Smarter, Sustainable, and Resilient Future for Communities.
## S&CC Proposal Types

<table>
<thead>
<tr>
<th>Proposal Category</th>
<th>Award Duration</th>
<th>Award Size</th>
<th>Estimated # of Awards (Per Fiscal Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrative Research Grants Track 1</td>
<td>Up to 4 years</td>
<td>$2.5M</td>
<td>10-15*</td>
</tr>
<tr>
<td>Integrative Research Grants Track 2</td>
<td>Up to 3 years</td>
<td>$1.5M</td>
<td></td>
</tr>
<tr>
<td>Planning Grants</td>
<td>1 year</td>
<td>$150K</td>
<td>20-30*</td>
</tr>
</tbody>
</table>
Example Communities Supported by S&CC

S&CC Community Examples

<table>
<thead>
<tr>
<th>Large Cities</th>
<th>Seattle (WA), Los Angeles (CA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tribal Communities</td>
<td>Sitka (AK), Rio Arriba County (NM)</td>
</tr>
<tr>
<td>Rural Communities</td>
<td>Elma (IA), Platte County (NE)</td>
</tr>
<tr>
<td>Mid-Sized Cities</td>
<td>Indianapolis (IN), Buffalo (NY)</td>
</tr>
</tbody>
</table>

Community Stakeholder Examples

- Local/State Government Offices/Agencies
- NGO’s
- Utility Providers
- Faith-Based Organizations
- Neighborhood Associations/Advocacy Groups
CIVIC Innovation Challenge

NSF 22-565
CIVIC Program Goals

- Address local priorities and challenges by piloting research-based solutions co-created by academic and community partners and stakeholders.

- Accelerate transition to practice of foundational research and emerging technologies into local government and community organizations.

- Explicit emphasis on projects that can be scaled and sustained in their pilot communities, with potential for transfer across the US.

- Joint federal investments in national priority areas, engaging vulnerable populations not typically involved in innovation and research activities.
CIVIC Program Structure

Develop two focused track themes with input from local communities (Ideas Festival) and co-funding federal agencies.

Outreach to researchers and communities for proposals that build on foundational research outcomes and stakeholder engaged programs from NSF and federal research programs.

Merit review of proposals involves community-representatives and leaders, in addition to researchers.

Stage 1 Planning Grant Awards ($50K for team capacity building and pilot idea refinement over 6 months)

Down-select Stage 2 Pilot Awards ($1M to execute fast-paced pilot project in 12-months)

Program specific review criteria focusing on strength of civic-academic partnerships, ability to execute a fast-paced pilot, and pilot potential for scalability and sustainability.

Create nationwide “communities of practice”, testing multiple approaches to address the track themes.

Active project management by NSF and Federal Partners to maintain focus on pace, impact, and scalability and sustainability.
CIVIC Program Themes

Track A Communities and Mobility
Offering Better Mobility Options to Solve the Spatial Mismatch Between Housing Affordability and Jobs

Track B Resilience to Natural Disasters
Equipping Communities for Greater Preparedness and Resilience to Natural Disasters

Track A Living in a Changing Climate
Pre-Disaster Action Around Adaptation, Resilience, and Mitigation

Track B Resource and Service Equity
Bridging the Gap between Essential Resources and Services & Community Needs

Year 1

Year 2
CIVIC 2022 Stage 1 Planning Grants

https://nsfcivicinnovation.org/

https://metrolabnetwork.org/
Tips for Writing a Good Proposal
The Heilmeier Catechism

George H. Heilmeier, DARPA director (1975-1977), crafted a set of questions known as the "Heilmeier Catechism" to help evaluate proposed research.

