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

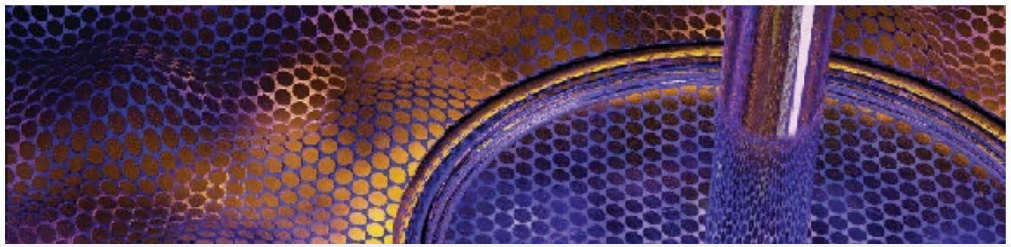
1.4B STEM education

$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



NSF AT A GLANCE

FAST FACTS

1950
Year Congress created NSF

$8.5B
NSF's approximate annual budget

94%
Percent of budget committed to research, education and related activities

12,200
Number of awards NSF funds each year

$200M
Amount NSF awards annually to small businesses to move discoveries into the marketplace

$1.4B
NSF spending each year

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

Cyber Physical Systems

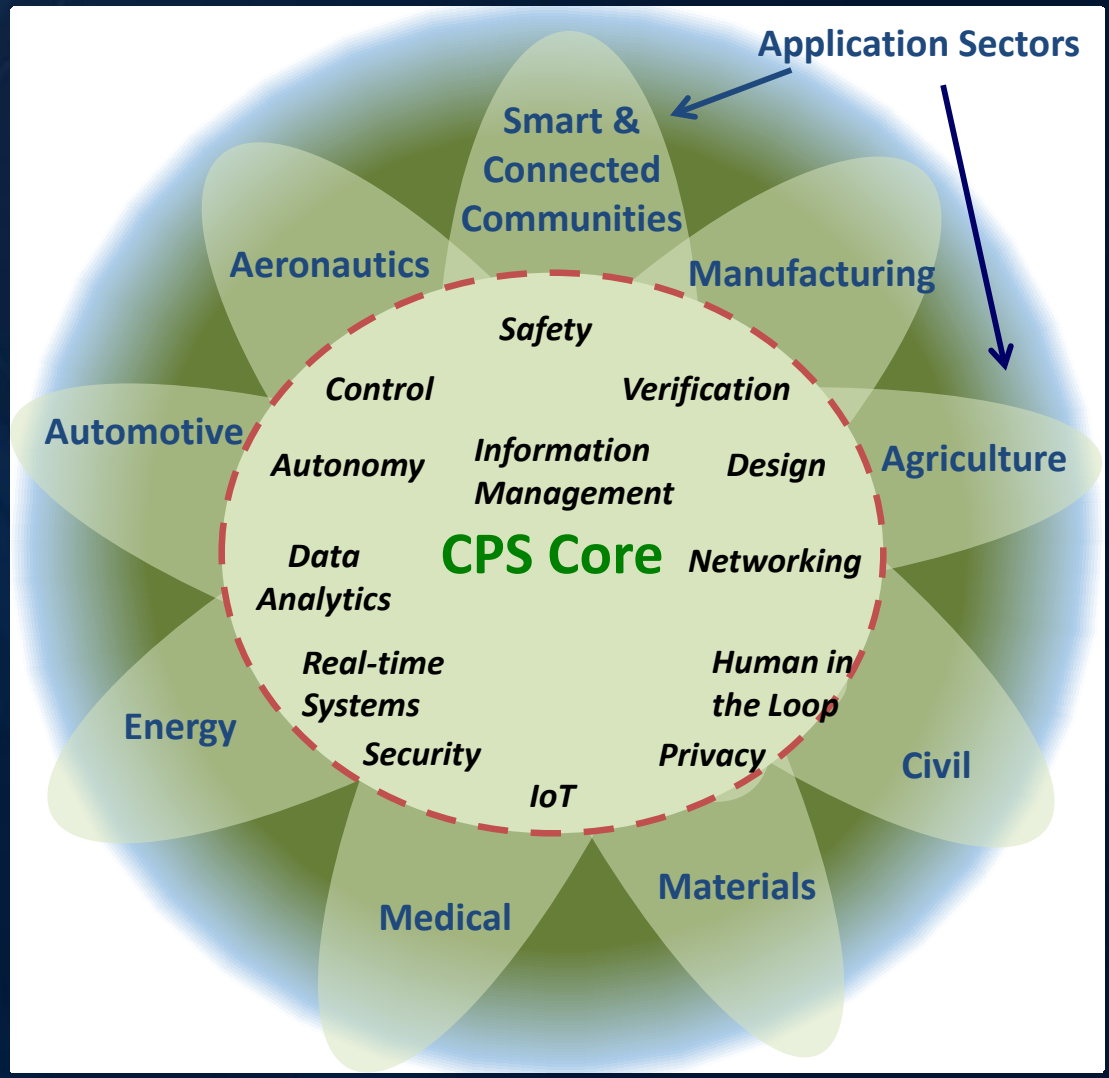
NSF 21-551

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



cps-vo.org

CPS-VO | BROWSE | SEARCH

username | password | Log in | ? | Search

Not a member?
Click here to register!
Forgot username or password?

Cyber-Physical Systems Virtual Organization

Fostering collaboration among CPS professionals in academia, government, and industry

Welcome to the home page of the Cyber-Physical Systems Virtual Organization

Follow @cpsvo

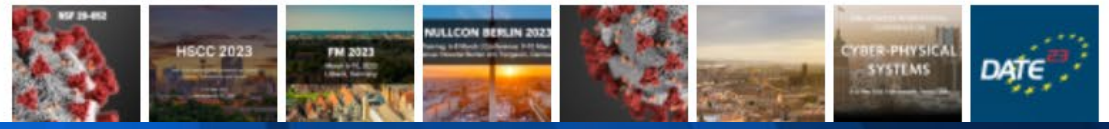
Upcoming Events

01/16/23 - 01/18/23
HiPEAC 2023
The HiPEAC conference is the premier European forum for experts in computer architecture,... *more*

01/16/23 - 01/20/23
DeepLearn 2023 Winter
8th International School on Deep Learning DeepLearn 2023 Winter will be a research training event...

