

## BIOGRAPHICAL SKETCH

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NAME: Visweswaran, Shyam

eRA COMMONS USER NAME (credential, e.g., agency login): vshyam

**POSITION TITLE:** Professor of Biomedical Informatics, University of Pittsburgh

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Jawaharlal Institute of Post-Graduate Medical Education and Research (JIPMER), Pondicherry, India	M.B.,B.S.	12/1987	Medicine & Surgery
Jawaharlal Institute of Post-Graduate Medical Education and Research (JIPMER), Pondicherry, India		06/1991	Residency in Anesthesiology
University of Illinois at Urbana-Champaign, Urbana, IL	M.S.	06/1996	Physiology and Biophysics
Boston University Medical Center, Boston, MA		06/2000	Residency in Neurology
University of Pittsburgh, Pittsburgh, PA	M.S.	07/2004	Intelligent Systems (AI)
University of Pittsburgh, Pittsburgh, PA	Ph.D.	09/2007	Intelligent Systems (AI)

## A. Personal Statement

I am Interim Chair and Professor of Biomedical Informatics with cross-appointments in the Clinical & Translational Science Institute at the School of Medicine and in the Intelligent Systems Program at the School of Computing and Information at the University of Pittsburgh (Pitt). My training is in artificial intelligence (AI), biomedical informatics, and clinical neurology, and my research interests include applying AI to biomedicine, with a specific focus on AI-enabled clinical decision support, ethically grounded clinical algorithms, patient-specific modeling and causal discovery from complex biomedical data, research data warehousing, and ontology development. I am the Director of the Center for Clinical Artificial Intelligence (CCAI) in the Department of Biomedical Informatics, the Director of the Informatics Core for the University of Pittsburgh Clinical and Translational Science Institute (CTSI), a PD/PI for the *All of Us Pennsylvania* research project that is a component of the Precision Medicine Initiative, a PD/PI of the Evolve to Next-Gen Accrual of patients to Clinical Trials (ENACT) network, and a site PI for the Genomic Information Commons (GIC). I also oversee the design and deployment of Neptune, a research data warehouse at the University of Pittsburgh.

The ongoing projects that I would like to highlight include:

UL1 TR001857 07/12/2016 - 05/31/2026  
Reis (PI), Role: Director, Informatics Core  
University of Pittsburgh Clinical and Translational Science Institute

OT2 ODO26554 02/08/2018 - 04/30/2026  
Reis, Visweswaran (PIs), Role: MPI  
All of Us Pennsylvania

U24 TR004111 01/08/2022 - 07/31/2027  
Reis, Visweswaran (PIs), Role: MPI

# ENACT: Translating Health Informatics Tools to Research and Clinical Decision Making

Ro1 NS098023

01/09/2022 - 08/30/2027

Zia (PI), Role: Co-I

Leveraging electronic health records to optimize treatment selection and response in multiple sclerosis

My recent key publications include:

1. **Visweswaran S**, McLay B, Cappella N, Morris M, Milnes JT, Reis SE, Silverstein JC, Becich MJ. An atomic approach to the design and implementation of a research data warehouse. *Journal of the American Medical Informatics Association*. 2022 Mar 15;29(4):601-608. PMID: 34613409; PMCID: PMC8922189.
2. Dobbins NJ, Morris M, Sadhu E, MacFadden D, Nazaire MD, Simons W, Weber G, Murphy S, **Visweswaran S**. Towards cross-application model-agnostic federated cohort discovery. *Journal of the American Medical Informatics Association*. 2024 Oct 1;31(10):2202-2209. PMID: 39110920; PMCID: PMC11413448.
3. Ji Y, Ma W, Sivarajkumar S, Zhang H, Sadhu EM, Li Z, Wu X, **Visweswaran S**, Wang Y. Mitigating the risk of health inequity exacerbated by large language models. *npj Digital Medicine*. 2025 May 4;8(1):246. PMID: 40319154; PMCID: PMC12049425.
4. Nourelahi M, Sadhu EM, Samayamuthu MJ, **Visweswaran S**. A resource for Logical Observation Identifiers Names and Codes terms that may be associated with identifying information. *Journal of the American Medical Informatics Association*. 2025 Jun 1;32(6):1066-1070. PMID: 40261908; PMCID: PMC12089774.

