

ABOUT

I trained as an architect and moved through urban planning into economics, chasing a way to make inequality tractable — to get it out of description and into equations, thresholds, and quantities that move. I do that from human centered design and engineering, which keeps the question of who a system is for attached to the formalism rather than downstream of it. I am now building the models I kept needing and not finding. My work asks why innovation systems concentrate their gains, and follows that question down until the standard formal apparatus stops being able to represent it — from the institutional mechanisms that produce concentration, to their firm-level source in endogenous concavity, to whether the mathematics economics borrowed from classical mechanics can carry the explanatory weight placed on it. The extension I am building treats growth as the feasible rate at which an economy expands its own possibility space, bounded by how fast human cognition and institutions can actually move. AI is a direct shock to that bound, which is why I am formalizing it now.

Advised by Dr. Stephen Turnovsky (Economics), Dr. Beth Kolko (Human Centered Design & Engineering), and Dr. Joshua Eisenthal (Philosophy of Science, Physics).

EDUCATION

University of Washington, Seattle, Sep 2024 - June 2027

Ph.D. Human Centered Design and Engineering

Human Centered AI and Data Science, Science Technology and Society Research

University of Michigan, Ann Arbor, Graduation Dec 2023

Master of Urban and Regional Planning, Graduate Certificate in Urban Informatics

Urban Design Focus

Entrepreneurship Leadership Program

Entrepreneurship Focus

Rackham Professional Development DEI Certificate

ArtsEngine AiiR grant, MicroGrant for my independent project

MEASI Academy of Architecture, Anna University, India, May 2018

Bachelor of Architecture

Thesis: 'A Contemporary Library for Research and Contemplation', explored how democracy, equity, diversity, and inclusivity translate into lived experiences in design of public spaces.

Top 50 in the Tamayouz International Graduation Projects Award 2018 with the selection criteria - "Aspirational and Transformative projects tackling local and global challenges, informed by a holistic understanding of context"

College of Environmental Design, University of California, Berkeley, Jul - Aug 2019

InArchADV

Refined design techniques that extract architectural concepts from creative processes utilizing a diverse range of visual art media, as part of an intensive month-long Summer Program

CEPT University, Ahmedabad, India, Dec 2015

Summer Fellow

Understanding Urban Life and Design of Contemporary Public Spaces

Refining Concepts for Architectural Design

AWARDS

University of Washington, Seattle, USA

Ph.D. in Human Centered Design and Engineering, Sep 2024 onwards

- Herbold Data Science Fellowship Recipient for the Academic Year 2024-2025
- Selected for the Science, Technology, and Society Studies Certificate Program

University of Michigan, Ann Arbor, USA

Alumni Relations Officer, Rackham Student Government Executive Board, Aug 2022 - Dec 2022

Entrepreneurship Leadership Program Fellow, Jan 2023 - May 2023

- Selected as 1 in 20 Entrepreneurs across the University to be trained to become Leaders and C-suite change makers
- Customer Discovery, Competitor Analysis, Market Research for startups
- ELP Trek to Washington D.C. to collaborate and brainstorm with startups

EXPERIENCE

University of Washington, Seattle, USA

Ph.D. in Human Centered Design and Engineering, Sep 2024 onwards

Research Direction: Humanity-Centered Macroeconomics

Advisors: Dr. Stephen Turnovsky from the Department of Economics; Dr. Beth Kolko from the Human Centered Design and Engineering Department; Dr. Joshua Eisenthal from the Philosophy Department (Philosophy of Science (Physics))

- Building formal macroeconomic models while interrogating the foundations of the formalism itself, and treating those as a single project rather than two.
- **Endogenous Concavity:** Examining why large firms escape diminishing returns. Standard growth theory treats the curvature of the production function as a fixed parameter — Samuelson's comparative statics yield signed results precisely because concavity is exogenous. I make it endogenous: firm size governs $n(S)$, the number of qualitatively distinct modes a firm can operate across — production, R&D, lobbying, acquisition, IP licensing. Each mode diminishes individually, but a firm large enough to rotate between them faces weaker effective concavity, grows faster, and grows larger still. The second-order conditions the standard apparatus depends on become variables, and identical policy shocks produce divergent responses across the firm-size distribution.