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...



CPS ARCHIVES
CPS & IOT
CPS SECURITY
EDUCATION
SAFETY
TOOLS & DESIGN STUDIOS
MORE COMMUNITIES ▸

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

Computer and Information Science and Engineering Research Initiation Initiative (CRII)

View guidelines
22-598

← Search for more funding opportunities

Print

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

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).

IMPORTANT DATES:

2022 Event Date:

April 4-5, 2022

The 2022 event has passed.

Visit the Webinar tab to watch the recorded Day 1 webinar.

ORGANIZER:

UNC-Chapel Hill

Department of Computer Science

Jack Snoeyink

Shahriar Nirjon

Snigdha Chaturvedi

Brett Piper

Support Email

Smart & Connected Communities

NSF 22-529

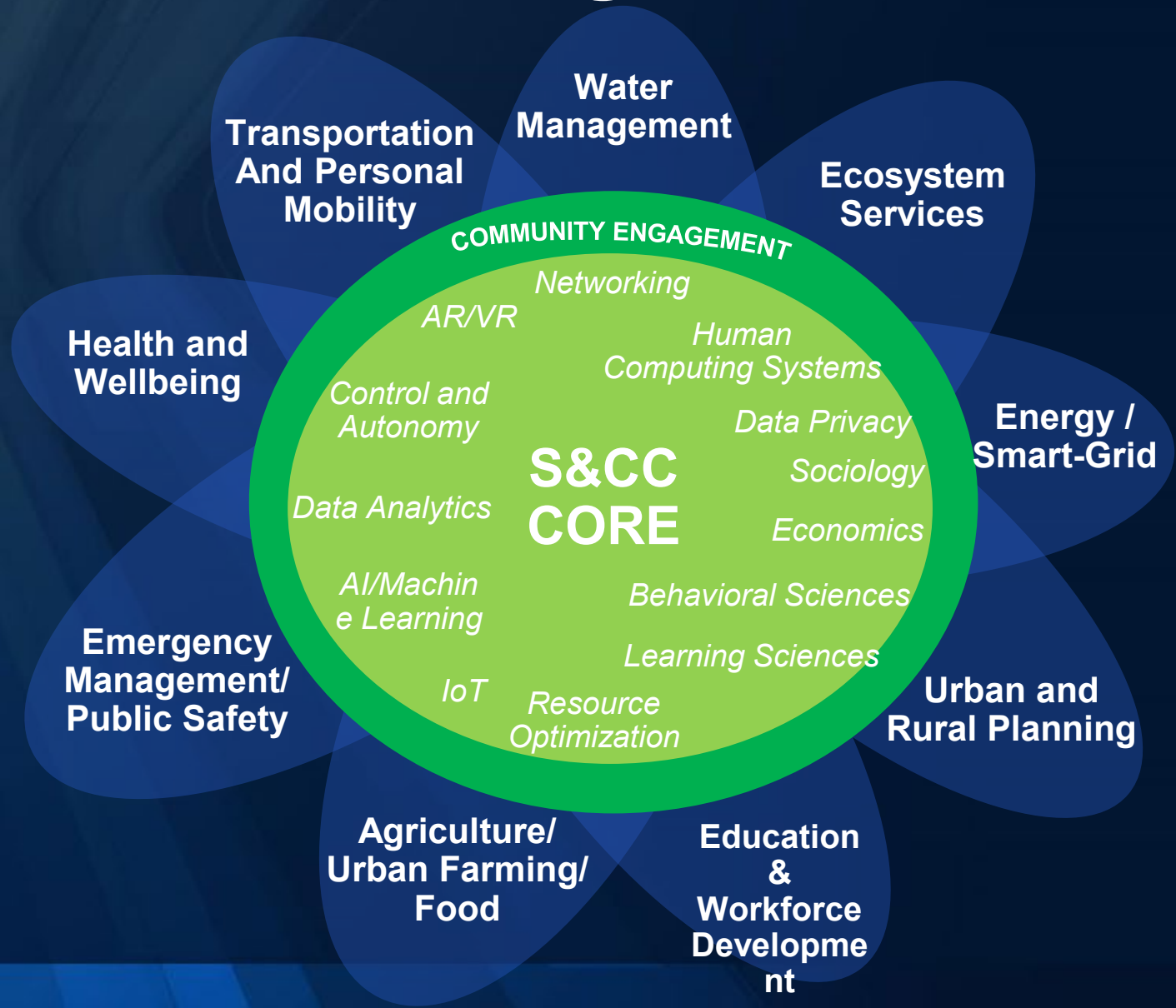
Overview of the S&CC Program

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.



