

# Varshika Srinivasavaradhan

780 Acacia Walk, Goleta, California 93117

404-884-9747 | [varshika@ucsb.edu](mailto:varshika@ucsb.edu) | [varshikavaradhan.github.io](https://varshikavaradhan.github.io) | [github.com/varshikaa](https://github.com/varshikaa)

## EDUCATION

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**University of California, Santa Barbara**

*Doctor of Philosophy in Computer Science, GPA: 4.0*

Santa Barbara, CA

*Sep 2022 – Present*

**Purdue University - Main Campus**

*Master of Science in Computer Science, GPA: 3.8*

West Lafayette, IN

*Aug 2018 – May 2020*

**Anna University**

*Bachelor of Engineering in Electronics and Communication, GPA: 3.9*

Tamil Nadu, India

*June 2014 – May 2018*

## RESEARCH INTERESTS

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My research focuses on measuring and characterizing Internet performance at the user edge. Specifically, I design tools and frameworks to conduct measurement experiments, and apply data-driven statistical methods to large-scale crowd-sourced and controlled datasets to model network performance, and to interpret instantaneous measurements in application-specific contexts. A key aspect of my work applies these insights to wireless and cellular networks, where multiple, ever-evolving radio technologies coexist, to understand what constitutes good coverage in practice and to identify digital-access disparities that shape broadband policy decisions.

## PUBLICATIONS

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- **V. Srinivasavaradhan**, J. Liu and E. Belding., "Broadband Access: Assessing the Interplay Between Wireline, Fixed Wireless, and Mobile Networks in the U.S.", TPRC 2025.
- **V. Srinivasavaradhan**, "Measuring the Mobile Gap: From Network Performance to Infrastructure Criticality", ACM MobiSys Rising Stars Forum 2025.
- **V. Srinivasavaradhan**, J. Liu and E. Belding, "5G Performance: A Multidimensional Variability Analysis", Passive and Active Measurement, PAM 2025.
- **V. Srinivasavaradhan**, O. Park and E. Belding., "Mapping Cellular Network Evolution and Infrastructure Criticality: A Nationwide Analysis", TPRC 2024.
- H. Manda\*, **V. Srinivasavaradhan**\*, L. Koduru, K. Zhang, X. Zhou, U. Paul, E. Belding, A. Gupta and T. Narechania, "Assessing the Efficacy of the Connect America Fund in Addressing Internet Access Inequities in the US", ACM SIGCOMM 2024.
- A.Paul, **V. Srinivasavaradhan**, S.Selvi, and C. Pandu Rangan., "A CCA-Secure Collusion Resistant Identity-Based Proxy Re-encryption Scheme", ProvSec'18

## PUBLISHED ARTICLES

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- Quality of Coverage (QoC): A New Paradigm for Quantifying Cellular Network Coverage Quality, Usability and Stability, <https://arxiv.org/abs/2510.21162>.
- Measuring Broadband Policy Success, Harvard Law Review Blog, July 16, 2024.
- Poster: Beyond the Bars: Decoding the Complexities of Cellular Network Performance through Speedtest Data, HotMobile 2024
- Poster: Characterizing Cellular Speed Test Performance: An In-Depth Analysis of What Matters, N2Women Workshop, ACM SIGCOMM 2023

## RESEARCH EXPERIENCE

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### Graduate Research Assistant

*University of California, Santa Barbara*

Sep 2022 – Present

*Santa Barbara, CA*

- Leading a comprehensive research project to collect and analyze active cellular network measurements across diverse geographic regions and over extended time periods. The work leverages spatial and temporal data dimensions to investigate cellular network performance variability and coverage characteristics at scale. The objective of the project is to go beyond traditional binary coverage maps by developing methods that provide richer, fine-grained insights into cellular service quality with low measurement overhead suitable for large-scale deployment.
- Curated ~15,000 officially sourced U.S. broadband policy news documents and built a transformer-based Retrieval Augmented Generation (RAG) pipeline that bridges the gap between fast-moving broadband developments and measurement needs. The objective of the project is to effectively understand broadband policies and translate them into actionable measurement guidance. We are currently improving its efficiency and are fine-tuning for accuracy and scalability.
- Studying measurements from crowdsourced speed testing platforms (Ookla Speedtest, Measurement Lab ndt7) and contextualizing them to understand different methodologies and biases using available metadata. Investigating the potential of these datasets to detect localized and AS-level outages and performance degradations.
- Analyzed terrestrial broadband availability in the U.S. by integrating FCC National Broadband Map data with millions of Ookla Speedtest measurements. Findings reveal near-universal reported coverage but significant gaps in actual performance, especially in rural areas. Specifically, Fixed wireless access (FWA) plays a critical role in extending broadband reach where wireline infrastructure is lacking, and its presence is positively correlated with better mobile broadband speeds. Our work highlights the importance of measurement-driven insights for guiding broadband policy decisions and infrastructure investments. ***Accepted at TPRC 2025***
- Using 2 million crowdsourced cellular (5G) Speedtest measurements from eight U.S. cities over four years, we quantified the impact of PHY layer features, device heterogeneity, and spectrum characteristics using novel statistical distance measures, and quantified the impact of the advances in device hardware in realizing the true potential of 5G. We also conducted controlled measurements to validate these results. ***Accepted at PAM 2025***
- Conducted longitudinal analyses of 5G network rollout and performance using publicly available Ookla Speedtest measurements and cellular infrastructure information. Evaluated deployment progress by geography, capturing urban-rural divides, and examined correlations between infrastructure density metrics and the observed network performance improvements. ***Accepted at TPRC 2024***
- Curated a dataset of 500K addresses with broadband availability and pricing information to analyze the influence of the Connect America Fund (CAF) program on broadband deployment, pricing, and internet service provider compliance, and also evaluated their competitive dynamics and regulatory adherence. Specifically, I analyzed and compared service availability, pricing, and maximum speeds between CAF-regulated monopolies and neighboring unregulated monopoly and/or competitive markets. The findings showed that while CAF-regulated monopolies sometimes improved service relative to unregulated monopolies, these improvements were often inconsistent, and competition played an effective role in enhancing broadband quality. This work provided important insights on the limitations of subsidy-driven monopolies and highlights the need for regulatory interventions to improve broadband availability in underserved communities. ***Accepted at SIGCOMM 2024***

