

June 2022

# CompEpi Quarterly

Newsletter of the Global Pervasive Computational Epidemiology project



[computational-epidemiology.org](https://computational-epidemiology.org)

# Team Meeting Review

Thank you to everyone who participated in our May hybrid team meeting. We wish the entire team could have attended in person, but overall we think it was a great success!

Our Program Committee deserves a special shout-out for the work they put into planning the sessions and keeping things on track: Anuj Mubayi, Xinwei Deng, Samarth Swarup, and Aravind Srinivasan.

The full program kicked off with a keynote address by Cecile Viboud, senior research scientist in the Division of International Epidemiology and Population Studies of the Fogarty International Center, National Institutes of Health.

We then broke into groups to consider the research progress we've made so far and future directions we'd like to explore in Modeling and Forecasting, Data and Privacy, Computation and Infrastructure, Policy and Decision Making, and Education and Outreach.

After some very lively discussions, we were treated to a panel discussion titled "Reflections on COVID and epidemiology research: short-term challenges and long-term questions" hosted by Srinivasan Venkatramanan. Panelists included Li Xiong (Emory University), Eili Klein (Johns Hopkins University), and Justin Crow (Virginia Department of Health).

A student poster session finished the day - make sure you look check out the pictures at the end of this newsletter.

Day 2 started with a riveting keynote address from Ramesh Raskar, an Associate Professor in the MIT Media Lab. We wrapped this up with presentations by the discussion groups and many great ideas for our October NSF Review Panel.

We are looking forward to more discussions and opportunities for collaboration going forward!



*Golda & Erin*

## Seminar Series - 10 Mar 22

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YouTube

### Role of Modeling During Epidemic Responses- View From Public Health, Industry, and Academia

David L. Swerdlow MD is a Senior Fellow at the Center for Communicable Disease Dynamics, Harvard T.H. Chan School of Public Health (CCDD). He recently retired from Pfizer Vaccines after six years as Global COVID Vaccine Medical Lead (March 2020 - July 2021) and Clinical Epidemiology & Business Development Lead (May 2015- July 2021). Previously he worked at CDC for 25 years. From 2009–15 he was the Associate Director for Science, National Center for Immunization and Respiratory Diseases (NCIRD). He was Incident Manager (CDC lead) of CDC's MERS Coronavirus Responses in 2013 and 2014 and held leadership roles during numerous other CDC emergency responses including CDC's response to cholera in Haiti (CDC lead), pandemic Influenza A (H1N1), Ebola in West Africa, Hurricane Katrina, adverse events associated with smallpox vaccine, and the anthrax bioterrorism attacks. At CDC he spent more than a decade studying food-borne diseases and several years studying respiratory diseases, rickettsial diseases and HIV/AIDS.



*Dr. David Swerdlow*



David attended UCSD and Harvard Medical School and completed an internal medicine residency at the University of Washington, Seattle, Epidemic Intelligence Service (EIS) fellowship at CDC, a preventive medicine residency at the San Diego County Health Department, and an infectious diseases fellowship at the Massachusetts General Hospital (1992-93). He is board certified in internal medicine and infectious diseases, was a clinical assistant professor of medicine at Emory University School of Medicine and worked in the Infectious Diseases Clinic at the Atlanta VA Medical Center from 1993- 2015. He was an adjunct assistant professor at Rollins School of Public Health, Emory University and was the lead instructor of two epidemiology courses. He was on the Program Committee of IDSA and was an Academic Editor at PLoS ONE. He has co-authored over 265 peer-review publications, book chapters, and government publications. David has had a long-standing interest in infectious disease modeling. At CDC he initiated and led the NCIRD Modeling Unit which was a collaborative effort with CCDD and Imperial College. He initiated several modeling short courses for CDC epidemiologists working with CCDD, Imperial College, and Hong Kong University. He was Co-Chair of the Pandemic Prediction and Forecasting Science and Technology Working Group (sponsored by the White House Office of Science and Technology Policy). He was guest editor of three Clinical Infectious Diseases supplements on the role of modeling and field epidemiology in response to influenza pandemics and led modeling efforts during several pandemic planning exercises at CDC. He was co-author of numerous papers describing transmission models of influenza, Ebola, MERS, typhoid fever, pertussis, and SARS-CoV-2. At Pfizer he initiated modeling projects with CCDD, the University of Utah, and Columbia University to understand the true burden of COVID-19 and the best vaccination strategies in long-term-care settings as well as the community, many of which have been published.