sccvo.org

Smart & Connected Communities Virtual Organization

LOGIN

THE NATIONAL SCIENCE FOUNDATION'S

SMART & CONNECTED COMMUNITIES VIRTUAL ORGANIZATION

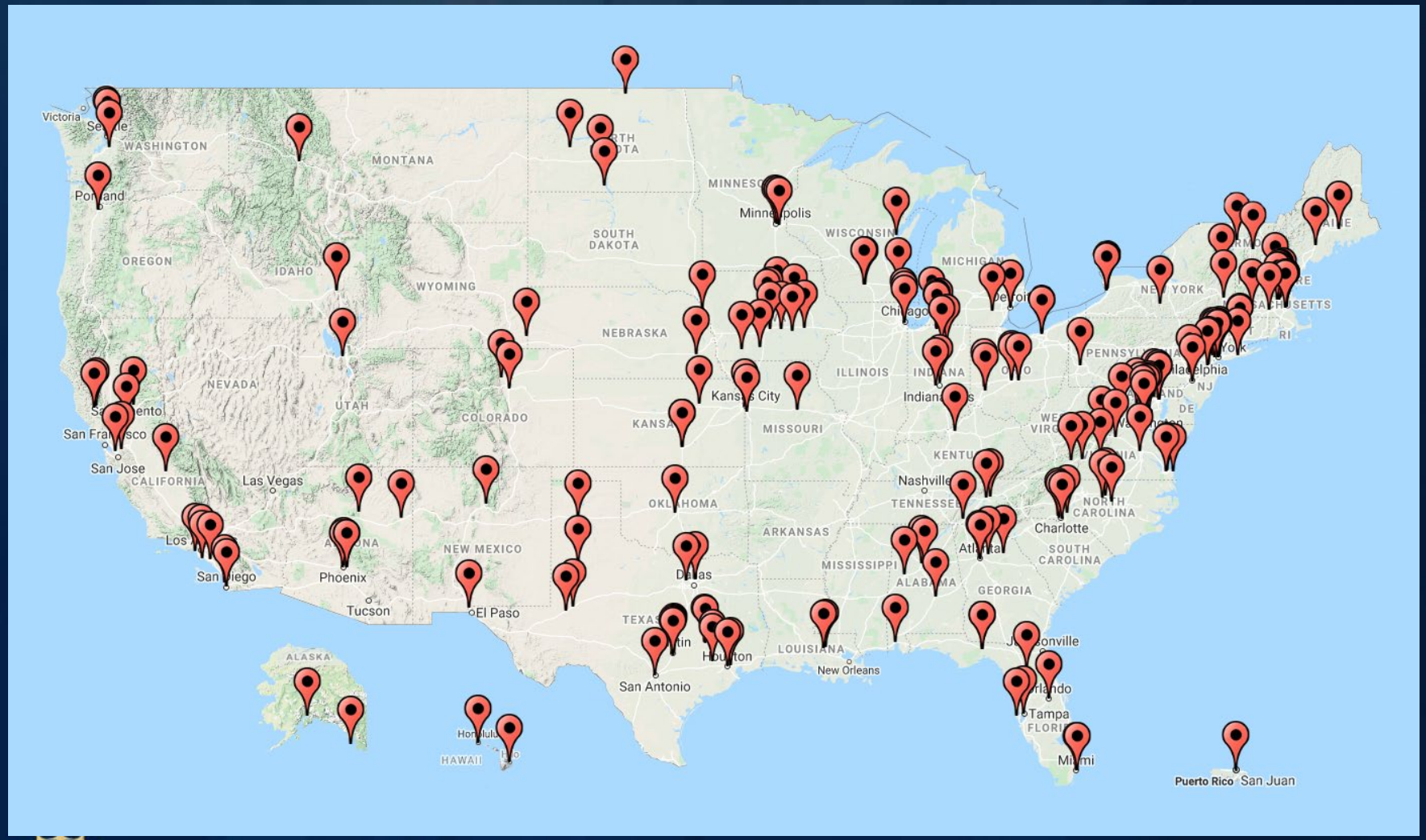
Pushing the Boundaries of Scientific Innovation to Create a Smarter, Sustainable, and Resilient Future for Communities

S&CC Proposal Types

Proposal Category	Award Duration	Award Size	Estimated # of Awards (Per Fiscal Year)
Integrative Research Grants Track 1	Up to 4 years	$2.5M	10-15*
Integrative Research Grants Track 2	Up to 3 years	$1.5M	
Planning Grants	1 year	$150K	20-30*

No Deadline

Example Communities Supported by S&CC



S&CC Community Examples	
Large Cities	Seattle (WA), Los Angeles (CA)
Tribal Communities	Sitka (AK), Rio Arriba County (NM)
Rural Communities	Elma (IA), Platte County (NE)
Mid-Sized Cities	Indianapolis (IN), Buffalo (NY)

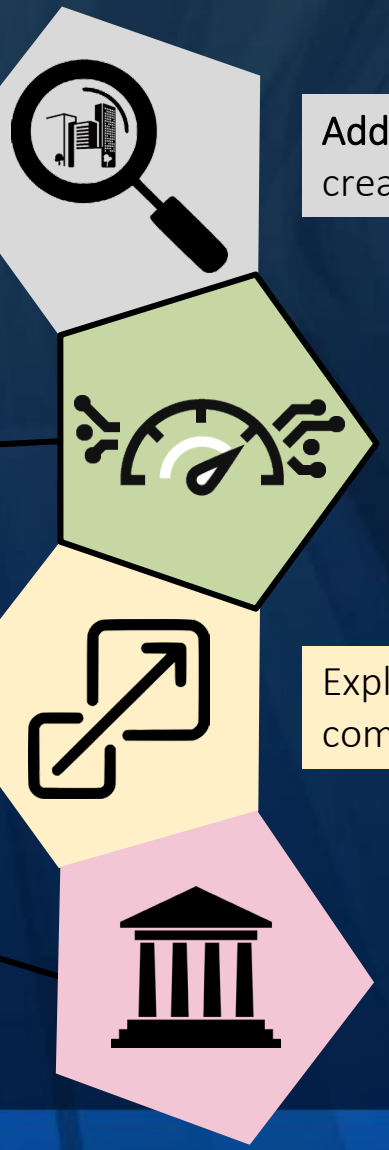
Community Stakeholder Examples
Local/State Government Offices/Agencies
NGO's
Utility Providers
Faith-Based Organizations
Neighborhood Associations/Advocacy Groups

CIVIC Innovation Challenge

NSF 22-565

CIVIC Program Goals

Foundational concepts embedded in CIVIC



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.

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.

