



**Lucy Family  
Institute for  
Data & Society**



**UNIVERSITY OF  
NOTRE DAME**

# **ANNUAL REPORT**

**Fiscal Year  
2022**



574-631-7095



<https://lucyinstitute.nd.edu/>

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# ANNUAL LETTER FROM DIRECTOR NITESH CHAWLA

**"The Lucy Family Institute will be an intellectual and interdisciplinary beacon that produces impactful and equitable data-driven solutions for the good of society" - N. Chawla**

*It was a year of founding, imagining, growth, collaboration, and impact. We not only grew the Institute team but also supported and participated in hiring several new faculty lines across campus. The Institute's team spent the year working toward the Institute's ambitious goals to design and deploy new funding opportunities, create engagement events, workshops, and research projects that tackle "wicked problems" with and for our stakeholders. They showed relentless optimism driven by the idea of inspired fundamental research that drives societal impact. Our dedicated Steering Committee faculty members amplified each of our activities, from convening focus groups at the Fall Symposium, to recruiting and hiring, writing proposals, and placing interns with industry. Our Institute Affiliates, University-wide collaborators, and community partners made each of our events full of networking and shared opportunity. I am thankful to be a part of this amazing organization. Together, we had an incredible year, and our journey has only just begun. We are deeply grateful to Robert and Sara Lumpkins for their generosity and entrusting us with this opportunity.*



Nitesh V. Chawla, PhD is the Frank M. Freimann Professor of Computer Science and Engineering and the Founding Director of the Lucy Family Institute for Data and Society.

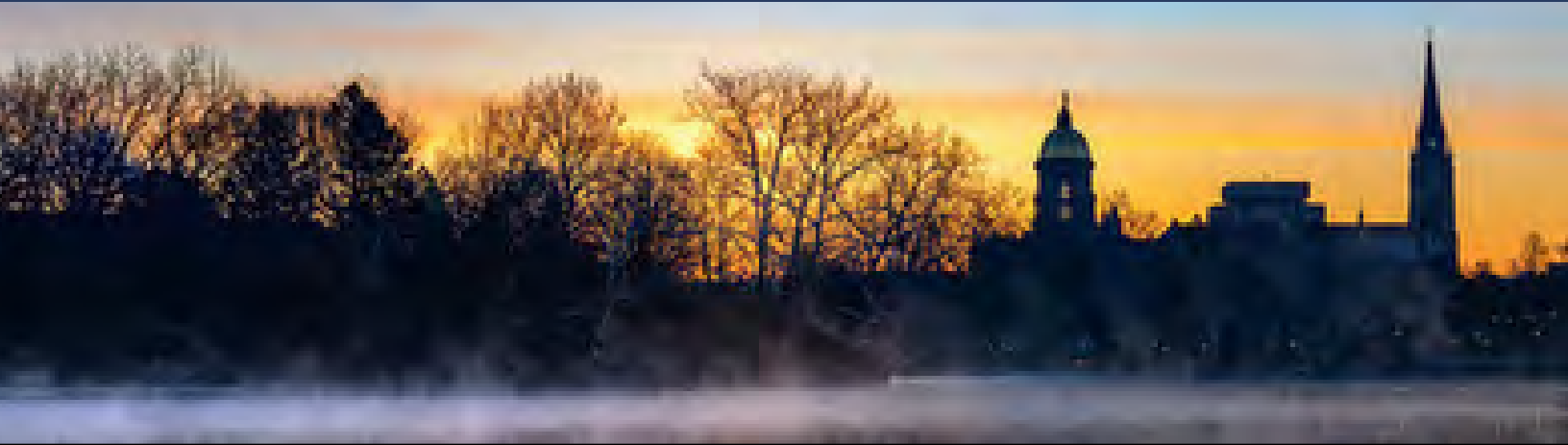
Respectfully,

*Nitesh Chawla*

# MISSION INSPIRED

*Launched in Fall of 2020 with a \$25 million gift from alumnus Robert Lumpkins and his wife, Sara, the Lucy Family Institute contributes to scholarship and education related to the relationship between data and society, with the goal of using data and innovation as a force for good in the world.*

**Our Mission:** *Enable positive impact on society and individual lives through innovative domain-informed and data-driven methods and applications.*



Hub for  
students,  
faculty and staff

Incubator for  
interdisciplinary  
research

Collaborator with  
community,  
industry,  
government & global  
partners

# KEY HIGHLIGHTS

## PEOPLE

The Institute hired and grew our team from 8 to 21 during FY22.

The Institute supported hiring of eight new tenure-track faculty; appointed three associate directors, hired two managing directors for initiatives, and recruited four faculty and new staff in the Institute.

The Institute has 148 Faculty/Staff Affiliates with campus-wide representation.

Selected ten Lucy Graduate Scholars from across nine departments in the University.

## CONVERGENCE RESEARCH DIRECTIONS

Identified three overarching domain-informed & data-driven research foci:

- Future of Work, Life & Physical Sciences
- Health & Well-Being of Communities
- Socio-Technical Systems for Sustainable Societies

Funded 13 one-to-two year internal grant projects proposed by interdisciplinary teams of Notre Dame faculty and staff.

Named on 80 proposals for external funding submitted in FY 22 (of which 35 have been so far funded).

273 papers & citable outputs authored by the Institute's 18 immediate faculty, staff & fellows in FY'22. These authors had 66,696 citations with 48,363 in last 5 years.

## INCUBATION HUB

Organized 30 events and 21 workshops including our popular Convergence series for faculty. Held our first annual Fall Symposium with 160 in attendance & hosted an inaugural student poster competition in Data & Society.

Recruited a managing director and establishing an on-site presence for Notre Dame's AnalytiXIN activities at 16Tech in Indianapolis connecting members of the Central Indiana Corporate Partnership and University's data science expertise / talent.

Grew the Applied Analytics & Emerging Technology Lab' (AETL) hub activities through recruitment of managing director, staff, and new partnerships.

Expanded the reach of our Center for Social Science Research (CSSR) through numerous workshops, research consultations (153), and through work on the South Bend Socio-Economic Indicators Dashboard.

## EDUCATION FOR DATA-DRIVEN FUTURE

Interdisciplinary Traineeship for Socially Responsible and Engaged Data Scientists (iTREDS) trained more than 70 undergraduate students (and growing) at Notre Dame and Saint Mary's College in data science through a lens of social responsibility and community engagement.

Hosted interactive workshops & pedagogy training for local middle school teachers during the Early Bridges to Data Science series.

Created a three week high school internship experience, Summer Trainee Program in Data Science & Society (STP), to learn about data science and apply skills to project-based learning.

# PEOPLE ARE THE HEART

**Nitesh Chawla**, PhD, Institute Director

**Jasmine Botello**, Executive Assistant

**Sugana Chawla**, MA, Education & Outreach Pgm. Mgr.

**Ying (Alison) Cheng**, PhD, Assoc. Director of Education

**Alissa Doroh**, Events & Communications Coordinator

**Brian Fogarty**, PhD, Assoc. Director, Center for Social Science Research (CSSR)

**Angelica Garcia Martinez**, PhD, International Scholar

**Matthew Hauenstein**, PhD, AETL Data Scientist

**Ian Hogan**, Administrative Coordinator

**Richard Johnson**, MLIS, Managing Director, Applied Analytics and Emerging Technology Lab (AETL)

**Michael Kennel**, AETL, Software Engineer

**Valentina Kuskova**, PhD, Managing Director of Notre Dame AnalytiXIN site in Indianapolis

**Cheng Liu**, PhD, Lead Data Scientist

**Katie Liu**, PhD, Research Program Manager

**Ramandeep Makhija**, MS, AETL Data Scientist

**Natalie Meyers**, MA, MLIS, Assoc. Director Operations

**Nuno Moniz**, PhD, Research Associate Professor

**Swapnil Motghare**, PhD, CSSR Asst Research Professor

**Jaron Porciello**, PhD, Assoc Professor of the Practice Information and Data Science

**Matthew Sisk**, PhD, Assoc. Professor of the Practice GIS/Data Science

**Yang Xu**, MS, CSSR Data Science Consultant

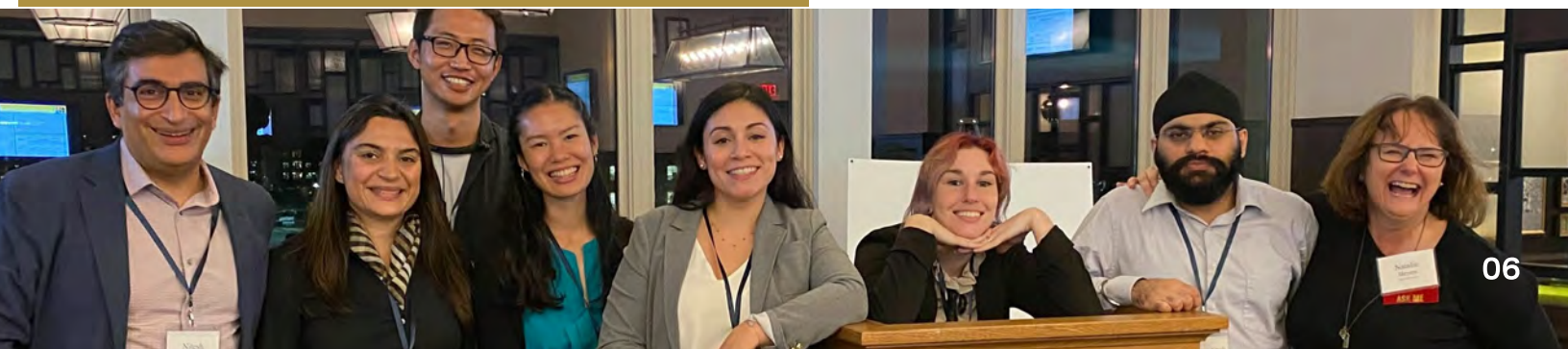
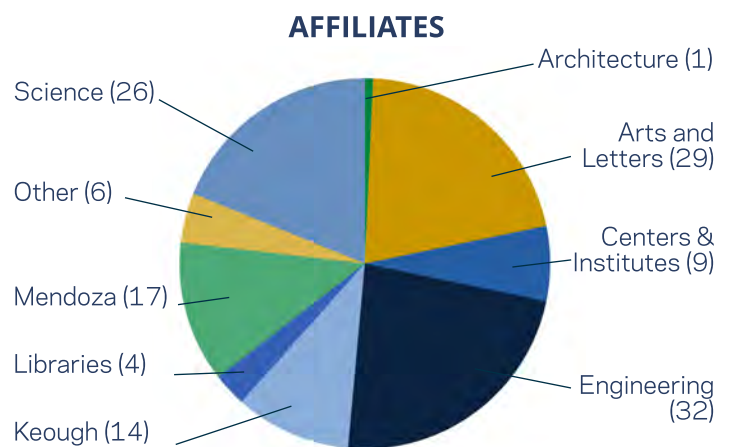
**Fanny Ye**, PhD, Assoc. Director Applied Analytics

**Jessica Young**, MS CSSR Data Science Consultant

*People are the heart of everything we do at the Institute. We deeply value the diversity and inclusivity of our team dynamic.*

*Growing our community of faculty and staff affiliates was an important goal for us this year. We finished FY22 with 148 affiliates.*

*The way we increase our impact on society is through domain-informed and data-driven research collaborations, gatherings, funding opportunities, internships, fellowships, and training.*



# WHAT IT'S LIKE WORKING IN LUCY

## Community Engaged

What I've enjoyed the most about being part of Lucy Team this past year is:

My job enables me to work with industry partners around the South Bend - Elkhart region and help them overcome their data science and analytical problems.