**Seminar Series - 24 Mar 22**

Click here  
to watch on  
YouTube

**Two Years Before the Mast:  
Reflections on the Late Pandemic**

Richard Hatchett is Chief Executive Officer of the Coalition for Epidemic Preparedness Innovations (CEPI), which supports the development of vaccines against epidemic diseases such as Ebola and Nipah and technology platforms to allow the rapid development of vaccines against emerging threats such as COVID-19. CEPI helped establish and now co-leads the COVAX pillar of the Access to COVID-19 Tools (ACT) Accelerator. Dr. Hatchett was previously the acting Director of the U.S. Biomedical Advanced Research and Development Authority (BARDA) and served as Director of Medical Preparedness Policy on the Homeland and National Security Councils under Presidents Bush and Obama, respectively. He received his medical degree from Vanderbilt and completed clinical training in internal medicine and medical oncology at Cornell and Duke.



*Dr. Richard Hatchett*



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*Would you like to present at a future Seminar?  
Email Golda and Erin with your availability, title, and abstract.*



**Seminar Series - 14 Apr 22**

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**A Framework for Modeling Complex Human Behaviors in Epidemic Simulations**

The COVID-19 pandemic has shown the importance of understanding the role of human behavior in the spread of infectious diseases. Behaviors such as mask-wearing, social distancing, and choosing to get vaccinated are driven by multiple social processes such as normative reasoning, risk perception, and attitudes. In ongoing work, we have been building a platform that can use the belief-desire-intention (BDI) agent paradigm together with large-scale agent-based simulations of epidemics to allow modeling such social phenomena. I will describe this new simulation platform and show an initial attempt at building a COVID-19 simulation with BDI agents that allows scaling up to ~8 million agents.



*Dr. Samarth Swarup*

 UNIVERSITY of VIRGINIA  
BIOCOMPLEXITY INSTITUTE

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Samarth Swarup is a research associate professor in the Network Systems Science and Advanced Computing division. Swarup earned his Ph.D. in Computer Science from the University of Illinois at Urbana-Champaign. His research interests include: Resilience and Sustainability - Simulation methods for urban and environmental modeling, disaster response, epidemic mitigation and prevention; Computational Social Science - Model-based informatics, racial and economic disparities, social media, big data; Simulation Analytics - Social networks and social contagion, causality and sense-making in simulations, AI and machine learning.

*Would you like to present at a future Seminar?  
Email Golda and Erin with your availability, title, and abstract.*

**Seminar Series - 12 May 22**

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**Adapting quarantine as a public health measure to scenarios where community transmission is ongoing on both sides of a border**

There is a longstanding gap in the science of public health: when there is already community transmission at a destination, how much travel quarantine can be justified? Travel quarantine is a venerable public health strategy designed to keep disease away from uninfected populations. But its use is controversial: it raises political, ethical, and socioeconomic issues balancing public interest and individual rights. Early in the COVID-19 pandemic, travel restrictions were aimed to slow or mitigate the spread of SARS-CoV-2 to heretofore unafflicted nations, a well-established approach justified by preventing or delaying disease in a country with zero prevalence. At times, strict national border control measures mandating an extensive quarantine have often been imposed between origin & destination countries that both have ongoing community transmission. Border restrictions are a politically expedient executive action. However, they provided diminishing public health benefits as the COVID-19 pandemic has progressed. Imported cases have had little impact where community transmission was well established. We investigated reasonable quarantines for travelers who have not been identified as likely infected by calculating post-quarantine transmission via country-specific imminent infections, identifying travel quarantine and testing strategies such that infections won't go up in the destination country when compared to complete border closure. The effect of travel policy on in-country transmission comes down to an import-export balance equation regarding whether travelers from a country carrying imminent infections to another faster in one direction than another. This balance can be accurately modeled.