### Student Research Intern

*Google LLC*

Oct 2024 – Mar 2025

*Cambridge, MA*

- Conducted analysis of large-scale, real-time latency measurements collected from hosts within Google's internal network infrastructure. Designed and implemented service level objective (SLO) definitions aimed at accurately capturing the diverse customer experiences across various service classes. This involved leveraging advanced statistical methods to interpret latency variation patterns under different operational scenarios and network loads, enabling the formulation of meaningful performance targets that capture end-user perception.

### Internet Quality Barometer Fellow

*Measurement Lab*

Jun 2024 – Sep 2024

*Remote, CA*

- Contributed to the development of an application-specific metric for Internet quality that moves beyond raw speed by translating Quality of Service (QoS) into Quality of Experience (QoE) scores. Designed algorithms to aggregate and assign importance scores to QoS metrics based on their statistical importance for different applications, creating a nuanced framework that better represents user experience across network conditions. Currently refining the model for broader applicability and policy relevance.

## Researcher, The CellWatch Project

Sep 2022 – Present

*Georgia Institute of Technology, University of California, Santa Barbara*

*Remote, CA*

- Collaborating with Prof. Ellen Zegura from Georgia Institute of Technology and Prof. Morgan Vigil-Hayes from Michigan State University on an open-source cellular network measurement suite designed for FCC-compliant speed test measurements to be used in challenge claims. The project includes a public data portal for aggregated anonymous data, a community coordination tool for organizing measurement campaigns, and a prediction engine that synthesizes multiple datasets to estimate coverage quality in a given area.

## C-STARS Research Intern

May 2019 – July 2019

*Oak Ridge National Laboratory*

*Oak Ridge, TN*

- Researched, implemented, and tested unsupervised machine learning algorithms to automatically classify cloud types using climate data from sky cameras and ceilometers.

## Indian Academy of Sciences Summer Research Fellow

May 2017 – April 2018

*Indian Institute of Technology Madras*

*Chennai, India*

- Developed a collusion-resistant Identity-Based Proxy Re-Encryption (IB-PRE) scheme satisfying adaptive Chosen Ciphertext Security (CCA) under the decisional bilinear Diffie-Hellman assumption. Designed to prevent unauthorized access to the delegator's secret key by a colluding proxy and delegatee. **Accepted at ProvSec 2018**

## PROFESSIONAL EXPERIENCE

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### Software Development Engineer

July 2020 – Jun 2022

*Amazon Inc.*

*Bellevue, WA*

- Worked on the Amazon Enterprise Access(AEA) mobile application for Amazon employees that offers secure access to Amazon's internal services without the use of VPN.
- Designed and implemented the key feature to enforce AEA for Amazon internal email access on mobile devices.
- Developed features for the frontend user interface for Prime Incentive creations and worked on workflows for Prime Referrals, Prime Gift cards, Prime Incentives for Amazon Prime customers.

## TEACHING EXPERIENCE

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### Graduate Teaching Assistant, University of California, Santa Barbara

Sep 2022 – May 2023

- Courses: Introduction to Computer Science and Introduction to Computer Networks.

### Graduate Teaching Assistant, Purdue University-Main Campus

July 2020 – Jun 2022

- Courses: Information Systems and Computing for Science and Engineering.

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, Java, Kotlin, MySQL, PostgreSQL, JavaScript, HTML/CSS, R, Go

**Libraries/Frameworks:** React, Node.js, Flask, JUnit, Spark, TensorFlow, PyTorch, Hadoop

**Developer Tools/Technologies:** Git, Docker, Google Cloud Platform, Amazon Web Services, Android Studio

## ACADEMIC ACHIEVEMENTS

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- UC Santa Barbara CS Department Outstanding Publication Award, 2025.
- Selected to present my work at the MobiSys Rising Stars Forum, 2025.
- SIGCOMM'24 work received the Internet Research Task Force-Applied Networking Research Prize, 2025.
- Internet Quality Barometer Fellowship from Measurement Lab, 2024.
- Graduate Fellowship from UC Santa Barbara, 2022.
- CS Departmental scholarship from Purdue University, 2018-2020.
- Gold Medal for Best Student award from Thiagarajar College of Engineering, Anna University, 2018.
- Indian Academy of Sciences Summer Research Fellow, 2017.