I am constantly inspired by the team's commitment to creating research and facilitating programs/events that have a genuine connection to the communities that we partner with.

*Being part of a shared mission with direct impact in the community.*

## Growth Mindset

What I've enjoyed the most about being part of Lucy Team this past year is:

*really enjoyed how quickly we as a team have grown*

**Expanding AnalytiXIN**

going from a handful of people to grow the team to today's size and impact!

## Team Work

What I've enjoyed the most about being part of Lucy Team this past year is:

*Being part of a fast-paced, passionate team.*

*Finally being able to work in person with a beautiful team.*

**The energy, interest and camaraderie of the team!**

*.. New team experience!*

*The team itself - feels like a family*

here at Lucy everyone is like a family who share the same vision and dedication towards the vision.

## Diversity

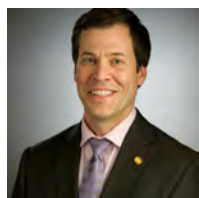
What I've enjoyed the most about being part of Lucy Team this past year is:

**The diversity of the team**

Everyone in Lucy has a different background and realms of experience it's been a huge boon to be able to leverage their expertise for whatever questions or problems I have.

# PEOPLE

## STEERING COMMITTEE



**Corev Angst**

IT, Analytics, and  
Operations, Mendoza  
College of Business



**Vijay Gupta**

Electrical Engineering, College  
of Engineering

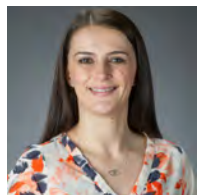


**Robert Landers**

Department of Mechanical  
Engineering, College of  
Engineering



**Fang Liu** Department of  
Applied and Computational  
Mathematics and Statistics,  
College of Science



**Tijana Milenkovic**

Department of Computer  
Science and Engineering,  
College of Engineering



**Rahul Oka**

Department of  
Anthropology, College of  
Arts and Letters



**Tim Weninger**

Department of Computer  
Science and Engineering,  
College of Engineering



**Fanny Ye**

Department of Computer  
Science and Engineering,  
College of Engineering



**Michael Ferdig**

Department of Biological  
Sciences, College of Science



**David Hachen**

Department of Sociology,  
College of Arts and Letters

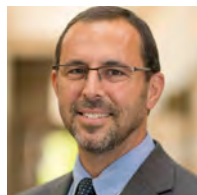


**Lizhen Lin** Department of  
Applied and Computational  
Mathematics and Statistics,  
College of Science



**Ron Metoyer**

Department of Computer  
Science and Engineering,  
College of Engineering



**Tom Mustillo** Keough School  
of Global Affairs & Concurrent  
Faculty of Political Science,  
College of Arts and Letters



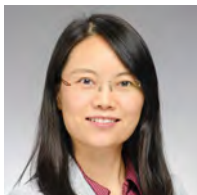
**Meghan Sullivan**

Department of  
Philosophy, College of  
Arts and Letters



**Olaf Wiest**

Department of Chemistry  
and Biochemistry, College  
of Science



**Xiangliang Zhang**

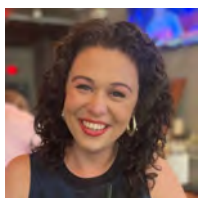
Department of Computer  
Science and Engineering,  
College of Engineering

# PEOPLE

## INTERDISCIPLINARY FACULTY HIRES

*The Lucy Family Institute collaborated with colleges and schools to hire the following interdisciplinary tenure track faculty with lines allocated by the University in support of the formation of the Institute.*

### COMPUTATIONAL SOCIAL SCIENCE



**Rachel Porter**

Department of Political Science, College of Arts and Letters



**Margaret Traeger**

Department of IT, Analytics and Operations, Mendoza College of Business

### DIGITAL HUMANITIES



**Ranjodh Singh Dhaliwal**

Department of English, College of Arts and Letters



**Matthew Kilbane**

Department of English, College of Arts and Letters

### HUMAN-CENTERED COMPUTING



**Karla Badillo-Urquiola**

Department of Computer Science and Engineering, College of Engineering

### DATA SCIENCE, AI & ANALYTICS



**Yuefeng Han**

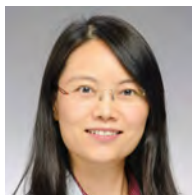
Department of Applied and Computational Mathematics and Sciences, College of Science



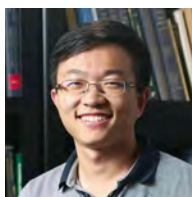
**Yang Yang** Department of IT, Analytics and Operations, Mendoza College of Business



**Yanfang Ye** Department of Computer Science and Engineering, College of Engineering



**Xiangliang Zhang** Department of Computer Science and Engineering, College of Engineering



**Changbo Zhu** Department of Applied and Computational Mathematics and Sciences, College of Science

### MANUFACTURING 4.0



**Robert Landers**

Department of Aerospace and Mechanical Engineering, College of Engineering

# PEOPLE

## GRADUATE STUDENT SCHOLARS



Ten graduate student leaders make up the inaugural cohort of **Lucy Graduate Scholars**. These PhD Candidates will receive a stipend as well as mentorship from Institute faculty and staff as they co-create a collaborative, interdisciplinary graduate student research community over the next two years.

- Awosiji Awotunde, Chemistry & Biochemistry, Advisor: Marya Lieberman
- Meghan Forstchen, Biological Sciences, Advisor: Jason Rohr
- Cat Gargano, Clinical Psychology and Peace Studies, Advisor: Laura Miller-Graff
- Spencer Giddens, Applied and Computational Mathematics and Statistics, Advisor: Fang Liu
- Wesley Hedden, Sociology and Peace Studies, Advisor: Ann Mische
- Maura Kraemer, Sociology, Advisor: Anna Haskins
- Yuwen Lu, Computer Science and Engineering, Advisor: Toby Li
- Etinosa Osaro, Chemical and Biomolecular Engineering, Advisor: Yamil Colon
- Annalisa Szymanski, Computer Science and Engineering, Advisor: Ron Metoyer
- Lizao Wang, History and Philosophy of Science, Advisor: Thomas Stapleford

# SOCIETY & EDITORIAL LEADERSHIP

- Nitesh Chawla elected as an **IEEE Fellow**.



- Alison Cheng elected to the **Board of Trustees of the International Psychometric Society**, serving a three-year term (2022 - 2024).
- Nitesh Chawla served as the **Program Co-chair for 28th ACM SIGKDD Conference on Data Mining and Knowledge Discovery**, which is the premier and flagship academic conference on data science.
- Matthew Sisk was invited to participate in **The Opportunity Project**, a program of the Census Open Innovation Labs at **U.S. Census Bureau** developing national-level indicators of well-being.
- Nitesh Chawla was invited to start a new journal by Springer Nature, titled **Discover Data**. Discover Data is a broad, open access journal publishing research into the theory and application of data science and data analytics across all fields of research. The journal welcomes submission of papers detailing the application of data science-driven techniques to novel problems in science, industry and society, as much as primary research into data theory, management and analysis.

## Developing an ecosystem of FAIR, Linked, and Open Data in and beyond Political Science

Political Methodology | Methods | Quantitative | Ethics | Big Data

Code:

INN465

Chair(s)

**Thomas Mustillo**

University of Notre Dame

Co-Chair(s)

**Raul Gomez**

University of Liverpool

**Michelangelo Vercesi**

Leuphana Universität Lüneburg

Panel Discussant(s)

**Linda Basile**

Università degli Studi di Siena

**Hajo Boomgaarden**

University of Vienna

**Elizabeth Brophy**

Wiley

**Natalie Meyers**

University of Notre Dame

**Eike Mark Rinke**

University of Leeds

Aug 26, '22 Lucy Affiliate Tom Mustillo, co-editor of the European Consortium for Political Research (ECPR) Political Data Yearbook (PDY) and the Institute's Natalie Meyers will participate in an international panel at the ECPR Annual conference and then return to campus to work with a team of iTREDS interns to expand online access to election data.

# CONVERGENCE RESEARCH DIRECTIONS

# INTERDISCIPLINARY & CONVERGENCE RESEARCH

RESEARCH

HOW WE INCENTIVIZE CHANGE

## Connecting Researchers to one another

*"In this first year, we got to hear from the Notre Dame community about the issues that they care about and pledge financial and intellectual support towards developing their Big Ideas. I hope this lays the groundwork for longstanding relationships with university teams and with community and industry partners."*

**-Katie**

## Connecting Researchers to Funding

In FY 22 the Institute was named on 80 proposals for external funding of which 35 have been so far funded.