Dr. Jeffrey Townsend

Yale

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Professor Townsend received his Ph.D. in 2002 in organismic and evolutionary biology from Harvard University. After that, he was appointed as a Miller Fellow at the University of California-Berkeley in the Department of Plant and Microbial Biology. In 2004, he was appointed as an Assistant Professor in the Department of Molecular and Cell Biology at the University of Connecticut. In 2006 he moved to an Assistant Professorship the Department of Ecology and Evolutionary Biology at Yale University. In 2013 he began to work on statistical approaches to fit mathematical models of disease spread and emergence, and was appointed as an Associate Professor of Biostatistics and Ecology & Evolutionary Biology, in 2017 he was named Elihu Associate Professor of Biostatistics and Ecology & Evolutionary Biology, and in 2018 he was appointed Elihu Professor of Biostatistics and Ecology & Evolutionary Biology.

*Would you like to present at a future Seminar?  
Email Golda and Erin with your availability, title, and abstract.*

## Seminar Series - 23 Jun 22

Click here  
to watch on  
YouTube

### **Increasing COVID Vaccine Uptake in Sub-Saharan Africa: A Multidisciplinary Approach**

Johnson & Johnson Global Public Health (J&J GPH) has a mission of accelerating equitable health care delivery among the world's most vulnerable and underserved populations. During the COVID-19 pandemic, Africa has experienced a disproportionate burden of the disease and suboptimal vaccine uptake. This seminar showcases J&J GPH efforts to understand and combat vaccine hesitancy across the African continent by leveraging data and behavior science alongside private sector capabilities. Specially, Lauren Marks from Johnson & Johnson Global Public Health will discuss J&J's approach to understanding a target audience and designing interventions to reach them, with an emphasis on how and why to use tools like Behavioral & Attitudinal Segmentation, Message Testing, and Geospatial Analysis to find the right people with the right message.

Sunny Sharma and Rebecca West from Ipsos will then delve into the research findings from some of these studies. In 2021, J&J GPH and Ipsos conducted two phases of unbranded market research with unvaccinated adults in Kenya, Nigeria, and Zambia. First, a segmentation typing tool was designed and tested to define sub-groups of people according to attitudinal barriers and motivators to vaccinate – the confident enthusiasts, enthusiastic pragmatists, vaccine skeptics, and COVID-19 cynics. Next, a discrete choice experiment was conducted to test optimal messages across sub-groups to support vaccine uptake. In this seminar, Rebecca and Sunny from Ipsos will present details of the segmentation study and recommended message strategies.

Lastly, Kenneth Davis and Quinn Lewis from Fraym will explore the Geospatial Analysis. In partnership with J&J GPH, produced machine learning (ML) enhanced spatial population data to 1) map levels of COVID-19 vaccine hesitancy, 2) model the underlying drivers of hesitancy based on Confidence, Convenience, and Complacency, and 3) replicate the five Ipsos population segments. These data and models were all produced down to the community and neighborhood level (1km<sup>2</sup>) across ten countries – Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, South Africa, Uganda, and Zambia. This insight is being delivered through a custom web-based application to inform risk communication and community engagement (RCCE) and social behavior change (SBC) efforts among a wide variety of implementing partners working to increase COVID-19 vaccine uptake.

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See speaker bios on next page



Lauren Marks leads USG partnerships for Johnson & Johnson Global Public Health, where she is responsible for developing partnership strategies, and executing insight-driven programs which achieve greater patient impact in Global Public Health. Previously, she managed the HIV/AIDS portfolio for Johnson & Johnson's Corporate Contributions group.

Prior to joining J&J, Lauren spent most of her career in government, at the Department of State and USAID. She was the Director of Private Sector Engagement in the Office of the U.S. Global AIDS Coordinator and Health Diplomacy, which leads implementation of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). In this role, she built several multi stakeholder partnerships and spearheaded large-scale innovation competitions to source new ideas to solve public health problems.

She also served as the Health Program/Public-Private Partnership Advisor at USAID/South Africa, where she built several successful PPPs between the US Government, the private sector, and non-governmental organizations. Lauren worked at USAID/Washington in the Bureau for Global Health, where she provided technical support to USAID missions in several African and Asian countries.

Prior to USAID, Lauren was a corporate attorney at Nixon Peabody LLP in New York. She has a law degree from Georgetown University and a BA from Duke University.



Sunny Sharma leads the Global Health practice within Ipsos UK. He has led research projects across HIV, TB, Family Planning, Malnutrition and vaccine hesitancy for makers, donors, private industry and implementing partners primarily in sub-Saharan Africa and South/ South East Asia.