- **What are you trying to do?** *Articulate your objectives using absolutely no jargon.*
- **How is it done today, and what are the limits of current practice?** *Your proposal not only has to go beyond the state of practice ---- but beyond the state of the art*
- **What is new in your approach and why do you think it will be successful?** *Think carefully to define what is success?*
- **Who cares? If you are successful, what difference will it make?** *Can you go beyond “it will be better” or “it will improve”?*
- **What are the risks?** *We in CPS anticipate that there should be risks – otherwise not enough research, but do you understand what the risks are?*
- **How much will it cost?** *Top line is fixed for proposal categories – but is the research benefit commensurate with the cost and is it realistic?*
- **How long will it take?**
- **What are the mid-term and final “exams” to check for success?** *What are the critical experiments you will do to demonstrate your hypotheses?*
Some Tips for CPS CAREER Proposals

Should a CPS CAREER proposal be your first exposure to the CPS program or even your first NSF proposal? You only have three tries. Speak with a CPS Program Officer before submitting a proposal.

Why CPS? Go beyond sensors and sensor processing. CPS need to tightly integrate computing, control, networking, and sensing of the physical world. Does the system close the loop?

Address core areas of CPS research. CPS is not just an application. What are the research questions? How does this go beyond today’s state of practice and the state of the art? Is the fundamental research applicable to several CPS domains – or is it a point solution for one domain?

Make sure your proposal can be understood and appreciated by CPS researchers who are not specialists in your area.

• Write a 5-year CAREER plan not a CPS 3-year project that you would submit to the CPS Solicitation.

How will the research impact society? Broader impact should go beyond dissemination.

• How will your research be integrated into education? Give this some real thought.

• Be realistic of what can be done.

• Participate on CPS small/medium panels.
Q & A

Thank you!
Benefits and Challenges of Using “Smart Home” Technologies in Permanent Supportive Housing

Anand Panangadan – California State University, Fullerton

Collaborators:
- Kiran George, Computer Engineering, CSU Fullerton
- Benjamin Henwood, Social Work, University of Southern California
- Tabashir Nobari, Public Health, CSU Fullerton

Community partners:
- Mercy House Living Centers
- Jamboree Housing Corporation

Anand Panangadan, Associate Professor
CSU Fullerton, Department of Computer Science
apanangadan@fullerton.edu
• Permanent supportive housing (PSH) is long-term, community-based housing combined with supportive services; PSH is an evidence-based and cost-effective intervention to end Homelessness.
• The COVID-19 pandemic forced PSH programs to attempt to use remote services; tele-services likely to increase.
• What are the socio-technological factors that affect the successful use of tele-services in PSH?
• What are some services that can be provided via technology?
Year 1: Needs assessment of technology-mediated services in PSH

• Conducted a needs assessment in April 2022 with PSH residents and staff to identify areas for improvement with “smart home” technology

• In-person focus groups with residents of 5 PSH complexes in Orange County. The PSH are run by our community partners.

• Online interviews with staff members

Year 2:

• Develop and evaluate prototypes of IoT-based services selected with community input

• Interviews with other key informants - the service providers
  • Mental health counselors at USC’s telehealth clinic
  • Telehealth providers in Orange County
“Smart Home” Technologies in Supportive Housing

Results

Support for/against specific technology-based applications.
NC: not covered in the focus group.

<table>
<thead>
<tr>
<th></th>
<th>Smart pill box</th>
<th>Smart cooking pot</th>
<th>Detect falls</th>
<th>Detect movement/liveness</th>
<th>Better sleep</th>
<th>Social connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Orchard</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NC</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Rockwood</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NC</td>
<td>NC</td>
<td>Yes</td>
</tr>
<tr>
<td>Jackson Aisle</td>
<td>Yes</td>
<td>No</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>No</td>
</tr>
<tr>
<td>Diamond</td>
<td>Mixed</td>
<td>Yes</td>
<td>Yes</td>
<td>NC</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Heroes Landing</td>
<td>Yes</td>
<td>Yes</td>
<td>Mixed</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Feeling of being left behind; marginalization
Technology is perceived as difficult

Social Connection and Isolation
Desire to meet face-to-face

Privacy, Trust, and Security
Mental health, living with other residents in a group setting