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)

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

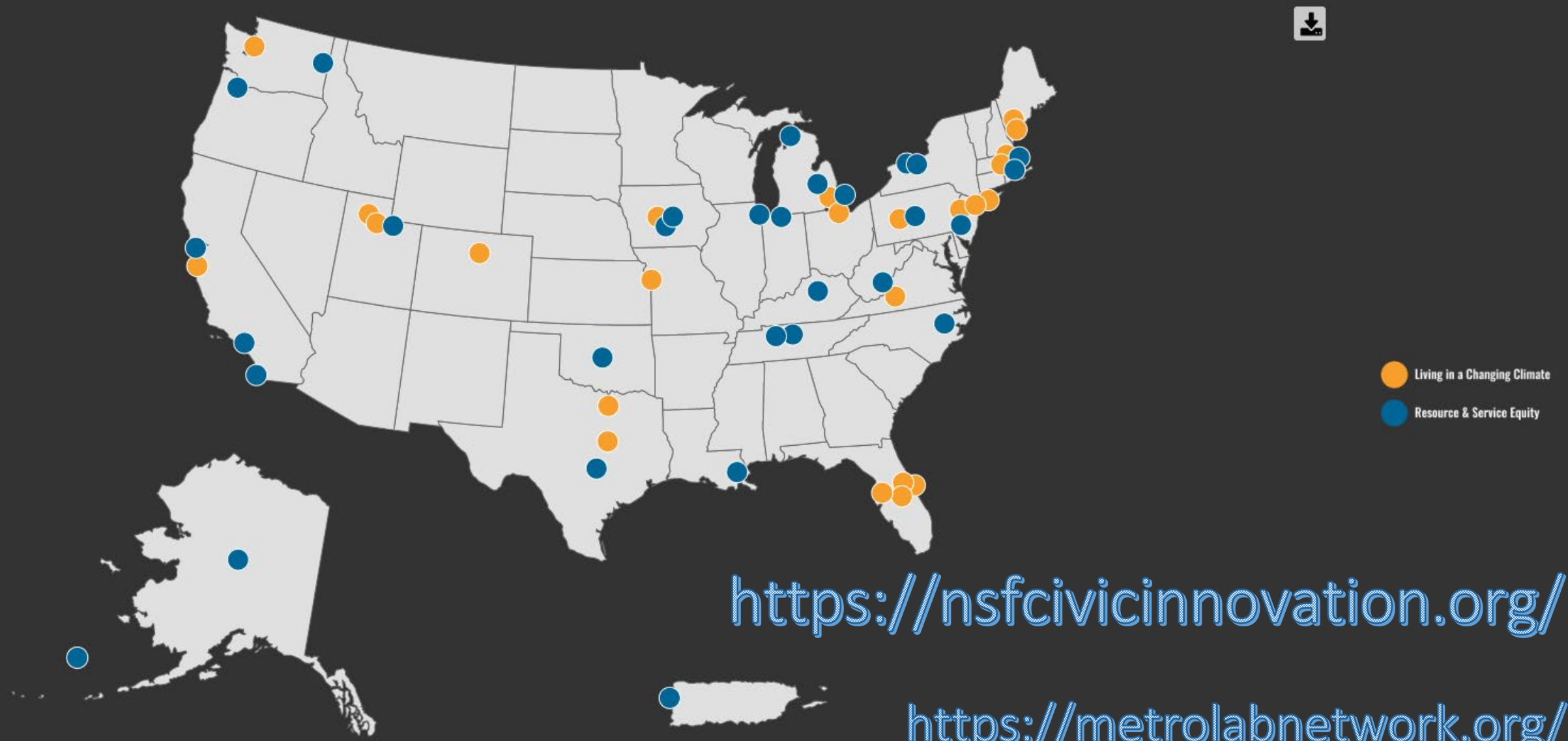
Track B Resource and Service Equity

Bridging the Gap between Essential Resources and Services & Community Needs

Year 1

Year 2

CIVIC 2022 Stage 1 Planning Grants



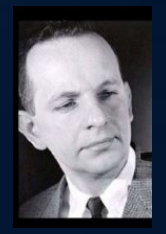
https://nsfcivicinnovation.org/

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!

Cal State Fullerton

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

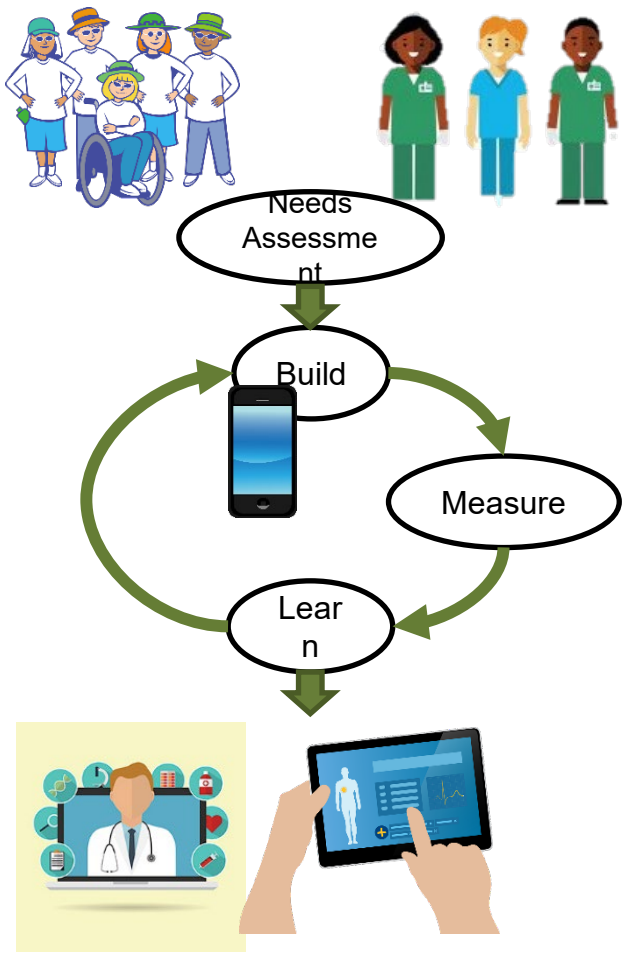
Anand Panangadan, Associate Professor

CSU Fullerton, Department of Computer Science

apanangadan@fullerton.edu

Project Overview

- 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?