He specialises in behavioural science research and design research ensuring that insight and research findings can be translated into tangible actions. He has been with Ipsos since 2011 and prior to solely focussing on Global Health in 2016, he supported private sector clients with their marketing research needs within the EU. He has worked to turn public health challenges into marketing challenges using techniques commonly used in the commercial sector to bring fresh approaches to the sector.

Sunny holds an MSc. in International Healthcare Management from Imperial College London and a Ba. In Politics and Economics from the University of Newcastle.



Rebecca West is Research Manager in global health at Ipsos UK, with expertise in adult HIV care and treatment and vaccine hesitancy in sub-Saharan Africa. She is passionate about using mixed methods to inform public health program implementation and improve care quality. Prior to joining Ipsos, she worked for the University of California San Francisco Center for AIDS Prevention Studies and ICAP at Columbia University, as well as completing a fellowship at Ariadne Labs/Harvard School of Public Health in implementation science.

Becca holds an MPH from Columbia University and a BS in Public Health from the University of Washington. She is currently a Doctor of Public Health candidate at Boston University. Her research is published in journals including *JAIDS*, *AIDS and Behavior*, *PLOS ONE*, *Journal of Global Health Science*, and the *International Journal of Health Policy and Management*, and she currently serves as a peer reviewer for *PLOS Global Public Health*.



Kenneth Davis is a New Business Manager with Fraym's Global Development team interested in leveraging emerging technologies to build a more just, equitable, and peaceful world. He is currently working with public health stakeholders to use spatial population data produced through machine learning to better understand people in the most data-scarce parts of the world.

Since the start of the COVID-19 pandemic, Kenneth has supported partnerships with multilateral organizations, global foundations, government agencies, and multinational companies to better mitigate the impact of the pandemic on the most vulnerable populations, develop more equitable country vaccination plans, and to disrupt to the growing threat of medical misinformation and vaccine hesitancy.

Previously, Kenneth worked as a business development professional at Global Communities and Creative Learning where he supported projects aimed at reducing the spread of HIV and preventing violent extremism. He has an M.A. in Ethics, Peace, and Global Affairs from American University and a B.A. in International Affairs and Religion from Florida State University.



Quinn Lewis is an Analytics Team Lead at Fraym, where he specializes in project management and geo-spatial data analysis with a focus on public health, agricultural productivity, and off-grid energy. He is currently working with public health and off-grid energy stakeholders, developing methodologies related to HIV risk, vulnerable population market segmentation, COVID-19 vaccine allocation, and rural electricity demand.

Prior to Fraym, Quinn received an M.I.A in International Development from the University of California, San Diego, where he was also a research assistant working on projects related to environmental variability and maternal and child health. Quinn is also a returned Peace Corps volunteer who served in Ethiopia from 2014-2016, where he worked at the intersection of agriculture, nutrition, and education.



# Publications & Preprints



*Our team has been busy supporting the challenges of real-time epidemic science, particularly pertaining to the COVID-19 Pandemic.*

**Data-driven Agent-based Models for Optimal Evacuation of Large Metropolitan Areas for Improved Disaster Planning.** [Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems](#). May 9;1639-1641. Islam KA, Marathe M, Mortveit H, Swarup S, Vullikanti A (2022)

**Theoretical Models and Preliminary Results for Contact Tracing and Isolation.** [Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems](#). May 9;1672-1674. Li GZ, Haddadan A, Li A, Marathe M, Srinivasan A, Vullikanti A, Zhao Z (2022)

**Finding Nontrivial Minimum Fixed Points in Discrete Dynamical Systems: Complexity, Special Case Algorithms and Heuristics.** [Proceedings of the Thirty-Sixth AAAI Conference on Artificial Intelligence](#). Feb 28; 9422-9430. Qiu Z, Chen C, Marathe M, Ravi SS, Rosenkrantz DJ, Stearns R, Vullikanti A (2022)

**Deploying Vaccine Distribution Sites for Improved Accessibility and Equity to Support Pandemic Response.** [arXiv:2202.04705](#). To appear in *Proceedings of the AAMAS 2022*. Feb 9. Li G, Li A, Marathe M, Srinivasan A, Tsepenekas L, Vullikanti A (2022) **Best Student Paper Award**.