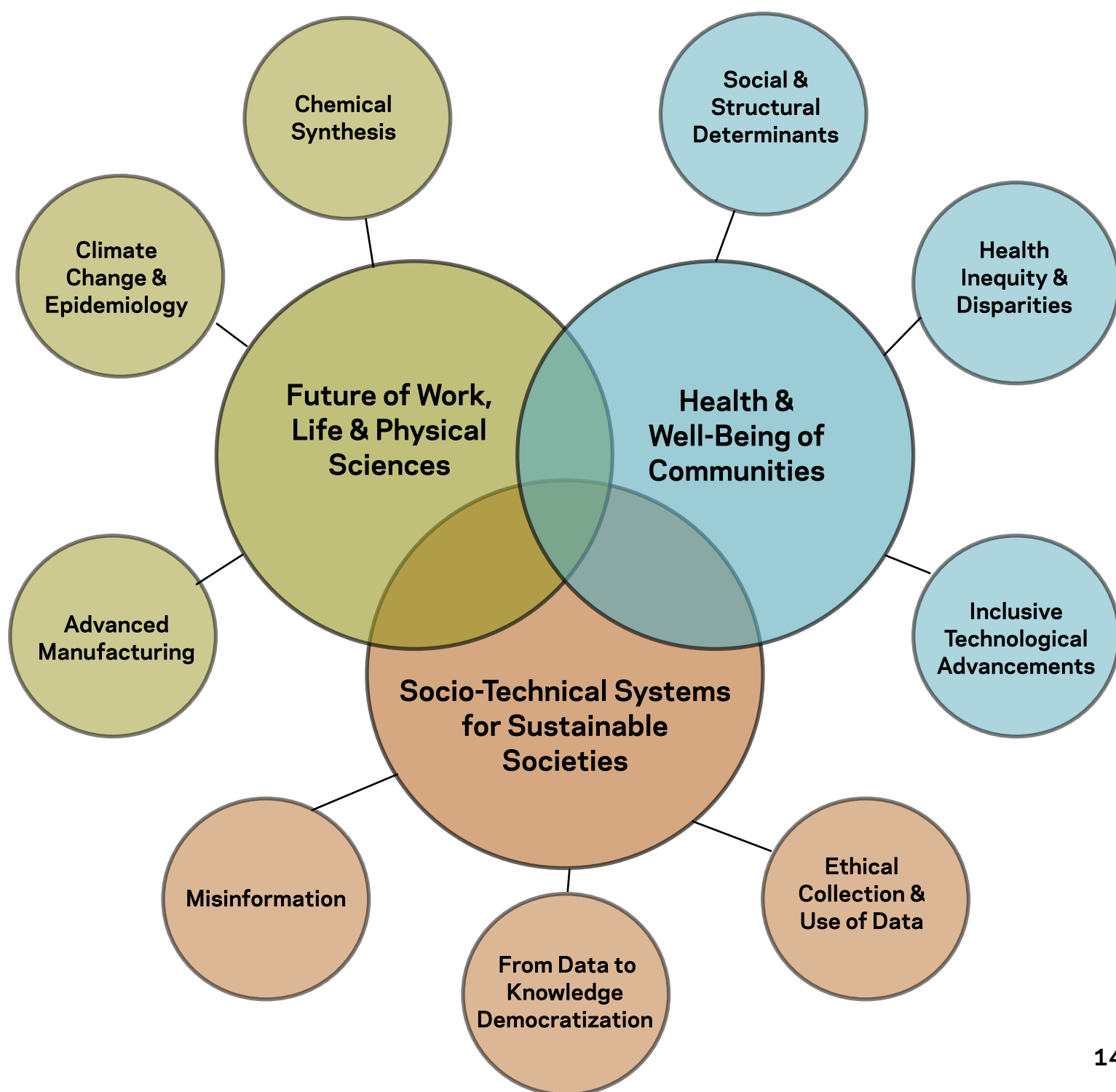


## INTRODUCING KATIE

Katie Liu, PhD joined the Institute as Research Program Manager in Aug 2021. Katie collaborates with Lucy Affiliated faculty, fellows, staff, and students to identify and develop internal and external funding opportunities.

# TRANSLATIONAL DATA-DRIVEN FUNDAMENTAL ADVANCES

The Institute faculty aims to inspire innovations in fundamental research that generate translational societal impact through **three overarching research foci that are domain-informed and data-driven.**



# IMPACTING SOCIETY THROUGH CONVERGENCE RESEARCH

## ADDRESSING HEALTHCARE DISPARITIES

Underserved communities face the challenges of disparities in healthcare, stemming from both availability and access to healthcare facilities and resources. These circumstances create an especially hazardous environment for child health and well-being, which are even more apparent in low- to middle-income countries (LMIC), like México. This project is centered on understanding the challenges associated with inequity in health and healthcare access in LMIC and developing a data-driven mobile application that will be deployed within a public health system in Mexico for enabling collection and modeling of clinical and social and structural determinants of health. The study population are families, with children battling pediatric cancer, that come from different (poorer) regions of Mexico and constantly face the challenges of access to healthcare.

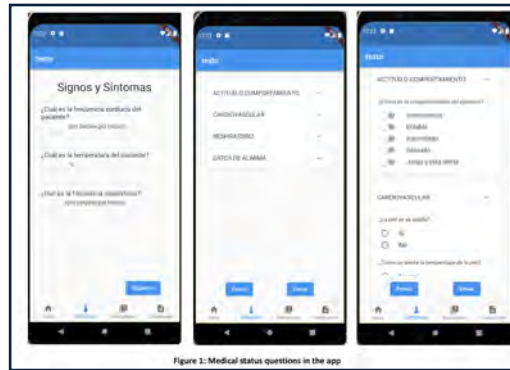


Figure 1: Medical status questions in the app



**Angélica García Martínez, PhD** is an International Scholar & Postdoctoral Research Associate at the Institute whose expertise is in cancer epidemiology, and works with children in high-vulnerability in rural villages and indigenous population in Mexico.

Hospital Infantil de México Federico Gómez's (HIMFG) in Mexico City treats children with cancer, many of whom are sent home after treatment to recover. Yet, fever and neutropenia (FN) can be a life-threatening complication in pediatric cancer patients undergoing chemotherapy treatment. In certain patients, this condition may progress to adverse infection outcomes such as septic shock or bacteremia, which in turn increase mortality risk. The Institute, in partnership with HIMFG, is working to develop optimal treatment strategies, to help care providers accurately classify children as low- or high-risk for these adverse events, so that low-risk children may receive treatment in a home setting, while the acutely ill are identified to receive closer attention in the hospital.



HOSPITAL INFANTIL de MÉXICO  
FEDERICO GÓMEZ  
Instituto Nacional de Salud



### Undergraduate Team that developed the prototype

William Gentry  
Elizabeth Medina

Patrick Soga  
Claudia Patterson  
Komal Wani (not pictured)



**Michael Kennel**,  
Software Engineer,  
works with the team  
to bring the mobile  
app concept from the  
lab to production.



**Jasmine Botello**,  
Executive  
Assistant, works on  
logistics,  
semi-structured  
interviews, and  
translation for this  
project.



**Jennifer Schnur**,  
PhD student,  
develops machine  
learning algorithms  
for triaging risk by  
integrating clinical  
and social  
determinants data.

# IMPACTING SOCIETY THROUGH CONVERGENCE RESEARCH

RESEARCH

## TACKLING HEALTH & HEALTHCARE INEQUITIES TOGETHER

The Institute led the organization of a Forum for the Moment to See Courage to Act Proposal, led by Nitesh Chawla, **A Call to Action: An Initiative to Solve Health and Healthcare Inequities**. This Forum brought together city, county and community leaders to identify data, scholarship, service and funding gaps which perpetuate healthcare disparities in our community.



A Forum Report is available online.

## STATE & NATIONAL HEALTH COLLABORATIONS



Nitesh Chawla chairs the **Structural and Social Determinants of Health Project Development Team (PDT) for Indiana CTSI**. The committee features 15 experts from Indiana University, IUPUI, Notre Dame, Purdue University, and the Regenstrief Institute. This PDT supports basic, clinical, and translational research that enables a deeper understanding of how social, economic, and environmental contexts shape patterns of health and wellness, including the onset of diseases and disorders, within communities and informs effective treatments and interventions to promote equitable opportunities for good health and well-being.



The Indiana Clinical and Translational Sciences Institute (CTSI) is a statewide collaboration of Indiana University, Purdue University, and the University of Notre Dame, as well as public and private partnerships. The Indiana CTSI is a member of a national network of CTSA-funded organizations across the U.S. Established in 2008, the Indiana CTSI is supported by a \$25 million Clinical and Translational Science Award from the National Center for Advancing Translational Sciences of the National Institutes of Health, supplemented by nearly \$60 million from the state, the three member universities, and public and private partnerships.



# IMPACTING SOCIETY THROUGH CONVERGENCE RESEARCH

The Institute's faculty and staff pursued external funding (80 proposals) to incubate, accelerate and further support our faculty's research projects. Of the 35 grants awarded a selection of highlights is offered below:

## C-CAS (CHEMICAL SYNTHESIS)

The NSF Center for Computer Assisted Synthesis (CCAS) is a nexus of collaboration, innovation, and education that brings together data science and chemical synthesis.



## FUTURE OF WORK

Our NSF funded project will be the first where academia, industry, and the state collaborate to design a framework for participatory AI adoption and implementation and shed light on how AI technologies and the way small and mid-sized manufacturing firms adopt these technologies affect labor productivity, retention, training, quality of work, and satisfaction.



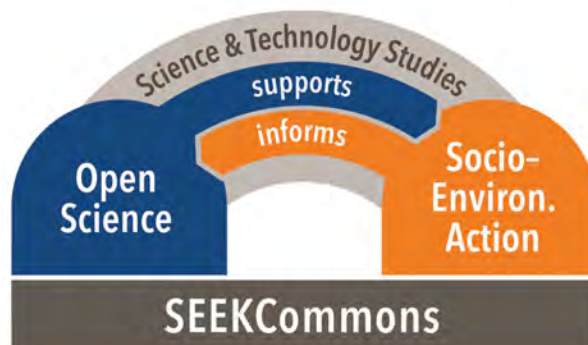
## ENERGY INSIGHTS (MANUFACTURING 4.0)

In collaboration with the Indiana University, Purdue University, Conexus Indiana, Energy Systems Network, Emerging Manufacturing Collaboration Center (EMC2) and Amazon Web Services (AWS), we will develop advanced energy and manufacturing models and analytics applications focused on reducing energy and carbon footprints.



## SEEK COMMONS (FAIR KNOWLEDGE DEMOCRATIZATION)

The NSF funded SEEKCommons, led by the University of Notre Dame, will bridge long-standing divides between the social and environmental sciences through the adaptation and application of open tools and methodologies that enable the sharing of socio-environmental research products as public goods.





## BUDGETING FOR BENEFACTION

# A RESEARCH INCUBATION STRATEGY

---

In FY 22 we allocated part of our budget towards funding mission-oriented one-two year convergence research projects across the University through our Institute's RFPs.

We invited proposals in the following Tracks:

- Track 1 (Convening): Convening proposals may be for interdisciplinary lectures, smaller workshops, larger multi-day conferences, or for curriculum development for co-teaching a new interdisciplinary course.
- Track 2 (Research Accelerators): An opportunity for Notre Dame community members to engage in preliminary work for up to two years towards a Big Idea that addresses pressing issues or gaps in data science & society. Funds may be used for hiring a co-mentored, interdisciplinary postdoctoral scholar or up to two graduate student(s) for two years.
- Track 3 (Infrastructure & Services): Request Lucy Family Institute core services such as the Center for Social Sciences Research (CSSR) services or Applied Analytics and Emerging Technology Lab (AETL) (data scientists or software engineers), equipment purchase, and/or data subscription.
- Track 4 (Partnerships): Facilitate South Bend & Elkhart Industry collaborations and/or community partnership initiatives.