## B. Positions, Scientific Appointments, and Honors

### Positions and Scientific Appointments

2023 - Present Director, Center for Clinical Artificial Intelligence, University of Pittsburgh  
2023 - Present Professor of Biomedical Informatics, University of Pittsburgh  
2023 - Present Vice Chair of Clinical Informatics, Dept. of Biomedical Informatics, Univ. of Pittsburgh  
2018 - Present NIH Peer Review Committee: CIDH standing member, NLM COI & Career Award, ad hoc  
2016 - Present Director, Informatics Core, Clinical and Translational Science Institute, Univ. of Pittsburgh  
2015 - 2023 Associate Professor of Biomedical Informatics, University of Pittsburgh  
2011 - 2012 NSF Peer Review Committee: Smart Health and Wellbeing  
2006 - 2015 Assistant Professor of Biomedical Informatics, University of Pittsburgh  
2001 - 2006 Fellow in Biomedical Informatics, University of Pittsburgh  
2001 - Present Member, American Medical Informatics Association  
2001 - Present Member, American Academy of Neurology  
1997 - 2000 Resident in Neurology, Boston University  
1996 Internal Medicine Intern, St. Luke's - Roosevelt Medical Center, New York  
1991 - 1995 Research Assistant, Physiology and Biophysics, University of Illinois at Urbana-Champaign  
1989 - 1991 Resident in Anesthesiology, Jawaharlal Institute of Post-Graduate Medical Education and  
Research, Pondicherry, India

### Honors

2024 - Present Member, Encoding Equity Inaugural Advisory Committee, Council of Medical Specialty  
Societies (CMSS)  
2023 - 2024 Member, NASEM's Committee on The Use of Race and Ethnicity in Biomedical Research  
2024 Fellow of the International Academy of Health Sciences Informatics (FIAHSI)  
2023 Fellow of the American College of Medical Informatics (FACMI)  
2022 Fellow of the Australasian Institute of Digital Health (FAIDH)  
2021 Fellow of the American Medical Informatics Association (FAMIA)  
2017 First place, AMIA Joint Summits Clinical Research Informatics Student Paper Competition,  
San Francisco, CA (for a mentored student – Andrew King)  
2015 First place, AMIA Fall Symposium Student Paper Competition, Washington, DC (for a  
mentored student – Andrew King)

2014	Hattie Beech Award for Best Teacher, Department of Biomedical Informatics, University of Pittsburgh, Pittsburgh, PA
2012	Distinguished Paper Award, AMIA Summit on Translational Bioinformatics, San Francisco, CA (for a co-authored paper)
2013	Distinguished Paper Award, AMIA Summit on Translational Bioinformatics, San Francisco, CA (for a co-authored paper)
2011	Marco Ramoni Distinguished Paper Award, AMIA Joint Summits on Translational Science, San Francisco, CA (for a co-authored paper)
2010	Homer R. Warner Research Award, AMIA Fall Symposium, Washington, DC (for a co-authored paper)
2005	Third place, AMIA Fall Symposium Student Paper Competition, Washington, DC
2005	Distinguished Paper Award, AMIA Annual Symposium, Washington, DC (for a co-authored paper)
2001 - 2005	National Library of Medicine Post-Doctoral Fellowship
2000 - 2001	Chief Resident, Department of Neurology, Boston University
1981 - 1991	National Science Talent Search Scholarship, Government of India

### C. Contributions to Science

My research focuses on the application of AI approaches to biomedical challenges, with a particular emphasis on AI-enabled clinical decision support, racial equity in clinical algorithms, patient-specific modeling, causal discovery from biomedical data, research-data warehousing, and ontology creation.