“Smart Home” Technologies in Supportive Housing

Activities

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.

PSH	Smart pill box	Smart cooking pot	Detect falls	Detect movement/liveness	Better sleep	Social connection
The Orchard	Yes	Yes	Yes	*NC*	No	Yes
Rockwood	Yes	Yes	Yes	*NC*	*NC*	Yes
Jackson Aisle	Yes	No	*NC*	*NC*	*NC*	No
Diamond	Mixed	Yes	Yes	*NC*	Yes	Yes
Heroes Landing	Yes	Yes	Mixed	Yes	Yes	No

- 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

Lessons Learned

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

Summary

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

CalPolyPomona

Establishing a CISE REU Site Program at a CSU Campus

Dr. Tingting Chen – California State Polytechnic University Pomona

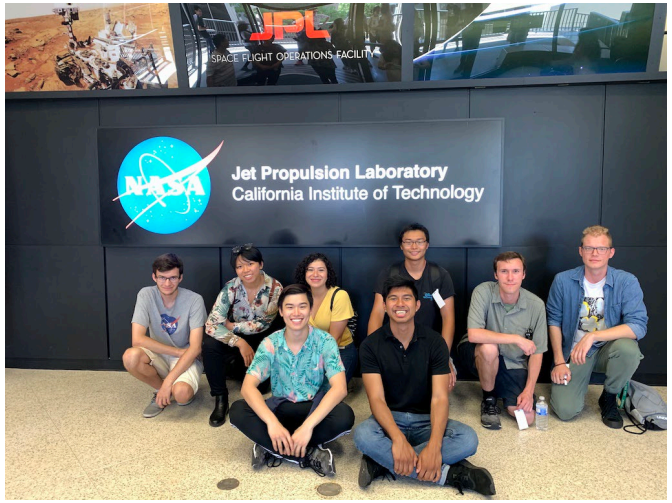
Tingting Chen, Professor

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.



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.
- Our undergraduate REU students have published papers and posters as first authors at AAAI-2019, IEEE Big Data 2019, 2022, workshops at SIGKDD 2019, 2021, 2022, CVPR 2020, ACM Practice and Experience in Advanced Research Computing (PEARC) 2020, and some international journals.
- 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 pursue 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.

Questions?

Contact Information:

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Cal Poly Pomona/Computer Science
https://www.cpp.edu/bigdatasec-reu/
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tingtingchen@cpp.edu

CALIFORNIA STATE UNIVERSITY
SAN BERNARDINO

Data Science, Traffic Engineering and many other Research Opportunities

Yunfei Hou – CSUSB, School of Computer Science and Engineering

Yunfei Hou, Associate Professor

CSUSB, Computer Science

yunfei.hou@csusb.edu

CALIFORNIA STATE UNIVERSITY SAN BERNARDINO

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

CALIFORNIA STATE UNIVERSITY SAN BERNARDINO

Data Science, Traffic Engineering and many other Research Opportunities

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

CALIFORNIA STATE UNIVERSITY SAN BERNARDINO

Data Science, Traffic Engineering and many other Research Opportunities

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.

UC RIVERSIDE UNIVERSITY OF CALIFORNIA
CSUSB
MORENO VALLEY COLLEGE Career & Technical Education
San Bernardino Valley College
RCC RIVERSIDE CITY COLLEGE
NORCO COLLEGE

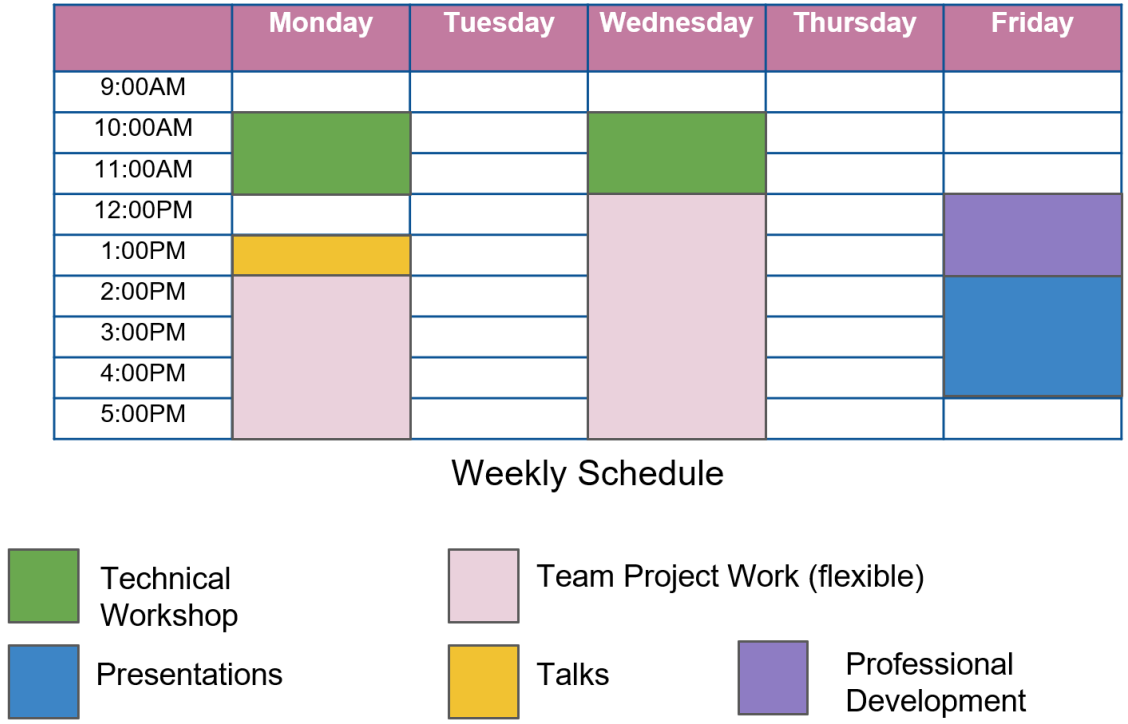
Summer 2022 DS-PATH Fellowship Recipients