After proposals were received and reviewed by our steering committee, we funded 13 projects proposed by interdisciplinary teams of Notre Dame faculty and staff affiliated with the Institute to inspire innovations in fundamental research that generate translational value for societal benefit. These projects demonstrate our commitment to tackling "wicked problems" using domain-informed and data-driven advances.

We anticipate these awardees will be sharing their initial project results supported by Institute funding at our second annual Lucy Family Institute Fall Symposium in Oct '22.

# FUNDING INTERDISCIPLINARY RESEARCH PROPOSALS

## TRACK 1 (CONVENING) AWARDEES:

### **Data Poetics (*Future of Work, Socio-Technical Systems*)**

Matthew Kilbane, Assistant Professor in the Department of English, with a team consisting of Ranjodh Singh Dhaliwal (English), Ashlee Bird (American Studies), Katherine Walden (American Studies), and Scott B. Weingart (Navari Family Center for Digital Scholarship)

### **Keeping the Republic Conference (*Socio-Technical Systems for Sustainable Societies*)**

Jeff Harden, Andrew J. McKenna Family Associate Professor in Political Science and Concurrent Associate Professor in Applied and Computational Mathematics and Statistics (ACMS), Matthew Hall (Political Science), and Claudia Francis (Rooney Center for the Study of American Democracy)

### **Lead & Healthy Housing Conference (*Health & Well-Being of Communities*)**

The Notre Dame Lead Innovation Team (ND-LIT), led by Heidi Beidinger-Burnett, Associate Professor of the Practice in the Department of Biological Sciences and Assistant Director of Community Health and Policy for the Center for Civic Innovation, Marya Lieberman (Chemistry & Biochemistry), Graham Peaslee (Physics), Matthew Sisk (Lucy Family Institute for Data & Society), and Jocelyn Keranen (ND-LIT)

## TRACK 2 (RESEARCH ACCELERATOR) AWARDEES:

### **Air Quality Policy and Incentives (*Health & Well-Being of Communities*)**

Paola Crippa, Assistant Professor in the Department of Civil and Environmental Engineering and Earth Sciences (CEEES), Diogo Bolster (CEEES), Stefano Castruccio (ACMS), Danielle Wood (Center for Civic Innovation), and Drew Marcantonio (Management & Organization)

### **Future of Work (*Future of Work*)**

Yong Suk Lee, Assistant Professor of Technology, Economy, and Global Affairs at the Keough School of Global Affairs, and Robert Landers, Advanced Manufacturing Collegiate Professor in AME, Corey Angst (IT, Analytics, and Operations, ITAO), Nicholas Berente (ITAO), Thomas Fuja (Electrical Engineering, iNDustry Labs), and Ed Kinzel (AME)

### **Nonlinear Structural Equation Modeling (*Data Science Methods*)**

Johnny Zhang, Professor in the Department of Psychology, Meng Jiang (Computer Science and Engineering, CSE), and Jun Li (ACMS)

### **Rapid Personalized Image-Based Cardiovascular Flow Modeling (*AI for Medicine*)**

Jian-Xun Wang, Assistant Professor in the Department of Aerospace and Mechanical Engineering (AME), and Chaoli Wang, Professor in CSE

### **Using Data Science to Protect Tap Water Quality (*Health & Well-Being of Communities*)**

Robert Nerenberg, Professor in CEEES, Michael Lemmon (Electrical Engineering), Matthew Sisk (Lucy Family Institute for Data & Society), and Danielle Wood (Center for Civic Innovation)

# FUNDING INTERDISCIPLINARY RESEARCH PROPOSALS

## TRACK 3 (INFRASTRUCTURE & SERVICES) AWARDEES:

### **Adaptive Time and Item Sampling (*Data Science Methods, Health & Well-Being of Communities*)**

Ross Jacobucci, Assistant Professor in the Department of Psychology, Brooke Ammerman (Psychology), Cheng Liu (Lucy Family Institute for Data & Society), Caleb Reinking (Center for Research Computing), and Alison Cheng (Psychology, Lucy Family Institute for Data & Society)

### **Indiana Sustainable Development Goals Scorecard (*Socio-Technical Systems for Sustainable Societies*)**

Paul Perrin, Director of Evidence and Learning for the Keough School's Pulte Institute for Global Development and Associate Professor of the Practice in the Keough School of Global Affairs at the University of Notre Dame, Swapnil Motghare (Lucy Family Institute for Data & Society), Harold Toro (Keough School of Global Affairs), and Kevin Waitkuweit (Pulte Institute for Global Development)

### **Social Network Analysis for Catholic Schools (*Socio-Technical Systems for Sustainable Societies*)**

Christine Trinter, Associate Professor of Mathematics Education with the Alliance for Catholic Education and Director of the Catholic School Teacher Leadership (CASTLE) Program, Daniel Lapsley (Psychology), and Allie Olshefke (CASTLE)

## TRACK 4 (PARTNERSHIP) AWARDEES:

### **Michiana Community Health Coalition (*Health & Well-Being of Communities*)**

Jessica Brookshire, Senior Program Director of the Office for Clinical Partnerships, Jen Burke Lefever, Managing Director of the William J. Shaw Center for Children and Families, and Jill Pentimonti, Director of Research Advancement in the Office of Federal and Washington Relations

### **Workshop on Innovation for Social Services Access (*Future of Work, Socio-Technical Systems for Sustainable Societies*)**

Ann-Marie Conrado, Cregg Family Director of the Program in Collaborative Innovation and an Associate Professor in the Department of Art, Art History, and Design, Ron Metoyer, Professor in CSE, and Clinton Carlson, Associate Professor of Visual Communication Design in the Department of Art, Art History, and Design

# OUR SCHOLARLY IMPACT

**Institute and Institute Affiliated Authors published 1050 items in Calendar Year '21.**

*These papers can be explored on our Institute's Publications Dashboard. The dashboard snapshot example below shows the tabular view of an author's scholarship.*

Papers published by Lucy affiliates in 2021

Download + Show 10 entries

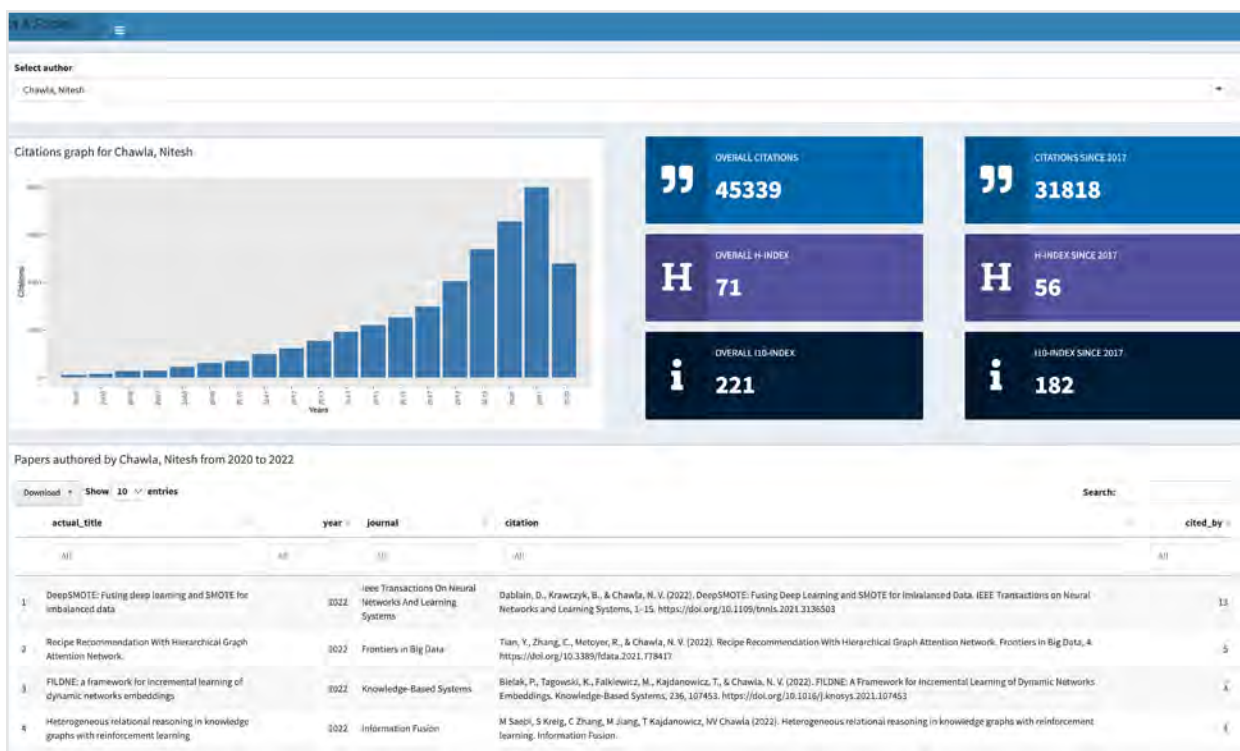
Search:

actual_title	authors	journal	citation
Discrete Heart Rate Values or Continuous Streams? Representation, Variability, and Meaningful Use of Vital Sign Data.	Chawla, Nitesh	Cin Computers Informatics Nursing	Feldman, K., Pokan, A. J., & Chawla, N. V. (2021). Discrete Heart Rate Values or Continuous Streams? Representation, Variability, and Meaningful Use of Vital Sign Data. <i>Cin Computers, Informatics, Nursing</i> , 29(1), 793-803. <a href="https://doi.org/10.1097/cin.0000000000000728">https://doi.org/10.1097/cin.0000000000000728</a>
Examining Response to Negative Life Events Through Fitness Tracker Data.	Chawla, Nitesh	Frontiers in Digital Health	Fuata, I., Feldman, K., Lin, S., Mettingly, S., O'Malley, S., & Chawla, N. V. (2021). Examining Response to Negative Life Events Through Fitness Tracker Data. <i>Frontiers in Digital Health</i> , 3. <a href="https://doi.org/10.3389/fdigh.2021.646068">https://doi.org/10.3389/fdigh.2021.646068</a>
Generative AI Design and Exploration of Nucleoside Analogs	Chawla, Nitesh	ChemRxiv	Doddish, D., Siro, G., & Chawla, N. (2021, November 2). Generative AI Design and Exploration of Nucleoside Analogs. <i>American Chemical Society (ACS)</i> . <a href="https://doi.org/10.26434/chemrxiv-2021-65p79">https://doi.org/10.26434/chemrxiv-2021-65p79</a>
Pandemic Pulse	Chawla, Nitesh	Digital Government: Research and Practice	Krieg, S. J., Schmitz, J. J., Marshall, J. D., Schoenbauer, M. M., & Chawla, N. V. (2021). Pandemic Pulse: Digital Government: Research and Practice, 2021, 1-9. <a href="https://doi.org/10.1145/3431805">https://doi.org/10.1145/3431805</a>
Machine Learning in Finance	Chawla, Nitesh	Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery & Data Mining	Kumar, S., Akoglu, L., Chawla, R., Rodriguez-Serrano, J. A., Fancourt, T., & Nagrecha, S. (2021). Machine Learning in Finance. In <i>Proceedings of the 27th ACM SIGKDD Conference on Knowledge Discovery &amp; Data Mining</i> . ACM. <a href="https://doi.org/10.1145/3447548.3489456">https://doi.org/10.1145/3447548.3489456</a>
Predicting Job Performance Using Mobile Sensing	Chawla, Nitesh	IEEE Pervasive Computing	Mojalish, S., Bagheri-Nasab, H., Rezaei, S., Martinez, G. J., Soha, K., Obuchi, H., ... Campbell, A. T. (2021). Predicting Job Performance Using Mobile Sensing. <i>IEEE Pervasive Computing</i> , 20(4), 43-51. <a href="https://doi.org/10.1109/mperv.2021.3118570">https://doi.org/10.1109/mperv.2021.3118570</a>
Jointly predicting job performance, personality, cognitive ability, affect, and well-being	Chawla, Nitesh	IEEE Computational Intelligence Magazine	Rebore-Granda, P., Lin, S., Wu, K., Martinez, G. J., Mattingly, S. M., Moskal, E., ... Dey, A. K. (2021). Jointly Predicting Job Performance, Personality, Cognitive Ability, Affect, and Well-Being. <i>IEEE Computational Intelligence Magazine</i> , 15(2), 48-61. <a href="https://doi.org/10.1109/mci.2021.3061877">https://doi.org/10.1109/mci.2021.3061877</a>
Graph Barlow Twins: A self-supervised representation learning framework for graphs	Chawla, Nitesh	arXiv	Bortak, P., Kujdanowicz, T., & Chawla, N. (2021). Graph Barlow Twins: A self-supervised representation learning framework for graphs. <i>ArXiv</i> . Retrieved from <a href="https://www.semanticscholar.org/paper/230f620db0802a55764aard76c3f7f532f6e">https://www.semanticscholar.org/paper/230f620db0802a55764aard76c3f7f532f6e</a>
mot2Vec: Semantic-aware Representation Learning for Weibo's Time Series Data	Chawla, Nitesh	2021 IEEE 8th International Conference on Data Science and Advanced Analytics (ISAA)	Lin, S., Wu, K., & Chawla, N. V. (2021). mot2Vec: Semantic-aware Representation Learning for Weibo's Time Series Data. In <i>2021 IEEE 8th International Conference on Data Science and Advanced Analytics (ISAA)</i> . IEEE. <a href="https://doi.org/10.1109/isda53316.2021.8968416">https://doi.org/10.1109/isda53316.2021.8968416</a>
FAKE REVIEW DETECTION ON YELP DATASET	Chawla, Nitesh	unditled	Maricham, S., Karuppayah, S., Wu, K., Dong, Y., Tan, J., Huang, C., & Chawla, N. (2021). FAKE REVIEW DETECTION ON YELP DATASET. Unditled. Retrieved from: <a href="https://www.semanticscholar.org/paper/1622491c33595e1a40f5402a244426c76d">https://www.semanticscholar.org/paper/1622491c33595e1a40f5402a244426c76d</a>

Showing 1 to 10 of 10 entries (filtered from 942 total entries)

Previous 1 2 3 4 Next

<https://lucyapps.shinyapps.io/Lucy-publications-dashboard/>



The Institute also offers an author's impact page for every institute affiliated scholar, from our own faculty and staff, to our steering committee members, Institute Fellows and Affiliates at Large.

*Our Director's page is shown as an example at left.*

**INCUBATION  
HUB FOR  
UNIVERSITY,  
COMMUNITY,  
GOVERNMENT,  
INDUSTRY, &  
GLOBAL PARTNERS**

## Platforms for open data sharing

### dataMichiana

Platform for exploring and downloading civic data, maps, and interactive dashboards for Michiana Area of Northern Indiana



Reducing Lead Poisoning in South Bend Children

Explore



Home Ownership and the Racial Wealth Gap  
A Case Study of South Bend, Indiana

Explore



Internet Access in St. Joseph and Elkhart Counties  
An Analysis of Who Has it and Who Doesn't

Explore

### South Bend Economy Database

Industry	Total Employment	Employment 10 Years Ago	Employment 20 Years Ago	Percent Change 10 Years Ago	Percent Change 20 Years Ago
Manufacturing	10,000	12,000	15,000	-16.7%	-33.3%
Retail	8,000	7,000	6,000	14.3%	33.3%
Healthcare	6,000	5,000	4,000	20.0%	50.0%
Education	4,000	3,500	3,000	14.3%	33.3%
Professional Services	3,000	2,500	2,000	20.0%	50.0%
Government	2,000	1,800	1,600	11.1%	25.0%
Construction	1,500	1,200	1,000	25.0%	50.0%
Transportation	1,000	900	800	11.1%	25.0%
Food and Beverage	800	700	600	14.3%	33.3%
Arts and Entertainment	500	400	300	25.0%	50.0%
Other	2,000	1,800	1,600	11.1%	25.0%

Research and data visualization tools for understanding economic dynamics and new growth opportunities in South Bend, IN

### Labor Demand and Supply

6139

Total Jobs as of Apr 25, 2022

5.48%

Percent change as compared to the year before

5262

Total Candidates as of Apr 25, 2022

1.14%

Percent change as compared to the year before



**Matthew L. Sisk**, PhD lead developer for the dataMichiana open data portal was appointed Associate Professor of the Practice in the Institute in 2022. His research focuses on human-environment interactions, the spatial scale of environmental toxins and community data.



**Swapnil Motghare**, PhD lead developer for the South Bend Economy Database was appointed Assistant Research Professor in the Institute in 2022.

# HUB FOR CONVENING

## FY 22 Events

We offered & co-organized an ever evolving combination of in-person and virtual events as COVID-19 gathering restrictions lifted progressively through the year. Faculty, staff and students were keen to gather in person, often meeting virtual collaborators from group projects for the first time "in-person," or renewing relationships across School, College, and departmental silos created by the pandemic situation. Our faculty & staff also delivered several invited presentations this past year. Below see highlights from the year's Institute Engaged convenings.

9/21/21 **Interdisciplinary Traineeship for Socially Responsible and Engaged Data Scientists** (iTREDS) Kickoff

9/22/2021 **Shamrock Series** & talk by N Chawla

10/5/2021 **AnalytiXIN** Workshop in Indianapolis

10/19/2021 **Assoc. For Women in Science** & talk w N Meyers

10/27/2021 **Fall Symposium**

11/17/2021 **Living in Data: A Citizen's Guide to a Better Information** author talk & workshop with J Thorp

11/17/2021 **GIS Day**

1/26/2022 **Life in Pixels(LiP): Discriminating Data** Author Talk with W Chun

1/15/2022 **Michiana Community Health Coalition** (MCHC)

2/9/2022 **LiP Bitstreams and Bookishness** Author talk with M Kirschenbaum and J Pressman

2/10/2022 **Social Determinants of Health**: How can we make collective impact in Indiana Chawla talk

2/22/2022 **MCHC**

2/16/2022 **Convergence** seminar with M Coppedge & T Weninger

2/17/2022 LOVE Data: **Custer's Revenge to Red Dead Redemption**: Changing the Language of Indigenous Representation in Video Games with Ashlee Bird

3/2/2022 **Faculty Hiring and Changing Representation in Academia** Author Talk w/Aaron Clauset

3/17/2022 **Convergence** seminar with V Kuskova & N Berente

3/23/2022 **LiP On Black Media Philosoph & Black Technical Object** author talks with A Towns & R Amaro

4/2/2022 **MCHC**

4/5/2022 **LiP Assembly Codes & Undersea Network** author talk with N Starosielski

4/8/2022 **Overcoming Barriers to Industry-Academic Engagement** talk

w T Shock(OneAmerica)

4/22/2022 **iTREDS Capstone Presentations**

4/20/2022 **IDEA Week** Analytixin & AeTL exhibit & talk by N Chawla

4/11/2022 **LiP Listening in the Afterlife of Data** author Talk with David Cecchetto

4/20/2022 **Convergence**

4/27/2022 **Data Poetics**: R Armantrout in Conversation with X Zhang

4/28/2022 **Computational Modeling of Humanities Data** with W Shang

5/4/2022 **MCHC**

6/2/2022 **AnalytiXIN**

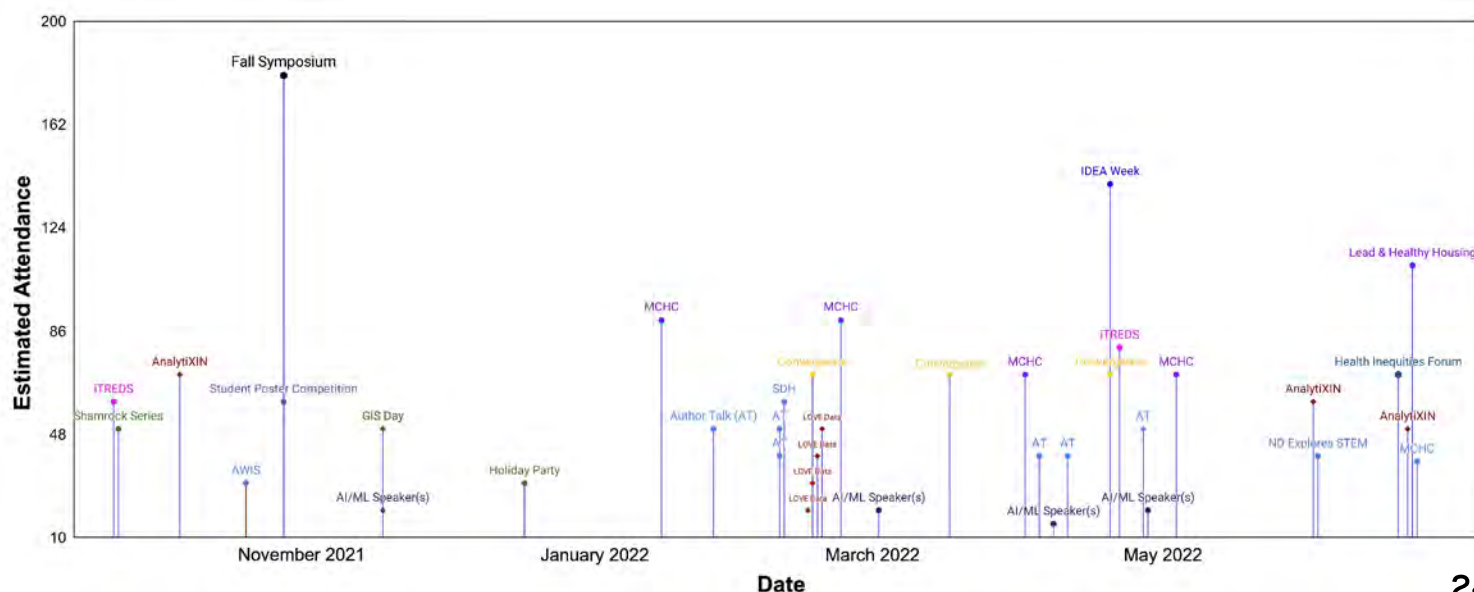
6/3/2022 **ND Explores STEM**

6/20/2022 **Health Inequities Forum**

6/22/2022 **AnalytiXIN Intern Welcome**

6/23/2022 **Healthy Housing**

6/24/2022 **MCHC**



# FALL SYMPOSIUM

HUB

### Meet & Greet Poster Session

12 PM  
Light Lunch  
Student poster competition with live voting (Pre-Function Area)

### Lucy Family Institute Introduction

1 PM  
**Welcome**  
Natalie Meyers, Associate Director Operations, Professor of the Practice, Lucy Family Institute for Data & Society