- **Foundations of the Formalism:** Writing a companion paper in philosophy of science asks whether Samuelson's borrowing of the Lagrangian from classical mechanics — the physics of fixed state spaces and known constraints — carries its explanatory warrant across the transfer, or yields a mathematics that predicts without explaining.
- **The Epistemological Loop:** Extending the research to join the two. When firms' knowledge production expands a shared epistemological commons, new firm types emerge endogenously and the dimensionality of the dynamical system becomes itself a dynamic variable — beyond what fixed-dimensional optimization can represent. Growth then becomes a question of the feasible rate of possibility-expansion, bounded by how fast cognition and institutions can actually move. AI is a direct shock to that bound, which is why I want to formalize it now.

Ph.D. Prelims Milestone: Innovation Systems and Economic Inequality

Advisors: Dr. Stephen Turnovsky from the Department of Economics; Dr. Beth Kolko from the Human Centered Design and Engineering Department

- Formalizing inequality in innovation systems as structural rather than incidental. Three institutional mechanisms interact: profit-filtering, where problems without a business model never become visible; cumulative advantage, where early leads compound into permanent dominance; and adaptive resistance, where concentrated interests coordinate against oversight faster than oversight can grow. Jointly they produce concentration exceeding what any one produces alone, and a boundary condition ($\beta_1 \times \Pi \times \gamma^{1.2} = 1.4$) partitions systems into three regimes with distinct stability properties. Because the cross-partials are negative, reforms compound: comprehensive change outperforms incremental adjustment by 2.17x, and prevention costs 4.5x less than correction. On these parameters, AI governance currently sits at 1.011 — approaching the threshold, not yet past it.

Teaching

Teaching Assistantship: Winter 2025: HCDE 534 - Designing a Human Centered Venture; Instructor: Sheryl Cababa; 18 Master's students

- Leading discussion sections around class readings and student reflections.
- Grading assignments and offering detailed feedback on business models to navigate human centered business values.
- Co-designing class workshop materials to align with learning outcomes.
- Researching class room discussion strategies to stoke student discussions while exploring course content delivery.

Teaching Assistantship: Autumn 2025: HCDE 316 - Sustainable Design; Instructor: Katya Cherukumilli; 34 undergraduate students

- Leading discussion sections and workshops during class to assist project teams through design ideation and prototyping.
- Facilitating design prototyping ideation and planning to debug user interactions from user feedback and surveys.
- Grading assignments and offering detailed feedback to improve projects and connect reflections back to class readings.
- Co-designing reading discussions with class teaching materials.

Washington 2050 Integrated Sustainable Transportation System, Aug 2024 onwards

- Developing Data Visualizations with D3, Tableau, Python, and other tools, to create dashboards for Political and other stakeholders to make effective decisions on Washington's Future of Transportation for the year 2050 using historical and forecasted data and trends

Research Scientist for Traffigram (startup) - "Travel in minutes not miles," Mar 2024 onwards

- Developing Usability Research for Traffigram which maps travel times based on isochronal distortions under Advisor Cecilia Aragon

University of Michigan, Ann Arbor, USA

Urban Informatics Graduate Certificate, Aug 2021 - Aug 2023

- Applying ML principles to public data for optimizing transportation routes and resource allocation in urban planning.
- Developing predictive models to help cities anticipate trends in infrastructure and transportation based on community sentiment.
- Interpreting large-scale datasets to provide actionable insights for participatory urban planning and decision-making.
- Building software models and tools to analyze public sentiment and predict urban growth, fostering data-driven solutions in city management.
- Focusing on ML research in software, creating models that integrate human-centered design with data-driven, intelligent systems to improve urban experiences.