1. **AI-enabled clinical decision support.** Electronic health record (EHR) systems are capturing increasing amounts of patient data that can be leveraged by AI and machine learning methods for computerized clinical decision support. My work focuses on developing a learning EHR system to provide decision support using the right data, at the right time. I also work with a team of collaborators in developing and implementing AI and machine learning methods for detecting adverse drug events and for identifying anomalies in the clinical management of patients.
  - a. King, AJ, Hochheiser, H, **Visweswaran, S**, Clermont, G, Cooper, GF. Eye-tracking for clinical decision support: A method to capture automatically what physicians are viewing in the EMR. In: AMIA Joint Summits Translational Science Proceedings. 2017 Mar 27-30; 2017:512-21. PMID: 28815151; PMCID: PMC5543363. (Awarded First Place in the Student Paper Competition at the AMIA Joint Summits Clinical Research Informatics, 2017)
  - b. King AJ, Cooper GF, Clermont G, Hochheiser H, Hauskrecht M, Sittig DF, **Visweswaran S**. Using machine learning to selectively highlight patient information. Journal of Biomedical Informatics. 2019 Oct 29:103327. PMID: 31676461; PMCID: PMC6932869.
  - c. King AJ, Cooper GF, Clermont G, Hochheiser H, Hauskrecht M, Sittig DF, **Visweswaran S**. Leveraging eye tracking to prioritize relevant medical record data: Comparative machine learning study. Journal of Medical Internet Research. 2020;22(4):e15876. PMID: 32238342; PMCID: PMC7163414.
  - d. Tajgardoon M, Cooper GF, Clermont G, Hochheiser H, Hauskrecht, M, Sittig DF, **Visweswaran S**. Modeling physician variability to prioritize relevant medical record information. JAMIA Open. 2020 Dec 31;3(4):602-610. PMID: 33623894; PMCID: PMC7886572.
2. **Ethically grounded clinical algorithms.** Clinical algorithms can perform unevenly across populations, potentially reinforcing or worsening health disparities at the point of care. My work examines the ethical implications of incorporating race and ethnicity into clinical prediction models and decision-support tools, with a focus on improving fairness, validity, and generalizability across diverse patient populations.
  - a. Anderson JW, Shaikh N, **Visweswaran S**. Measuring and reducing racial bias in a pediatric urinary tract infection model. In: AMIA Summits on Translational Science Proceedings. 2024 May 31;2024:488-497. PMID: 38827048; PMCID: PMC11141814.

- b. Anderson JW, **Visweswaran S**. Algorithmic individual fairness and healthcare: a scoping review. JAMIA Open. 2025 Feb;8(1):ooae149. PMID: 39737346; PMCID: PMC11684587.
- c. **Visweswaran S**, Sadhu EM, Morris MM, Samayamuthu MJ. Online database of clinical algorithms with race and ethnicity. Scientific Reports. 2025 Mar 29;15(1):10913. PMID: 40157976; PMCID: PMC11954862.
- d. Ji Y, Ma W, Sivarajkumar S, Zhang H, Sadhu EM, Li Z, Wu X, **Visweswaran S**, Wang Y. Mitigating the risk of health inequity exacerbated by large language models. npj Digital Medicine. 2025 May 4;8(1):246. PMID: 40319154; PMCID: PMC12049425.

3. **Patient-specific modeling and causal discovery from biomedical data.** The typical paradigm in predictive modeling in medicine is to learn a single model from a database of individuals. A population-wide model is one that is meant to be applied to an entire population of future individuals. My work, on the other hand, focuses on patient-specific modeling, in which models are personalized to the characteristics of the individual at hand and optimized to perform well for that individual. Patient-specific models are likely to have better predictive performance than the typical population-wide models that are optimized to have good predictive performance on average on all future individuals. Moreover, such models can identify features such as genomic factors that are specific to an individual, thus enabling precision medicine. In addition, my research focuses on the development of AI and statistical machine learning methods for causal discovery using electronic health record (EHR) data, molecular data, or both.

- a. **Visweswaran S**, Angus DC, Hsieh M, Weissfeld L, Yealy D, Cooper GF. Learning patient-specific predictive models from clinical data. Journal of Biomedical Informatics. 2010 Oct; 43(5):669-85. PMID: 20450985; PMCID: PMC2933959.
- b. **Visweswaran, S**, Ferreira, A, Cooper, GF. Personalized modeling for prediction with decision-path models. PLoS One. 2015 Jun 22;10(6):e0131022 PMID: 26098570; PMCID: PMC4476684.
- c. Strobl E, Zhang K, **Visweswaran S**. Approximate kernel-based conditional independence tests for fast non-parametric causal discovery. Journal of Causal Inference. 2019 Mar; 4(1):31-48.
- d. Johnson A, Cooper GF, **Visweswaran S**. A novel personalized random forest algorithm for clinical outcome prediction. In: Studies in Health Technology and Informatics (MedInfo). 2022 Jun 6;290:248-252. PMID: 35673011.

4. **Research data warehousing.** Several local, regional, and national initiatives are underway to establish clinical data repositories for the reuse of EHR data in clinical, translational, and informatics research. I lead the development and implementation of a research data warehouse called Neptune. I also lead the efforts for data harmonization, translation to standard terminologies and mapping to standard value sets for several projects that include: 1) NCATS-funded ENACT network (previously Accrual of patients to Clinical Trials (ACT) network), 2) NIH-funded *All of Us Pennsylvania* Research Program, 3) PCORI-funded PaTH clinical data research network, 4) NCATS-funded Genomics Research Information Commons, 5) NCATS-funded National COVID Cohort Collaborative (N3C) and 6) the Consortium for Clinical Characterization of COVID-19 by EHR (4CE).