**Benediction**  
Rev. James Bracke, C.S.C.

**Getting to know Lucy Family Institute for Data & Society and Agenda for the Day**  
Nitesh Chawla, Founding Director Lucy Family Institute for Data & Society, Frank M. Freimann Professor of Computer Science and Engineering

**Opening Remarks**  
Marie Lynn Miranda, Charles and Jill Fischer Provost, Professor of Applied and Computational Mathematics and Statistics, Founding Director of Children's Environmental Health Initiative

### Panel of the Deans

1:05 PM  
Moderator: Rev. Robert A. Dowd, C.S.C., Vice President and Associate Provost for Interdisciplinary Initiatives, Associate Professor of Political Science

R. Scott Appleby, Marilyn Keough Dean of the Keough School of Global Affairs, Professor of History

Patricia Culligan, Matthew H. McCloskey Dean of the College of Engineering, Professor of Civil and Environmental Engineering and Earth Sciences

Ken Kelley, Senior Associate Dean for Faculty and Research, Mendoza College of Business, Edward F. Sorin Society Professor of IT, Analytics, and Operations

Sarah Mustillo, I.A. O'Shaughnessy Dean of the College of Arts and Letters, Professor of Sociology

Santiago Schnell, William K. Warren Foundation Dean of the College of Science, Professor of Biological Sciences

**Break**  
2:25 PM  
Poster Voting Continues 'til 3 PM

**Perspectives on Data & Society**  
2:45 PM  
Moderator: Nitesh Chawla

Abby Córdoba, Associate Professor of Global Affairs

Marya Lieberman, Professor of Chemistry and Biochemistry

Fang Liu, Professor of Applied and Computational Mathematics and Statistics

Walter Schreier, Dennis O. Doughty Associate Professor of Computer Science and Engineering

Meghan Sullivan, Wiley Family College Professor of Philosophy, Director Notre Dame Institute for Advanced Study

### Amplifying Research

3:00 PM  
**Introduction**  
Nitesh Chawla

**Remarks**  
Robert J. Bernhard, Vice President for Research, Professor of Aerospace and Mechanical Engineering

**Breakout Research Session Champion Pitches**  
Moderator: Katie Liu, Research Program Manager, Lucy Family Institute for Data & Society

*Data Science for Tackling Health Inequities & Disparities* Championed by Heidi Beidinger-Burnett, Director, Master of Science in Global Health Program, Associate Professor of the Practice in Biological Sciences

*Innovating AI & the Future of Work* Championed by Robert Landers, Advanced Manufacturing Collegiate Professor

*Fighting Misinformation & the Digital Divide* Championed by Tim Weninger, Frank M. Freimann Collegiate Associate Professor of Computer Science and Engineering

*Human-Centered Data Science* Championed by Ronald Metoyer, Associate Dean of Diversity and Special Initiatives in the College of Engineering, Professor of Computer Science and Engineering

*Convergence of Data Science Methods & Society* Championed by Thomas Mustillo, Associate Professor of Global Affairs and concurrent Associate Professor of Political Science, Director of the Undergraduate Minor in Data Science

*Imagining AI for Multi-Modal & Multi-Scale Applications in the Sciences* Co-Championed by Xiangliang Zhang, Associate Professor, Computer Science and Engineering & Michael Ferdig, Professor of Biological Sciences

**Amplifying Research Breakouts**  
4:15 PM

- Data Science for Tackling Health Inequities & Disparities (B01)
- Innovating AI & the Future of Work (202)
- Fighting Misinformation & the Digital Divide (204)
- Imagining AI for Multi-Modal & Multi-Scale Applications in the Sciences (205)
- Convergence of Data Science Methods & Society (206-07)
- Human-Centered Data Science (215-16)

### Amplifying Education

4:45 PM  
**Introduction**  
Ying (Alison) Cheng, Professor of Psychology, Associate Director of Education, Lucy Family Institute

**Remarks**  
Elliott Visconti, Associate Provost, Chief Academic Digital Officer, Associate Professor of English

**Panel on Data Analytics Educational Opportunities**  
Moderator: Alison Cheng

Corey Angst, Professor of IT, Analytics, and Operations (on the Analytics PhD program)

Chloe Gibbs, Assistant Professor of Economics, Director of the Program for Interdisciplinary Educational Research (PIER)

Ronald Metoyer, Associate Dean of Diversity and Special Initiatives in the College of Engineering, Professor of Computer Science and Engineering (on ITREDS)

Thomas Mustillo, Associate Professor of Global Affairs and concurrent Associate Professor of Political Science, Director of the Undergraduate Minor in Data Science

Roger Woodard, Teaching Professor of Applied and Computational Mathematics and Statistics, Director of the Master's in Data Science

Guanglian Zhang, Associate Professor of Psychology (on the Quantitative Methods PhD program, and the Advanced Quantitative Social Science Minor)

**Concluding Remarks**  
Nitesh Chawla

**Reception, Breakout Report Outs & Poster Awards**  
(Foley's, O'Neill Hall)  
6 PM

**Members of the Notre Dame community are encouraged to mask when not presenting, eating, or drinking.** Masking is required for all event visitors from outside the Notre Dame campus community.

We want the event to be engaging for all. We've anticipated certain accommodations to enable participation (diet, allergy, interpreter, lactation room) but know special circumstances may arise.

**Need Assistance?** Lucy staff wearing an "Ask Me" badge ribbon can help or contact us by phone 574-631-7095 or email: [lucyinstitute@nd.edu](mailto:lucyinstitute@nd.edu)

**Oct 27, 2021** The Institute held its first Annual Fall Symposium convening over 160 registrants including our Provost, Deans, faculty, staff and students. We met around the common goal of exercising our mutual talents toward becoming a force for good in the world.



## Student Poster Competition

Live/crowd sourced digital voting during the event determined the winners of awards for the top three posters (\$300, \$200, \$100)

The Future of Work in a Digital and Algorithmic World: Algorithmic Management and Power & Informa...	33
Developing a New Surrogate Model for Computational Fluid Dynamic Simulation of Aorta Using Stocha...	19
False drugs are dangerous to human health, can we identify them outside a science lab ?	17

# INTERDISCIPLINARY MOMENTS

HUB

## Convergence Series

In FY 22, we hosted a popular convergence series co-organized by steering committee members, Tim Weninger and Tom Mustillo, to foster interdisciplinary conversations and collaborations between the Institute's affiliates. Each event featured multiple speakers who presented different perspectives on a common theme. Topics included Diffusion of Democracy and International Freedom, Data Analytics for Transforming Industry, and Unlocking Digital Texts.



## Data Poetics

In April 2022, we hosted the first event in the Data Poetics series. Poet and scholar Rae Armantrout discussed the humanity of machine learning with Institute Fellow and computer scientist, Xiangliang Zhang.

Zhang created a machine learning model that generated a poem using Armantrout's works as training data.

The event took place at the South Bend History Museum and was open to South Bend and Notre Dame community members.

## Lead & Healthy Housing Conference

In June 2022, we hosted the Lead & Healthy Housing Conference in collaboration with the Notre Dame Lead Innovation Team (ND-LIT) to conduct a resource gap analysis, identify new stakeholders, and develop a plan of action for next steps. This was the first in-person opportunity for lead poisoning prevention stakeholders to gather in over two years.

Community leaders identified resource gaps through survey responses and group brainstorming (right). These priorities will be prioritized in the coalition's plan for future action.



# CO-INNOVATION, ENGAGEMENT AND COLLABORATION BETWEEN ACADEMIC TEAMS, INDUSTRY LABS, AND THE REGIONAL BUSINESS COMMUNITY

HOW WE INCENTIVIZE CHANGE



## WELCOME RICK

**Rick Johnson**, BS, MLIS joined Lucy Family Institute as Managing Director of the **Applied Analytics & Emerging Technology Lab** (AETL) and Assoc. Professor of the Practice in April 2022. His goals include enabling sustained engagement and collaboration between academic teams, iNDustry Labs, and the regional businesses. Rick will be developing partnerships that accelerate Industry 4.0 digital transformation in the region, enhancing competitiveness and growth; and cultivating societal impact through the application of strong data analysis and innovative insights within the business community.

AETL is part of the Lucy Family Institute, and collaborates with iNDustry Labs to help accelerate economic and innovation impact in the South-Bend Elkhart region, achieving the goals of the LIFT Network.

**Rick Johnson**, BS, MLIS Assoc Dir. AETL

**Michael Kennel**, BS AETL Software Engineer

**Ramandeep Makhija**, BS MS, AETL Data Scientist

**Matthew Hauenstein**, PhD AETL Data Scientist

*The team enables sustained co-innovation, engagement and collaboration between academic teams, iNDLabs, and the regional business community.*

They pilot ideas and proofs-of-concept for the digital and analytics journey of businesses and accelerate use-inspired research that leads to application of analytics, scaling analytics powered innovation, and driving advancement of foundational research.

# TESTIMONIALS



Having the opportunity to work closely with the team at AETL allows CHaSE Manufacturing, LLC access to additional Data Science and Software Engineering resources and perspectives, helping CHaSE increase the quality of our decision making and improve the value of our data. In addition, it is our shared mission to make derivative works from our collaboration open and available for others in our region; by our continued efforts, we hope to have a long-term impact on CHaSE, our customers and vendors, and the region.