Cost, Resources, Facilitating Conditions

Performance Expectancy
Technology addresses a specific need
Diversity of target population

- In the focus groups, PSH residents were asked their opinions on several potential technology-based applications.
- The responses were used to identify which technologies had the most support from residents.
- The focus groups were diverse:
  - age, gender, race/ethnicity, family status
- Preferences varied depending on age, gender:
  - E.g.: A “smart” cooking pot was attractive to many groups except for one group.
- Increasing the number of subjects in the study.
Lessons Learned (Proposal writing/project management)

- Proposal improved with each resubmission, but
  - there were team changes which required changes in activities
- Attended CSU and CSUF proposal writing workshops
- College Grants Specialist was instrumental in finding collaborators
  - sometimes have to look outside campus
- Working in an interdisciplinary team was a “learning process”
  - Important to have team members who are supportive and patient
- Planning grants from NSF
  - Starting with a planning grant would have led to clearer goals and activities right from the start
Long-Term Goals

• Systematically study factors determining efficacy of technology-mediated services
• Identify supportive housing needs that could be addressed with technology
• Develop and evaluate new supportive technologies in PSH setting

Successful outcomes for the project would be:
• A list of socio-technological factors that affect the successful use of tele-services in PSH
• A general model for predicting when tele-services can be effective in supportive housing
• Privacy-preserving data analysis and storage methods adapted for PSH applications

Community impact:
• Research outcomes can inform the design of future supportive housing
Use-Inspired Research

• Target community: The over 65,000 homeless in Los Angeles and Orange counties and the network of service providers who work to end homelessness

• Community partners:
  • Mercy House Living Centers
  • Jamboree Housing Corporation

Inter-disciplinary

• Computer Science and Engineering, Social Work, Public Health
• Quantitative and qualitative research methods

Goal

• investigate the socio-technological aspects of adopting sensor-based technologies to provide tele-services in PSH
Questions?

Contact Information:

Anand Panangadan
CSU Fullerton, Department of Computer Science
http://www.fullerton.edu/ecs/faculty/apanangadan/
657-278-3998
apanangadan@fullerton.edu
Establishing a CISE REU Site Program at a CSU Campus

Dr. Tingting Chen – California State Polytechnic University Pomona

Tingting Chen, Professor
Cal Poly Pomona, Department of Computer Science
tingtingchen@cpp.edu
Project Overview

• REU Site: Undergraduate Research Experiences in Big Data Security and Privacy”
• NSF grants #CNS-1758017 (2018-2021) and the renewal #CNS-2050826 (2021-2024)
• Our Research Experience for Undergraduates (REU) program engages undergraduate students in big data security and privacy research, in Computer Science Department and ECE Department at Cal Poly Pomona, every summer.
Establishing a CISE REU Site Program at a CSU Campus

Activities

- Immersive research project experience of 10 weeks guided by faculty mentors (about 10 undergraduate students each summer), with a structured supervision schedule.
- Research projects in the areas of 1) Security and Privacy of Big Data, Model and Platform, 2) Big Data Intelligence for Security.
- Professional Development Activities
  - Invited Speaker Series.
  - Field trips to research labs (NASA JPL, UCLA, etc)
  - Training workshops on research ethics, graduate school application, etc.
  - Multiple project presentations on and off campus, e.g., NSF CISE REU SoCal poster symposium.
  - Cohort building social activities
- Post-REU participant support.
- Virtual REU sites in summer 2020 and 2021.
Results

• To date, the grants have funded 46 undergraduate students for their summer research experience at Cal Poly Pomona, 24 of which are students from minority or underrepresented groups and 31 are students from institutions without Ph.D programs.


• With our faculty support, one participant received NSF Graduate Research Fellowship award, and two other participants received Goldwater Scholarship.

• 6 Of our alumni have enrolled in Ph.D or Master programs after their REU experience.
Lessons Learned

• Building a successful REU site needs joint effort from the university, i.e., College of Science, Office of Undergraduate Research, the Office of Research and Sponsored Programs, University Housing, and the Information Technology Support Team, etc.