CALIFORNIA STATE UNIVERSITY SAN BERNARDINO

Data Science, Traffic Engineering and many other Research Opportunities

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/



Summer 2022 DS-PATH Weekly Schedule

CALIFORNIA STATE UNIVERSITY SAN BERNARDINO

Data Science, Traffic Engineering and many other Research Opportunities

Sample DS-PATH Projects

Jet Propulsion Laboratory
California Institute of Technology

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

FOOTHILL TRANSIT FORWARD

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

AMES RESEARCH CENTER

NASA

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

COUNTY OF RIVERSIDE MAY 9, 1893

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

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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 Altas, OSM (open-source mapping), StreetLight Data InSight, SCAG, LEHD, US Census Bureau

LTC
Leonard Transportation Center
CAL STATE SAN BERNARDINO

WRCOG
Western Riverside Council of Governments

Summer 2022 DS-PATH Project Presentation

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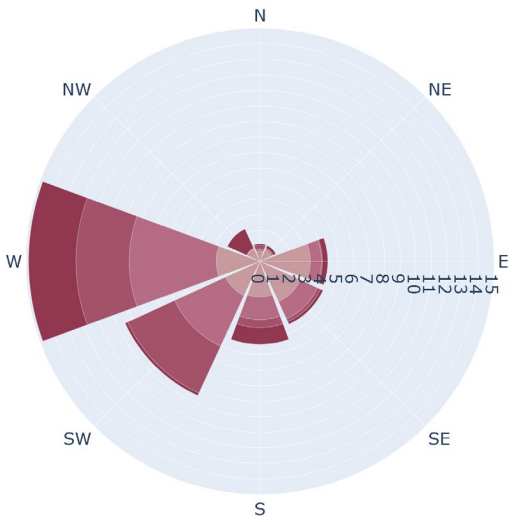
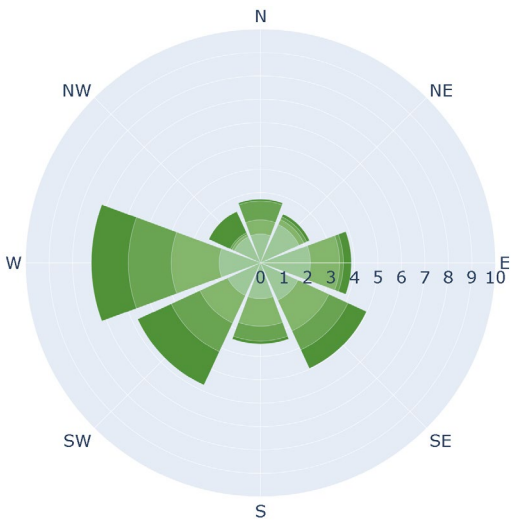


from Rialto

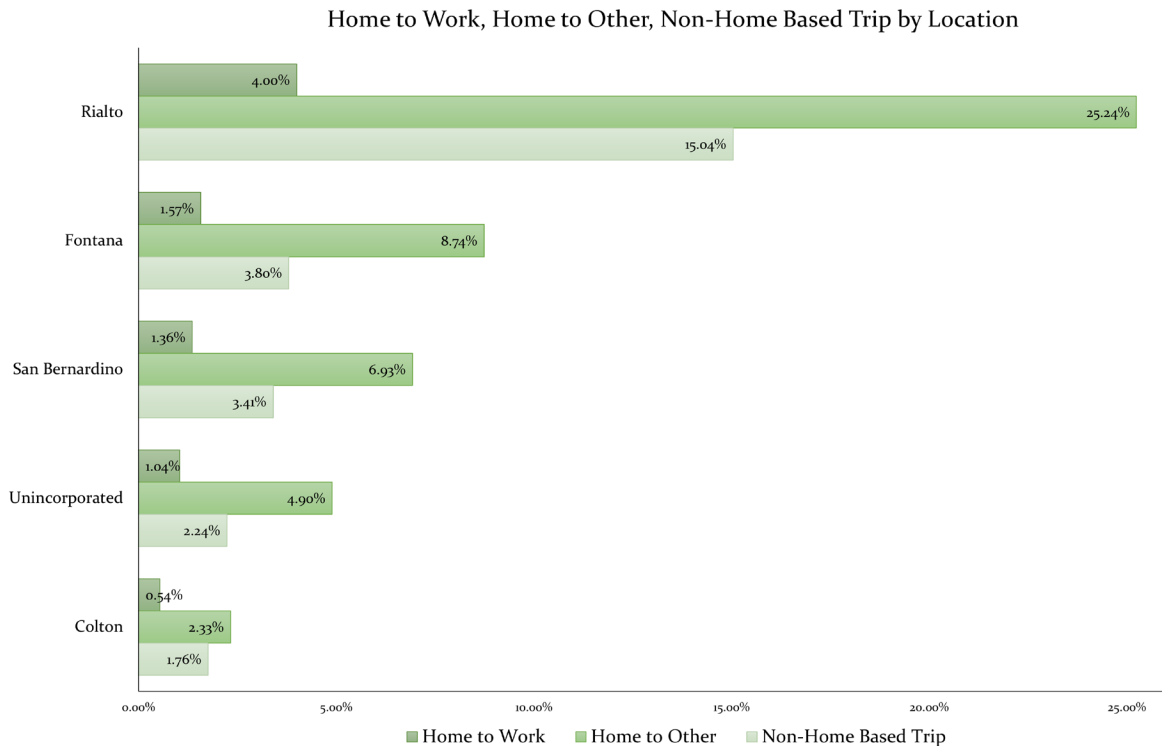
Less Than 10 miles	37.1%
10-24 miles	29.8%
25-50 miles	18.1%
Greater than 50 miles	14.9%



to Rialto

Less Than 10 miles	41.5%
10-24 miles	26.1%
25-50 miles	18.8%
Greater than 50 miles	13.6%