**- Matt Harrison, CHaSE Manufacturing, LLC**

By providing our technology and services to this collaboration, we're in a position to assist the SBE region's industrial businesses in remaining competitive as data-driven insights become increasingly critical to standard business operations. We are very excited to be in partnership with the University, and to help facilitate the opportunities created when academic resources, enhancement of student skills, and industry growth intersect in support of a common goal.

**- Rich Carlton, President and CRO, Aunalytics**

## aunalytics



"1st Source Bank is excited to partner with the College of Engineering and AETL to give students applied experience on a real problem to analyze and learn from data. We look forward to the insights they discover and future opportunities to learn from each other.

**- Jeff Williams, 1st Source Bank**

The Center for Civic Innovation (CCI) in the College of Engineering is pleased to partner with AETL to offer a student project in the area of financial analytics with 1st Source through our new course EG35101, 'Industry and Community Based Innovation Projects'. Historically, CCI has offered student projects in the public sector with regional governments and not-for-profits, but the LIFT grant opens new opportunities with local businesses. CCI and the Lucy Family Institute have already worked together on the DataMichiana web portal and we're looking forward to working with AETL on this exciting new project with 1st Source Bank.

**-Prof. Jay Brockman, University of Notre Dame**



The AnalytiXIN initiative is based out of Indianapolis with the mission of **creating an ecosystem for fostering academic collaborations with Industry.**

*The Lucy Family Institute is executing this Lily Endowment funded project for the University.*



## WELCOME VALYA

**Valentina (Valya) Kuskova**, PhD was appointed in March 2022 as Professor of the Practice in the Lucy Institute and to serve as the Inaugural Managing director for Notre Dame's AnalytiXIN program. Her main responsibility is to coordinate and execute the implementation of the Notre Dame AnalytiXIN interface with industry stakeholders.

*"Notre Dame's commitment to finding creative and consequential ways to partner with AnalytiXIN has been outstanding. The office at 16 Tech is the first location in Indianapolis for the university. We are thrilled to have them in this new, vibrant community and having a thought leader like Dr. Kuskova spearheading Notre Dame's Indy-based presence will accelerate our shared interests and efforts to grow the state's data science capabilities,"* said David Johnson, president and CEO of CICP.

# PEOPLE@ analytiXIN

Professor in Electrical Engineering  
Expertise in Wireless, IOT

**Monisha Ghosh**



Advanced Manufacturing Collegiate Professor of Aerospace & Mechanical Engineering  
Expertise in manufacturing processes

**Robert Landers**



Research Associate Professor in Lucy Family Institute for Data & Society  
Expertise in machine learning, DS

**Nuno Moniz**



Assistant Professor in School of Global Affairs  
Expertise in AI & Ethics

**Yong Suk Lee**



Associate Professor of Practice in Lucy Family Institute for Data & Society  
Expertise in data science & GIS

**Matthew Sisk**



Collegiate Associate Professor of Computer Science & Engineering  
Expertise in AI, Analytics, Cybersecurity

**YanFang Ye**



## AnalytiXIN Faculty Fellows

The AnalytiXIN Faculty fellows, as part of talent recruitment initiative, will bring their expertise to collaboration with Indiana Industries to advance the state-of-the-art in different sectors such as life sciences, pharmaceuticals, healthcare and manufacturing.

## Student interns

are a part of AnalytiXIN project-level engagement.

**Six** students were selected out of more than 30 applications for the Summer program.



# INDIANA INDUSTRY PARTNERSHIPS



**Nicholas Berente**  
**(IT, Analytics, & Operations)**



**Toby Li**  
**Computer Science & Engineering)**



**Lizhen Lin**  
**(Applied & Computational Mathematics and Statistics)**



**Xiufan Yu**  
**(Applied & Computational Mathematics and Statistics)**



**Xiangliang Zhang**  
**(Computer Science & Engineering)**

## Summer Faculty Fellows

are a part of the Strategic Engagement initiative, aimed at immediately addressing companies' data-related needs with Notre Dame's expertise and top talent.

Notre Dame faculty applied to be Summer Faculty Fellows by sharing ideas of research collaborations that were co-created with AnalytiXIN companies.

Phase I funding includes one month of faculty summer salary, travel, and funding for fundamental research.



## CENTER FOR SOCIAL SCIENCE RESEARCH

### CSSR Team

**Brian Fogarty**, PhD Assoc. Director,  
Center for Social Science Research  
(CSSR)

**Cheng Liu**, PhD Lead Data Scientist

**Swapnil Motghare**, PhD CSSR Asst  
Research Professor

**Yang Xu**, MS CSSR Data Science  
Consultant

**Jessica Young**, MS CSSR Data Science  
Consultant

The Center for Social  
Science Research (CSSR)  
provides capacity as a  
research core facility  
dedicated to supporting and  
collaborating with scholars  
at Notre Dame engaged in  
social science research.



HOW WE SERVE

## BRIAN FOGARTY

Brian Fogarty, PhD serves as an Associate Director for Lucy Family Institute, specifically overseeing the Center for Social Science Research. He is also concurrent Associate Professor of the practice in the Department of Political Science. At the CSSR, he works with social science researchers to support their project research design, data, and quantitative analysis needs. His current research focuses on the news media as a strategic actor in politics and understanding perceptions of voter and electoral fraud.



# CONSULTATION

Data Science consultation and services  
for social sciences research faculty



Modeling and analysis for  
social sciences (text mining,  
machine learning)



Survey design and data  
collection



Data visualization and  
preparation



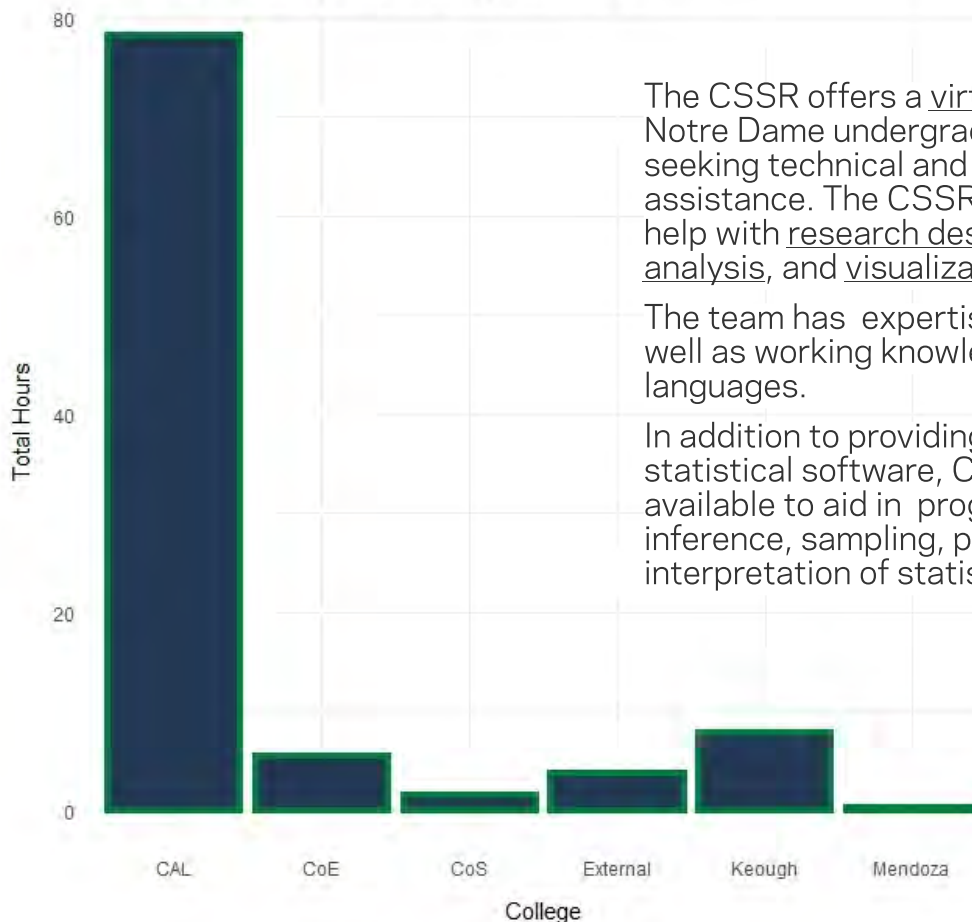
General statistics consulting

Open Help Desk for graduate and  
undergraduate students



Free assistance with coursework,  
research questions, software, and  
programming

Total CSSR Student Help Desk Support for FY22



The CSSR offers a virtual help desk available to all Notre Dame undergraduate and graduate students seeking technical and methodological research assistance. The CSSR's highly trained team offers help with research design, data collection, modeling, analysis, and visualization.

The team has expertise in R, Python, and Stata as well as working knowledge of various programming languages.

In addition to providing assistance with navigating statistical software, CSSR Help Desk consultants are available to aid in program evaluation, causal inference, sampling, power analysis, and interpretation of statistical results.

The 'External' category includes former ND students & students at other universities.

# INTERNATIONAL COLLABORATIONS

*Institute foci include collaborations that leverage our expertise to tackle national and global challenges in data & society. Our faculty often co-organize or are invited to national and international projects as global thought leaders, co-investigators, and technical experts.*



**Ghana: Maternal & Infant Health** Lack of access to maternal and infant health information, poor decision-making skills, socio-cultural norms and practices, teenage pregnancies, and reliance on paper data systems are major drivers of maternal and infant mortality in rural communities in Ghana. We will scale-up, strengthen, and evaluate an effective multi-component intervention titled “Technology for Maternal and Infant Health (T4MIH)” in five regions in Ghana. T4MIH will leverage data and technology as strategies for decreasing delays in seeking and receiving skilled healthcare, enabling health-related decision-making and increasing maternal and infant health knowledge among women and adolescent girls, as well as their social networks. **Team:** Yenupini Joyce Adams (PI and Lucy Affiliate), Marian Botchway (Eck, Lucy Affiliate), Jackline Oluoch-Aridi (Notre Dame International), Paul Perrin (Pulte, Lucy Affiliate), Nitesh Chawla, Jessica Young, and Michael Kennel. In Ghana, the Savana Signatures team includes: John (Stephen) Agbenyo, Ethel (Emefa) Ehla, Eric Opoku, Elikem Agbenyo.



**Italy: AI & Society** Institute Director, Nitesh Chawla, was an invited speaker at University of Pisa as part of the Italian Government National program on AI for Society. The Institute is exploring a partnership with the University of Pisa on the exchange of students.