• Student cohort building activities help improve students’ experience and research outcomes.

• Cutting-edge research should still be the focus.
Next Steps/Long-Term Plans

• Long-Term Goals:
  • Building research pathways for Computer Science students at institutions without Ph.D programs.

• Next Steps:
  • NSF REU Site renewal.
  • Expanding the engaging activities (workshops, seminars, panels etc) to academic year semesters with various funding supports.
Summary

• Undergraduate research experience is important for Computer Science students to retain their interest and encourage their pursuit of advanced study and research careers.

• NSF REU site is a great program to expose new students to research, retain existing interest and build community in computing research.
Establishing a CISE REU Site Program at a CSU Campus

Questions?

Contact Information:

Tingting Chen
Cal Poly Pomona/Computer Science
https://www.cpp.edu/bigdatasec-reu/
909-869-4842
tingtingchen@cpp.edu
Data Science, Traffic Engineering and many other Research Opportunities

Yunfei Hou – CSUSB, School of Computer Science and Engineering
Data Science, Traffic Engineering and many other Research Opportunities

Summer 2022 Student Research

• DS-PATH Summer Fellowship:
  • Data Science Career Pathways in the Inland Empire (DS-PATH)
  • A joint project with UC Riverside (lead), Riverside City College, Moreno Valley College, Norco College and San Bernardino Valley College

• CCDS Fellows Program
  • Central Coast Data Science Partnership (CCDS)
  • A joint project with UC Santa Barbara (lead), Cal Poly San Luis Obispo and Santa Barbara City College

• Both projects are supported by the NSF Harnessing the Data Revolution: Data Science Corps (HDR DSC) program
Fall 2022 Projects

• Two New NSF Grants:

1. "Broadening Inclusive Participation in Artificial Intelligence Undergraduate Education for Social Good Using A Situated Learning Approach"
   - from the IUSE:EHR (Education and Human Resources) program
   - a collaboration between SJSU, Cal Poly Pomona, CSULB and STEM-NET

2. "Improving Online STEM Education for Undergraduate Students at HSIs"
   - from the HSI (Hispanic Serving institutions) program
   - a collaboration between College of Natural Science and Jack H. Brown College of Business & Public Administration, CSUSB
DS-PATH Summer Fellowship

- Provides students (undergraduate and graduate) with authentic research and applied data science projects.
- Student teams (3-4 people) are paired with projects proposed by industry, non-profits, and faculty.
  - Accepted fellows will be able to specify their project preference.

Data Science, Traffic Engineering and many other Research Opportunities

Summer 2022 DS-PATH Fellowship Recipients
DS-PATH Summer Fellowship

- **Project date:**
  - 10-week June 13 to August 19, 2022

- **Time commitment:**
  - ~33hr/week

- **Pay rate:**
  - $5,000 stipends

- **Mode:**
  - In-person and virtual workshops, talks, etc.
  - Team-based projects

- **Project website:**
  [https://dspathways.nicepage.io/](https://dspathways.nicepage.io/)

---

### Summer 2022 DS-PATH Weekly Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00AM</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Purple</td>
<td>Blue</td>
</tr>
<tr>
<td>10:00AM</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>11:00AM</td>
<td>Purple</td>
<td>Purple</td>
<td>Purple</td>
<td>Purple</td>
<td>Purple</td>
</tr>
<tr>
<td>12:00PM</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>1:00PM</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>2:00PM</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>3:00PM</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>4:00PM</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>5:00PM</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
<td>Blue</td>
</tr>
</tbody>
</table>

**Legend:**
- Green: Technical Workshop
- Purple: Team Project Work (flexible)
- Blue: Presentations
- Yellow: Talks
- Professional Development
Sample DS-PATH Projects

Given multinomial sensor data (timeseries) from Mars Orbiter, develop model to detect anomalies.