Participatory Design in Clean Energy Systems, Research Assistant, Aug 2022 - Aug 2023

- Researched incorporation of participatory processes in design of energy technologies in collaboration with communities to center principles of equity and environmental justice
- Exercised business acumen, customer discovery, market research, ecosystem mapping skills to comprehensively interview industry experts to document current state of community engagement in design of clean energy technology

Information and Data Specialist, Brademas Fellow, Aug 2022

- Interned with Global Detroit (GD); support in the activation of a relational database to study effect, storymapping impact; support in developing scope and design of on-demand datasets to create custom reports on international and immigrant talent for US regions; co-designed a data dashboard about immigrants in Detroit

Global Information Engagement Program Fellow; Community Engagement Intern, May 2022 - Jul 2022

- Interned with City of Ann Arbor: Designed a digital Engagement Hub for the City of Ann Arbor
- Conducted customer discovery, user studies, UI/UX research and design for an accessible website for the City's community engagement efforts

Independent Research: AiiR Grant, MicroGrant (ArtsEngine), Aug 2021 - Jan 2023

- Contextualized learnings in urban complex systems to address community needs to develop innovative prototypical technology solutions to urban problems
- Visioned, designed, and built apps using Python and No-Code App Building platforms using creative white-boarding to break down complex problems into logic-models for building prototype software applications

City of Ann Arbor, Michigan, USA

Systems Planning and Community Engagement Intern, May 2022 - Jul 2022 & Jan 2023 - May 2023

- Exercised systems thinking to design, prototype, plan for the City's Engagement Initiatives across the City's planning departments for effective community engagement in Ann Arbor to promote DEI principles
- Conducted community needs assessments by data collection and data analysis of surveys, interviews, and interactions with the Equitable Engagement Steering Committee representing minority groups in the city
- Data Analysis and Reporting: Analyzed and synthesized geographic and socioeconomic data for urban planning projects, resulting in a 30% increase in data accuracy and efficiency in project planning. Developed comprehensive reports on urban development trends, influencing key policy decisions and contributing to a 25% improvement in community planning outcomes
- Community Engagement and Public Information: Facilitated over 4 community engagement sessions, reaching 100+ residents, to gather input for urban development plans, enhancing community involvement by 50%. Delivered clear and concise information on city planning policies to diverse audiences, achieving a 35% increase in public understanding and support for urban development initiatives
- Project Coordination: Coordinated the review of 100+ user feedback on the online engagement hub, ensuring 95% translation of views into design review and feedback processes. Utilized professional judgment to evaluate user feedback, leading to a 20% increase in the efficiency of the feedback and design review process
- Interdepartmental Collaboration: Collaborated with other department members on problem-solving and task completion, leading to a 25% improvement in interdepartmental project coordination. Represented the department in interdepartmental service teams, contributing to a 20% increase in cross-functional project success rates. Assisted in coordinating with different departments in the City to understand their community engagement needs including the Comprehensive Planning Department and process, achieving a 98% success rate in ensuring their feedback was documented
- Stakeholder Negotiation and Consensus Building: Successfully negotiated solutions and facilitated consensus on planning issues with applicants and interest groups, resulting in a 30% decrease in project disputes. Played a key role in resolving complex planning challenges, leading to a 40% improvement in stakeholder satisfaction

Chennai Resilience Centre (CRC), Chennai, India

A unit of Care Earth Trust (CET), supported by the Adrienne Arsht – Rockefeller Foundation Resilience Centre and the Resilient Cities Network

Program Facilitator, Aug 2020 - Jul 2021

- Researched for the Urban Oceans project: Marine litter, Microplastics, and the impact of Plastics in oceans; Waste Management Systems for transition to a circular economy for plastic; Extreme Heat project and Challenge; Chennai Urban Horticulture Initiative (CUHI); Water as Leverage (WaL) Initiative to propose a nature-based in-situ waste water treatment system for a Children's Convent in Chennai; CRC's COVID Relief and Resilience Building Programs and documented through reports