**Network Models and Simulation Analytics for Multi-scale Dynamics of Biological Invasions.** [Front. Big Data 5](#). Feb 7;796897. Adiga A, Palmer N, Baek YY, Mortveit H, Ravi SS (2022)

**Heterogeneous Adaptive Behavioral Responses May Increase Epidemic Burden.** [ResearchGate Preprint](#). Jan 28. Espinoza B, Swarup S, Barrett C, Marathe M (2022)

**Impact of weeknight and weekend curfews using mobility data: a case study of Bengaluru urban.** [medRxiv](#). Jan 28. Adiga A, Athreya S, Marathe M, Midthala J, Rathod N, Sundaresan R, Venkataramanan S, Yasodharan S (2022)

**Projecting the seasonality of endemic COVID-19.** [medRxiv](#). Jan 28. Townsend J, Lamb A, Hassler H, Sah P, Alvarez-Nishio A, Nguyen C, Galvani A, Dornburg A (2022)

**Fundamental limitations on efficiently forecasting certain epidemic measures in network models.** [Proceedings of the National Academy of Sciences](#). Jan 25;119(4). Rosenkrantz D, Vullikanti A, Ravi SS, Stearns R, Levin S, Poor HV, Marathe M (2022)

**SARS-CoV-2 Testing Strategies for Outbreak Mitigation in Vaccinated Populations.** [medRxiv](#). Jan 1. Kumar C, Balasubramanian R, Ongarello S, Carmona S, Laxminarayan R (2022)



## May Team Meeting: Cecile Viboud, NIH

### YouTube Direct and Indirect Consequences of the COVID-19 Pandemic: A Natural Experiment

Q Working in this area for so long, do you see the need for absolutely a new class of mathematical models, or do you see that access to more data would solve many of the problems? Because this is a continuing debate in terms of whether we should invest in collecting more data, or should we build more and more sophisticated models, and I would like to take your perspective.

A I'm always going to be the data person, that's how I was trained. So I will argue for more data, and I think now there's so much opportunity even just on the epi side - we're talking about how we don't have any data from LMICs [low- and middle-income countries], for instance in a lot of those fields, but also the immune system and behavior.

We've gotten more of those during COVID-19 - I think we were lucky in a way, but there's just so much more that we need, and to me that's the more crucial need rather than new computational approaches, but I could be wrong.

I know this audience is also probably more math-oriented than I am, but my view is that we have such gaps in data that's really the major frontier.



Cecile Viboud is a senior research scientist in the Division of International Epidemiology and Population Studies of the Fogarty International Center, National Institutes of Health, USA. Her research focuses on the epidemiology and transmission dynamics of acute viral infections, at the interface of public health and computational modeling. Her work has primarily concentrated on the epidemiology of respiratory viruses and pandemic influenza, but she has recently become interested in the potential of Big Data to strengthen infectious disease surveillance and forecasting approaches. A native of France, she received an engineer degree in biomedical technologies from the University of Lyon (1998), a Master of Public Health (1999) and a PhD in Biomathematics (2003) from Pierre and Marie Curie University, Paris, France.

## May Team Meeting: Ramesh Raskar, MIT

### Waze-like App for Pandemic Journey

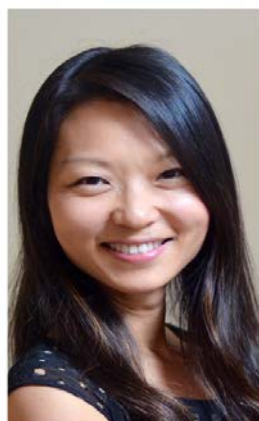
Ramesh Raskar, an Associate Professor at MIT, argues that despite spending billions of dollars and creating vaccines in a record time, in western democracies we failed to tame the pandemic because we missed one critical element in the pandemic response: citizen engagement. Crowdsourced data is the most powerful tool in a pandemic to achieve self-orchestration and social behavior change. Waze navigation app is a great example of self-orchestration. Drivers share their GPS data and Waze servers analyze traffic density and calculate emerging hotspots. Waze app gently nudges every driver to avoid those hotspots, via highly personalized hyper-local information. How can we navigate the haze of confusing data about exposures, symptoms, shutdowns, treatments and vaccination guidance, with an app that looks like Waze for the pandemic journey? On the other hand, poor public health data has led to reactionary decisions and policies that often don't play out and cause the public to lose trust. With citizen engagement missing, the classic loop of interventions, evidence-based predictions, and alerts completely falls apart thus eroding our confidence in public health and its officials. What will the future of public health look like when all citizens feel safe to be engaged and expressive without the fear of a 'surveillance state'? It will usher in an era of early warning and proactive nudges rather than the reactive policing and clumsy mandates. It is inevitable that there will be another 'Disease X' pandemic, but with the right technology combined with citizen engagement we'll be able to navigate through it as easily as navigating through rush hour traffic.