Given Aircraft flight data (~187 features) with labeled anomalies (3 classes), build a model to classify anomalous conditions on flight descent pattern.

Analyze bus routes in the Inland Empire region to improve estimation of bus arrival time.

Analyze spending and retention data for social workers and help build dashboards for the county of riverside.

Data Science, Traffic Engineering and many other Research Opportunities
Traffic Congestion Analysis for Rialto

- **Objective**: Determine cause of traffic congestion by performing trip analysis at the city of Rialto, San Bernardino county

- **Data Sources**: ESRI Living Atлас, OSM (open-source mapping), StreetLight Data InSight, SCAG, LEHD, US Census Bureau
From Rialto to Rialto

Commute Trip Distance and Direction with Live and Work share

Top Places Visited from Rialto, CA (All Day avg.)

Data Science, Traffic Engineering and many other Research Opportunities
Data Science, Traffic Engineering and many other Research Opportunities

Heat Map/ All Day Trip Distribution from Rialto
CCDS Poster Presentations

- Predicting Memory Recall Based on fMRI Brain Activities

Data Science, Traffic Engineering and many other Research Opportunities

Examining Political Polarization and Structural Connectivity of Social Networks
[1] Preston Reed, Holly Chea, Sheng Tan, Yongping Zhang, Yunfei Hou, Kimberly Collins, Raffi Der Wartanian. Shifts in Public Transit Equity During the COVID-19 Pandemic: A Case Study at Riverside, California. ASCE ICTD 2022

Building New Data Science Programs

- Funding opportunities for Data Science:
  - Harnessing the Data Revolution (HDR) at NSF have multiple programs, see [https://www.nsf.gov/cise/harnessingdata/](https://www.nsf.gov/cise/harnessingdata/)
  2. Grand Challenge: Building Critical Mass for Data Science at CA Learning Lab, see [https://calearninglab.org/grant/data-science-rfp/](https://calearninglab.org/grant/data-science-rfp/)

- Other related NSF programs:
  - Improving Undergraduate STEM Education: Computing in Undergraduate Education (IUSE: CUE)
  - Broadening Participation in Computing (BPC)
  - NSF Scholarships in Science, Technology, Engineering, and Mathematics Program (S-STEM)
Summary

• New Data Science programs are on the raise
  • Need to build more pathways, better connected with industry patterners

• Involved undergraduate students in research is great
  • Especially helpful for underrepresented/underprivileged groups

• There is a need to promote job awareness in computing
  • Computing as public utility/infrastructure service
Questions?

Contact Information:

Yunfei Hou
CSUSB, Computer Science
https://hou.academic.csusb.edu/
909-537-3608
yunfei.hou@csusb.edu
Expanding Big Data and Cloud Computing (BDCC) Technology beyond Computer Science (CS) Discipline

Mohammad Husain, PhD – Cal Poly Pomona

Collaborators (if any): Winny Dong, PhD (co-PI), Director, Office of Undergraduate Research, Cal Poly Pomona

Supported by 2021 CISE-MSI NSF Award.
In almost every discipline, there is a tremendous demand of analysis of vast data points collected from multiple sources such as a stock market, bioinformatics, and predictive intelligence.

Industry and organizations are moving away building static internal computing resource to dynamic and scalable on-demand cloud computing resource for convenience and cost-effectiveness.

In academia, CS departments have ramped up efforts to train CS graduates through data science and cloud computing courses who are expected be ready to design, develop, maintain and move forward the core technologies supporting BDCC
However, many non-CS majors are also expected to interact with BDCC technology from a user perspective in their careers as well as many non-CS faculty needs to interact with BDCC technology for their research.

Therefore, the overarching goal is to provide hands-on exposure to BDCC technology to non-CS students and faculty members.
Activities: At CPP

Activity 1: Cal Poly Pomona Multidisciplinary students participated in hands-on introductory and advanced BDCC training and culminating projects utilizing Amazon Web Services, Google Cloud Platform and Microsoft Azure via NSF CloudBank.