- a. Haendel MA, Chute CG, Bennett TD, Eichmann DA, Guinney J, Kibbe WA, Payne PRO, Pfaff ER, Robinson PN, Saltz JH, Spratt H, Suver C, Wilbanks J, Wilcox AB, Williams AE, Wu C, Blacketer C, Bradford RL, Cimino JJ, Clark M, Colmenares EW, Francis PA, Gabriel D, Graves A, Hemadri R, Hong SS, Hripcak G, Jiao D, Klann JG, Kostka K, Lee AM, Lehmann HP, Lingrey L, Miller RT, Morris M, Murphy SN, Natarajan K, Palchuk MB, Sheikh U, Solbrig H, **Visweswaran S**, Walden A, Walters KM, Weber GM, Zhang XT, Zhu RL, Amor B, Girvin AT, Manna A, Qureshi N, Kurilla MG, Michael SG, Portilla LM, Rutter JL, Austin CP, Gersing KR, N3C Consortium. The National COVID Cohort Collaborative (N3C): Rationale, design, infrastructure, and deployment. Journal of the American Medical Informatics Association. 2021 Mar 1; 28(3):427-443. PMID: 32805036; PMCID: PMC7454687.
- b. Le TT, Gutiérrez-Sacristán A, Son J, Hong C, South AM, Beaulieu-Jones BK, Loh NHW, Luo Y, Moore J, Morris M, Ngiam KY, Patel LP, Samayamuthu MJ, Schriver E, LM Tan ALM, Moore J, Cai T, Omenn GS, Avillach P, Kohane IS, 4CE Consortium, **Visweswaran S\***, Mowery DL\*, Xia Z\*. Multinational characterization of neurological phenotypes in patients hospitalized with COVID-19.

Scientific Reports. 2021 Oct 12;11(1):20238. PMID: 34642371; PMCID: PMC8510999. (\*senior authors)

- c. **Visweswaran S**, McLay B, Cappella N, Morris M, Milnes JT, Reis SE, Silverstein JC, Becich MJ. An atomic approach to the design and implementation of a research data warehouse. Journal of the American Medical Informatics Association. 2022 Mar 15;29(4):601-608. PMID: 34613409; PMCID: PMC8922189.
- d. Murphy SN, **Visweswaran S**, Becich MJ, Campion TR, Knosp BM, Melton-Meaux GB, Lenert LA. Research data warehouse best practices: catalyzing national data sharing through informatics innovation. Journal of the American Medical Informatics Association. 2022 Mar 15;29(4):581-584. PMID: 35289371; PMCID: PMC8922176.

5. **Ontology development.** I lead the development of the common data model and i2b2 ontologies and a COVID-19 ontology for the ENACT network (previously ACT network) that links the EHRs of 57 CTSA hubs with >140 million patient records that investigators query in real time for cohort discovery and for research. The ontologies are deployed on the ENACT network, and since they are freely available, they are used beyond the ENACT network, such as the Genomic Information Commons, the Consortium for Clinical Characterization of COVID-19 by EHR, and by institutions not part of the ENACT network.

- a. **Visweswaran S**, Becich MJ, D'Itri VS, Sendro ER, MacFadden D, Anderson NR, Allen KA, Ranganathan D, Murphy SN, Morrato EH, Pincus HA, Toto R, Firestein GS, Nadler LM, Reis SE. Accrual to Clinical Trials (ACT): A Clinical and Translational Science Award Consortium network. JAMIA Open. 2018 Oct;1(2):147-152. PMID: 30474072; PMCID: PMC6241502.
- b. **Visweswaran S**, Samayamuthu MJ, Morris M, Weber GM, MacFadden D, Trevett P, Klann JG, Gainer V, Benoit B, Murphy SN, Patel L, Mirkovic N, Borovskiy Y, Johnson RD, Wyatt MC, Wang AY, Follett RW, Chau N, Zhu W, Abajian M, Chuang A, Bahroos N, Reeder P, Xie D, Cai J, Sendro ER, Toto RD, Firestein GS, Nadler LM, Reis SE. Development of a COVID-19 application ontology for the ACT network. JAMIA Open. 2021 Apr 19;4(2):ooab036. PMID: 34113801; PMCID: PMC8083220.

**Complete List of Published Work in MyBibliography:**

<https://www.ncbi.nlm.nih.gov/myncbi/shyam.visweswaran.1/bibliography/public/>