Ramesh Raskar is an Associate Professor at MIT Media Lab and directs the Camera Culture research group. His focus is on Machine Learning and Imaging for health and sustainability. They span research in physical (e.g., sensors, health-tech), digital (e.g., automated and privacy-aware machine learning) and global (e.g., geomaps, autonomous mobility) domains. At MIT, his co-inventions include camera to see around corners, femto-photography, automated machine learning (auto-ML), private ML (split-learning), low-cost eye care devices (Netra, Catra, EyeSelfie), a novel CAT-Scan machine, motion capture (Prakash), long distance barcodes (Bokode), 3D interaction displays (BiDi screen), new theoretical models to augment light fields (ALF) to represent wave phenomena and algebraic rank constraints for 3D displays (HR3D). His work has appeared in NYTimes, CNN, BBC, NewScientist, TechnologyReview and several technology news websites. His invited and keynote talks include TED, Wired, TEDMED, Darpa Wait What, MIT Technology Review, Google SolveForX and several TEDx venues. His co-authored books include Spatial Augmented Reality, Computational Photography, and 3D Imaging (under preparation).



## May Team Meeting: Panel Session

### **Reflections on COVID and epidemiology research: short-term questions and long-term challenges**



Dr. Eili Klein is an associate professor in the Department of Emergency Medicine at Johns Hopkins University. Upon finishing his Ph.D. in ecology and evolutionary biology from Princeton University, Dr. Klein joined the Johns Hopkins faculty in 2012. He is also a senior fellow at the Center for Disease Dynamics, Economics and Policy in Washington, D.C. His research focuses on the role of individuals in the spread of infectious diseases, an area that sits at the nexus of economics and epidemiology. The primary disease focus of Dr.

Klein's research is antimicrobial resistance and the spread of disease within the hospital. He is actively involved in research efforts supported by the Centers for Disease Control and Prevention (CDC) as well as Agency for Healthcare Research and Quality (AHRQ).

Dr. Li Xiong is a Professor of Computer Science and Biomedical Informatics at Emory University. She held a Winship Distinguished Research Professorship from 2015-2018. She has a Ph.D. from Georgia Institute of Technology, an MS from Johns Hopkins University, and a BS from the University of Science and Technology of China. She and her research lab conduct research on algorithms and methods at the intersection of data management, machine learning, and data privacy and security, with a recent focus on privacy-preserving and robust machine learning. Her research is supported by federal agencies including NSF, NIH, AFOSR, PCORI, and industry awards including Google, IBM, Cisco, AT&T, and Woodrow Wilson Foundation. She is an IEEE fellow and an ACM distinguished member.

Justin Crow is the Director of Division of Social Epidemiology, Office of Health Equity at the Virginia Department of Health, where his role is to provide strategic and operational leadership of research, analysis and presentation, to ensure methodological and data quality, and to collaborate with stakeholders to identify needs. Recently, he started in his new role as Foresight & Analytics Coordinator at the Virginia Department of Health, Office of Emergency Preparedness. His task involves better connecting forecasting, early warning systems, and modeling to policy decisions, program design, and preparedness planning - all to improve the health and well-being of Virginians. He has a Masters in Public Administration from Virginia Commonwealth University and a BLS in Political Science from University of Mary Washington. He is also a certified Superforecaster with the Good Judgment Project, providing probabilistic forecasts of political and economic events for a diverse group of clients, public and private.