Commute Trip Distance and Direction with Live and Work share



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

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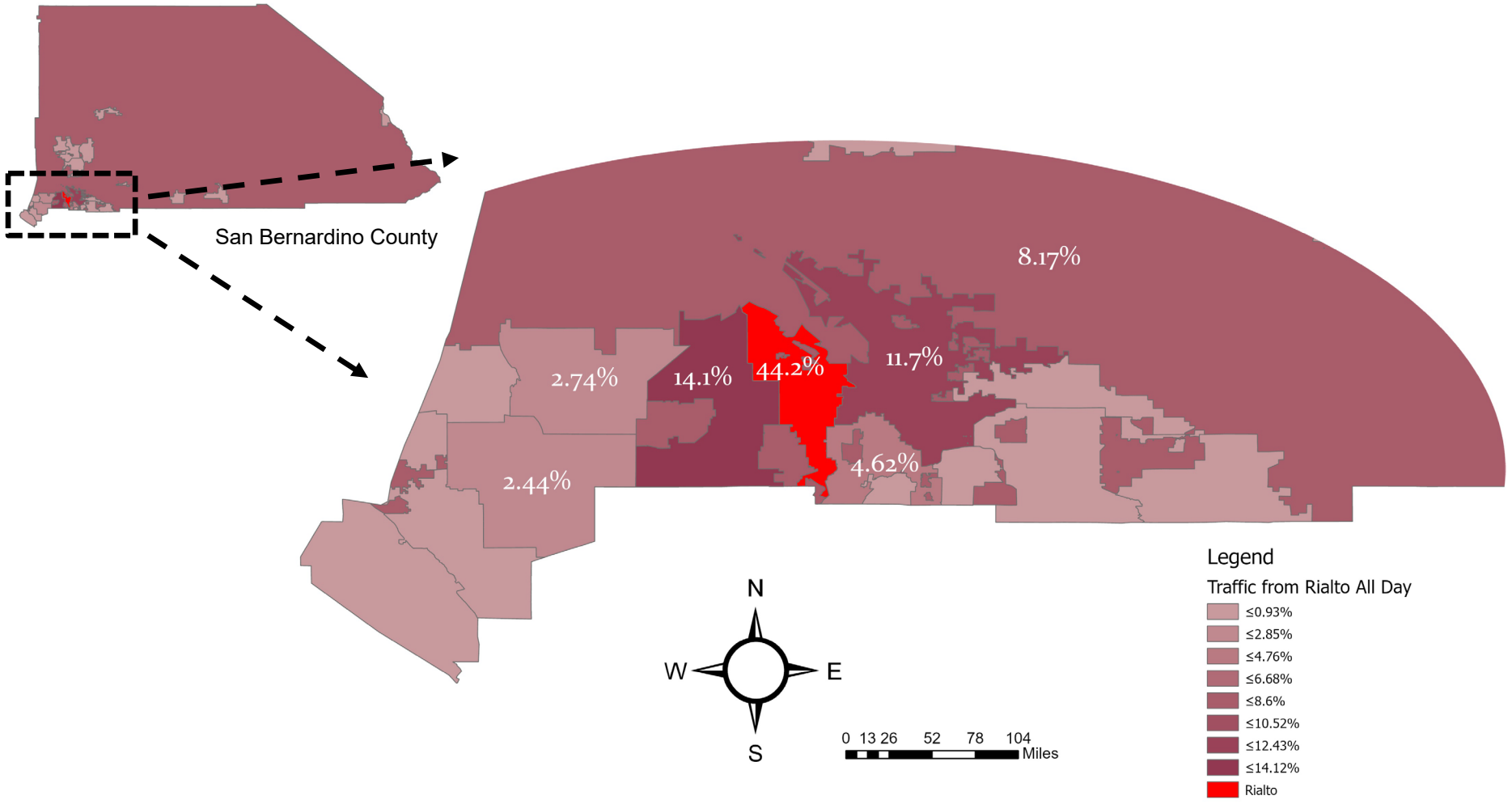

Heat Map/ All Day Trip Distribution from Rialto

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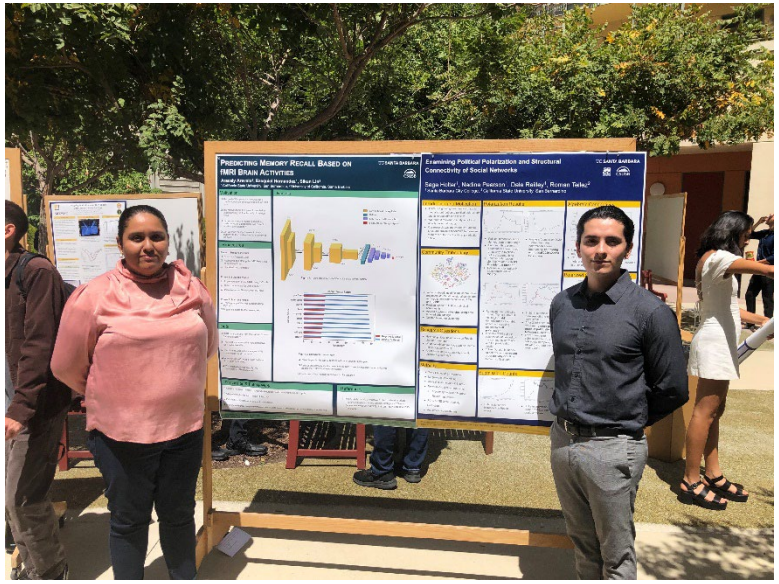
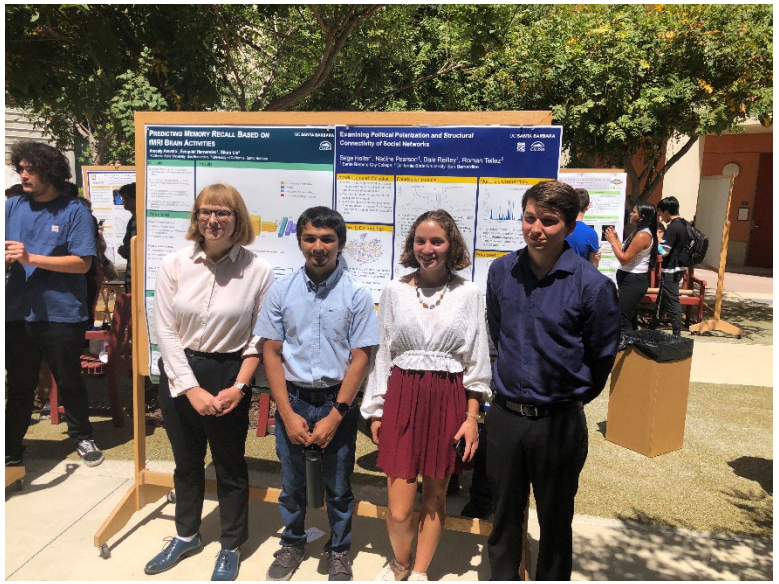
CCDS Poster Presentations