**Germany: Digital Ethology** Institute Director, Nitesh Chawla, participated in the Ernst-Strungman Digital Ethology Forum. The group focused on the study of human behavior as captured by its digital footprint, and explored how it can be used to quantify the human environment and facilitate understanding of its impact on health and well-being.



**Poland/EU and beyond:** The Institute (represented by Chawla) is a partner in a European Union (EU) funded consortia proposing a project entitled: **Overcoming Multilevel Information Overload - OMINO**. The OMINO consortia includes universities from Poland (lead), Austria, Slovenia, United Kingdom, Japan, Israel, Singapore, and United States. As part of the consortia, the Institute will be a host to European students and researchers who travel abroad with support from an EU funding instrument. The Institute's host role creates compelling collaborative opportunities and expands the Institute's global footprint. One of the most important aspects of the OMINO research area is its interdisciplinary nature, requiring the joint work of experts in different fields and topics, such as neuroscience, data mining and machine learning, statistical physics of complex systems, social science and journalism.

# INSTITUTE ROLE IN GLOBAL DATA COMMONS



The **GO (Global Open) FAIR** initiative's main goal is kickstarting the development of a global data 'commons' for research and innovation. By making the currently fragmented landscape of data and services Findable, Accessible, Interoperable and thus Reusable (FAIR) for machines and people, we can together achieve a global Internet of FAIR Data & Services capable of supporting AI/ML/data science intensive global research collaborations.



**Natalie Meyers**, MA, MLIS serves as Assoc. Director Operations, and Professor of the Practice in the Institute and a member of the GO FAIR US Support and Coordination Office & serves as an U.S. Member on the International Science Council's Committee on Data (CODATA) Data Interoperability Working Group.



At the Institute we strive to exemplify and encourage FAIR data practices through our participation in GOFAIR, through our RFPs that require FAIR data sharing, through our data science training, in our platform implementations, and even in our RFPs. When we make benefactions we require FAIR output sharing of our awardees and offer support in making shareable data and code FAIR.



Agencia Nacional de  
Investigación y Desarrollo



PONTIFICIA  
UNIVERSIDAD  
CATÓLICA  
DE CHILE

In July '21 the University of Notre Dame declared its commitment to collaborate as a Partner Institution with Pontificia Universidad Católica de Chile, on its proposal for Development of Institutional Capacities for Knowledge Management of Scientific Information and Research Data: "Building the basis for open science".

# EDUCATION FOR DATA-DRIVEN FUTURE

# EDUCATION INITIATIVES

EDUCATION

HOW WE INCENTIVIZE CHANGE



## Early Bridges *to* DATA SCIENCE UNIVERSITY OF NOTRE DAME

*A three-day summer series where local middle school teachers participate in interactive workshops and pedagogy training at ND so that they can learn methods for teaching data science to their students.*



### INTRODUCING ALISON

Ying (Alison) Cheng, PhD was appointed as the Institute's Associate Director of Education Initiatives in FY 22 and serves concurrently as Professor of Psychology where her research focuses on quantitative methods in educational and psychological measurement research, particularly item response theory (IRT) and cognitive diagnostic modeling.

This year Alison was elected to the Board of Trustees of the International Psychometric Society. She will be serving a three-year term (2022 - 2024).

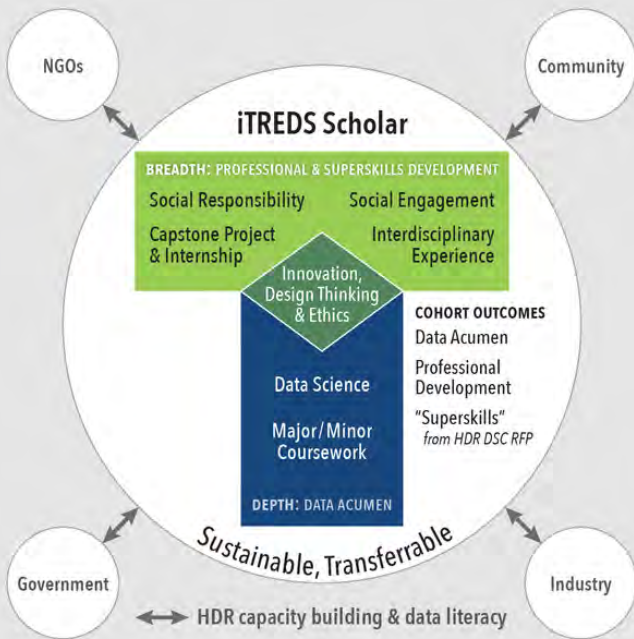
### Summer Trainee Program for Data Science & Society (STP)

A three-week experience for two undergraduate Interns leading high school students (STP Scholars) to learn about data science and to apply skills through project-based learning. High school students will also get the opportunity to design and execute their own data science research projects, which will be rooted in their curiosities to address real-world problems within their community.



# ITREDS

**Interdisciplinary Traineeship for Socially Responsible and Engaged Data Scientists (iTREDS)** trains undergraduate students at Notre Dame and Saint Mary's College in data science through a lens of social responsibility and community engagement. Students produce impactful and equitable solutions while appreciating the ethical implications of data science innovation.



## EDUCATION

HOW WE INCENTIVIZE CHANGE

### INTRODUCING SUGANA

Sugana Chawla, MA in Education, manages the iTREDS program as the Education and Outreach Program Manager. Sugana also has a BS in Environmental Science and Policy. She is inspired everyday to work with our interdisciplinary cohort of students, faculty and external stakeholders to develop data science curricular and research experiences that advance common good.



# WORKSHOPS & TRAINING



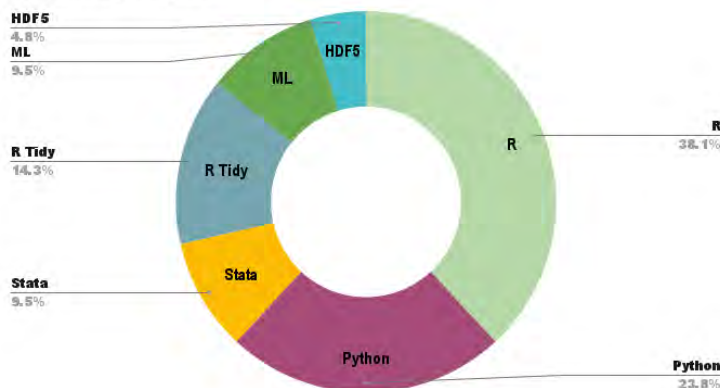
Photo Credit - Denise Linn Riedl, Chief Innovation Officer  
City of South Bend

Labs for Industry Futures and Transformation (LIFT) Network interns learning R, eating pizza, and digging into some cool datasets on June 16 with the Institute's Prof. Mat Sisk at South Bend's Ignition Park Technology Resource Center.

## Workshop Topic Coverage in FY 22

02/01/2022 R & Studio  
02/03/2022 Python  
02/04/2022 Stata  
02/09/2022 Tidyverse  
02/09/2022 Twitter Data w Python  
02/16/2022 Tidyverse  
02/16/2022 Twitter Data w Python  
02/23/2022 Tidyverse  
02/23/2022 Pulling Twitter Data with Python  
03/02/2022 Linear Regression in R  
03/10/2022 R Carpentries

### Workshop Topics



FY 22 WORKSHOPS

### Pulling Twitter Data with Python (3-Session Sequence):

1. Extracting Data with Twitter API (Feb 9)
2. Parsing Twitter Data (Feb 16)
3. Wrangling & Basic NLP with Twitter Data (Feb 23)

### Tidyverse in R (3-Session Sequence):

1. Intro to Tidyverse & Data Management (Feb 9)
2. Variable Manipulation & Wrangling (Feb 16)
3. Data Visualization (Feb 23)



### Linear Regression in R (Mar 2)

Generalized Linear Regression in R (Mar 16)  
Intro to Machine Learning with R  
(Mar 23)

# EXPANSION GOALS FOR FY 23

## Expanding the Team

- **Jaron Porciello**, MLIS Associate Professor of the Practice joins the faculty in July '22 as an information and data scientist.
- **Nuno Moniz**, PhD Research Associate Professor joins the institute in Aug '22 as a Machine Learning / AI Scientist
- **Ian Hogan**, Administrative Coordinator joins in Aug '22
- **Bo Pei**, PhD Postdoc for Education Research in collaboration with ND Learning joins in Aug '22

## Research & Education Expansion

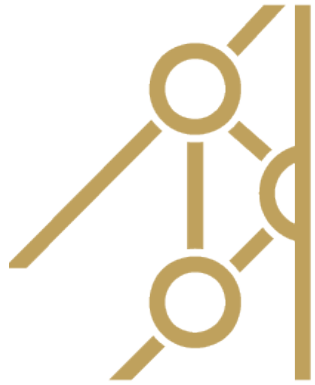
- We are developing AI-driven digital platforms that center around fair, equitable, accessible and inclusive learning.
- Developing a sustainable expansion of the iTREDS including possibilities of an iTREDS minor as well as a graduate program implementation of iTREDS.
- Expanding Data Literacy Programming for our communities including middle and high school students and teachers.
- Contributing to building a diverse and inclusive data science workforce.

## Growing Collaborations & Our Translational Impact on Society

- Growing partnerships with the local community for social justice, reducing gun violence, health equity, and expanding our inclusive data stories
- Engine for regional & statewide innovation & industry impact
- Foster global collaborations in diverse areas, including health & wellbeing, fair elections, peace process implementation, mitigating digital divide, pursuing ethical data and algorithm governance and using data science for sustainable development goals.
- We will foster emerging International Collaborations in: Algeria, Canada, Chile, Columbia, Europe (ECPR FAIR & CODATA), Italy, Mexico, Vietnam, and the UK.

## Convergent Research Ideas

- The Institute seed funded the **Michiana Community Health Coalition** which has now attracted additional funding provided by Beacon Health and continues under this support in FY23.
- **Lead poisoning prevention:** NSF funded collaboration between Lucy researchers, St. Joseph County Department of Health, Beacon Community Impact, and the City of South Bend will work together to close the loop on community access to resources.
- **Socio-technocal systems for Sustainable Societies:** The Gates Foundation has expressed interest in AI-enabled Natural Language Processing for Sustainable Agriculture
- **Inclusive Technological Advancements for ERC:** NSF Engineering Research Center for Systems and Technologies for Intelligent, Transformative, and Context-aware Healthcare.
- **AI for Education:** NSF AI Institute for Socially Responsible Learning Assessment and Support



## **Lucy Family Institute for Data & Society**

*"We believe data science and analytics offer a powerful opportunity to enhance interdisciplinary collaboration and learning at the University, and that Notre Dame is uniquely positioned to bring an ethical perspective to its use for the good of society."*

**- Bob and Sara Lumpkins**



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