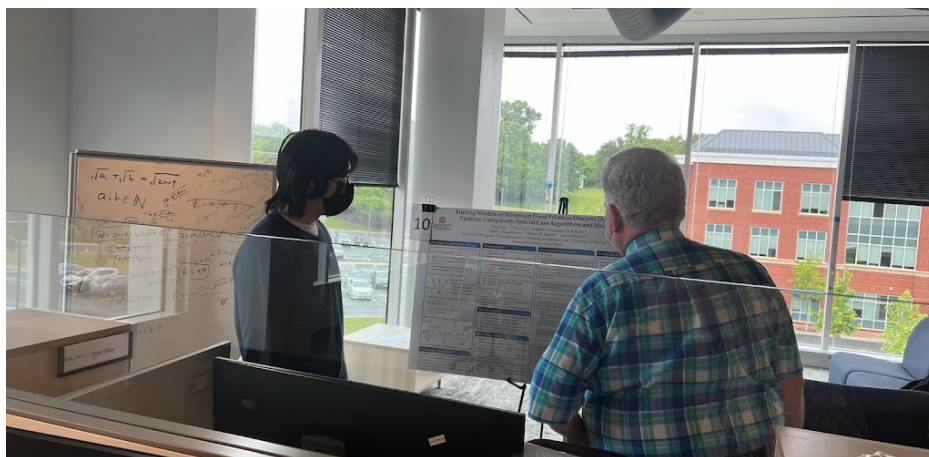
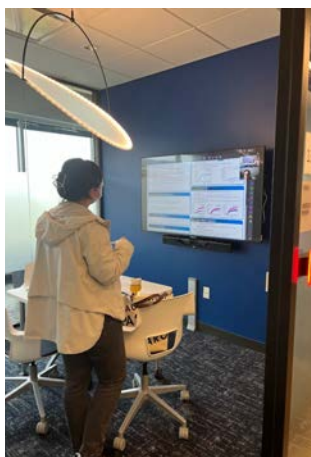


Dr. Srin Venkatramanan, Moderator



## Student Spotlight: Poster Session

We are so proud of our students and post docs and we love when they have an opportunity to talk about their research!



Faraz Dadgostari, UVA	Identifying Emergent Behavioral Classes in Epidemiological Agent-Based Simulation Models Using Inverse Reinforcement Learning
Baltazar Espinoza, UVA	Consequences of Adaptive Human Behavior in Epidemics
Jack Heavey, UVA	Provable Sensor Sets for Epidemic Detection over Networks with Minimum Delay
Dung Nguyen, UVA	Differentially Private Densest Subgraph Detection
Giridara Gopal Parameswaran, One Health Trust	Computational Epidemiology in One Health
Di Zhu & Md Khairul Islam, UVA	Understanding County Level Covid-19 Infection and Feature Sensitivity with Deep Learning
Galen Harrison, UVA	Addressing Vaccine Hesitancy through Multi-Modal Learning
Luka Gabitsinashvili, UVA	SPRINT - Student Pandemic Researchers - Interventions
Chirag Kumar, One Health Trust/Princeton	The Global Impact of Maternal Neonatal Sepsis Vaccines: A Bayesian Modeling Analysis
Zirou Qiu, UVA	Finding Nontrivial Minimum Fixed Points in Discrete Dynamical Systems: Complexity, Special Case Algorithms and Heuristics
Viswanathan Arunachalam, Univ Nacional de Colombia	Mathematical Validation and Inference in an Epidemic Model with Random Environmental Conditions: Implication for COVID-19 Epidemic Response in Colombia
Aparna Kishore, UVA	A Framework for Simulating Multiple Contagions Over Multiple Networks

## From the admin team



We are excited to be a part of this team and community. Please let us know about your publications and presentations, if you'd like to present at our Seminar Series, or if you want to share the progress your group has made. Building a community on this scale requires an intentional effort and commitment, and we are here to support you in any way we can.

**Golda Barrow {ggh5e@virginia.edu} & Erin Raymond {er9ff@virginia.edu}**

### Social media

We are always looking for content, so please let us know if there is a link, comment, or video we can share on social media.



### Join our Seminar Series the 2nd & 4th Thursday of every month!

Here's the schedule for the next few months - stay tuned for more details!

14 Jul - Sandeep Juneja, STCS-TIFR  
25 Aug - Katriona Shea, PSU  
20 Oct- David Higdon, VT  
3 Nov - Natarajan Meghanathan, JSU



### NSF acknowledgement

Remember to acknowledge NSF in your publications. Check with your grant manager for the appropriate number.

- In any publication (including web pages) of any material based on or developed under this project: "This material is based upon work supported by the National Science Foundation under Grant No. [CCF-xxxxxxx]."
- All publications except scientific articles or papers appearing in scientific, technical or professional journals: "Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation."
- NSF support must be orally acknowledged during all news media interviews, including popular media such as radio, television and news magazines.