- **Predicting Memory Recall Based on fMRI Brain Activities**



Examining Political Polarization and Structural Connectivity of Social Networks

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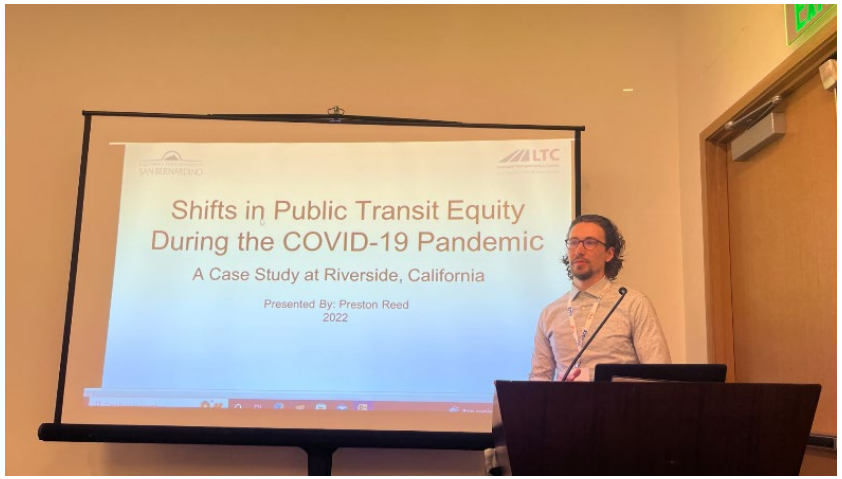
Conference Presentations

[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

[2] Kimberly Collins, Raffi Der Wartanian, Preston Reed, Holly Chea, Yunfei Hou, Yongping Zhang. **Social Equity and Public Transit in Suburban Areas: A Case Study of the Inland Empire During the COVID-19 Pandemic.** TRB 2023



Student team presenting at the International Conference on Transpiration and Development (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/
  1. HDR: Data Science Corps (DSC) https://beta.nsf.gov/funding/opportunities/harnessing-data-revolution-data-science-corps-dsc
  2. Grand Challenge: Building Critical Mass for Data Science at CA Learning Lab, see 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)

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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

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Questions?

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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.

Mohammad Husain, Professor

Cal Poly Pomona, Department of Computer Science

mihusain@cpp.edu

Project Overview: Motivation

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

Project Overview: Goal

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

Activities & Result: CSU & CC Outreach

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 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 use the resources and get started at your campus.

Questions?

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Mohammad Husain, Cal Poly Pomona
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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

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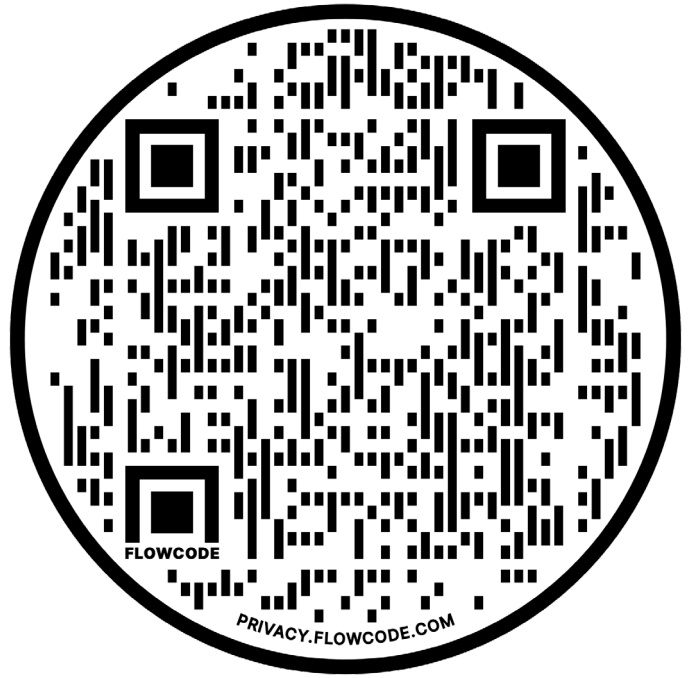
STEM-NET FEEDBACK

Webcast Feedback Survey

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

Use the QR Scan Code to download it



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STEM-NET Upcoming Events

STEM-NET Virtual Research Café 10.0

Date: Friday, February 10,2023
Time: 11am-12pm

Register Here

STEM-NET February Webcast

Topic: NIH NIGMS-Funded Research in the CSU Part I
Date: Friday, February 24, 2023
Time: 10am-12pm

Register Here

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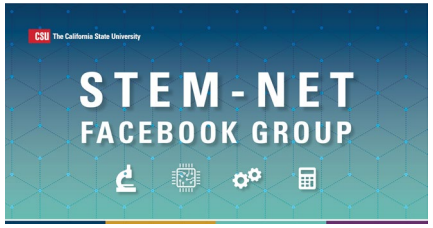
STEM-NET Community Groups

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!

Frank A. Gomez *CSU Office of the Chancellor* *fgomez@calstate.edu*