- CS graduate students provided peer-mentorship

Activity 2: Cal Poly Pomona Multidisciplinary faculty participated in introductory BDCC training, BDCC research application workshop, and mentored team BDCC project and proposal development projects utilizing Amazon Web Services, Google Cloud Platform and Microsoft Azure via NSF CloudBank.

- One CS and One non-CS faculty paired for the project and proposal development
Results: CPP Activities

Activity 1 participants: CPP students from Food Science and Technology, Kinesiology, Biology, Mechanical Engineering, Physics, Animal Science, Biotechnology, Mathematics, Finance, Political Science, Chemistry, Electrical Engineering, Geography & Anthropology, Apparel Merchandizing and Management, Aerospace Engineering, and Psychology.

Activity 2 participants: one CS faculty paired with faculty from: Geography & Anthropology, Hospitality Management, Technology and Operations Management, Economics, and Aerospace Engineering
Results: CPP Faculty Research Projects

- Applying data analytics to aerial vehicle flight data
- Large scale CT Scan image analysis
- Analyzing hospitality data during COVID
- Analytical model of vaccination policy response among different population
- Big data analytics for specialty crops
Activity 3: Outreach introductory BDCC training workshop for California State University faculty and students’ projects utilizing Amazon Web Services, Google Cloud Platform and Microsoft Azure via NSF CloudBank.

Activity 3 participants:

CSU faculty from CSU San Marcos, Humboldt, Stanislaus, Dominguez Hills, Sacramento, Sonoma, Merced College and LACCD.

CSU students from CSU Monterey Bay, San Francisco, Northridge, San Bernardino, Stanislaus, Dominguez Hills.
Lessons Learned

There were a lot of interest during recruitment from multidisciplinary participants

- The positive impact of HS level AP CS courses as well as school districts offering fundamental courses are quite visible
- Non-CS majors also have basic computational skills and familiarity with terminologies

Non-CS faculty member also need more capacity building in BDCC domain to get better understanding of vast data their fields generate
Next Steps/Long-Term Plans

- Applying for next thread of CISE-MSI program
- Creation of an interdisciplinary academic certificate at CPP
- Promote CS-nonCS faculty BDCC research collaboration through Office of Undergraduate research.
Summary

There is a lot of demand for hands-on exposure to BDCC technology from non-CS students and faculty members.

Please get in touch if you would like to use the resources and get started at your campus.
Questions?

Contact Information:

Mohammad Husain
Computer Science
www.cpp.edu/faculty/mihuusain
9098692022
mihuusain@cpp.edu
Speaker Contacts

Linda Bushnell, National Science Foundation
lbushnel@nsf.gov

Anand Panangadan, Cal State Fullerton
apanangadan@fullerton.edu

Tingting Chen, Cal Poly Pomona
tingtingchen@cpp.edu

Yunfei Hou, Cal State San Bernadino
yunfei.hou@csusb.edu

Mohammad Husain, Cal Poly Pomona
mihusain@cpp.edu
Next Steps/Closing Remarks

Dr. Frank A. Gomez
Executive Director, STEM-NET
Office of the Chancellor

https://www2.calstate.edu/impact-of-the-csu/research/stem-net

Frank A. Gomez
CSU Office of the Chancellor
fgomez@calstate.edu
Webcast Feedback Survey

Please take a few moments to tell us about your webcast experience.

Use the QR Scan Code to download it
STEM-NET Virtual Research Café 10.0
Date: Friday, February 10, 2023
Time: 11am-12pm

STEM-NET February Webcast
Topic: NIH NIGMS-Funded Research in the CSU Part I
Date: Friday, February 24, 2023
Time: 10am-12pm
Join our CSU STEM-NET Community listserv

csustemnet@lists.calstate.edu

Begin a Conversation with Colleagues and Join our Private CSU STEM-NET Facebook Group

https://www.facebook.com/groups/2629611737269292
For more information about STEM-NET visit our website:

THANK YOU FOR JOINING US TODAY!