

Anil Kumar Vadathya

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Research engineer with >5 years experience in machine learning, interested in solving challenging problems to create a measurable impact.

RESEARCH EXPERTISE

Machine learning	- generative models (GANs, diffusion), neural networks, regression, classification
Computational imaging	- solving inverse problems, depth estimation, 3D imaging, and implicit models
Computer vision	- CNNs, face detection, recognition, gaze estimation, and adversarial learning
Medical imaging	- segmentation and classification of MRI, 3D reconstruction
Behavioral health	- AI applications for prediction, risk estimation, and causal analysis

SKILLS

Training, testing, and deploying neural networks; Python, PyTorch, Tensorflow, MXNet, C, BASH, SQL, Matlab; GitHub, Docker, Linux; Database management, High dimensional data modeling;

EDUCATION

Indian Institute of Technology (IIT) Madras **June 2018**
MS in Electrical Engineering *Chennai, India*

- Masters thesis on “generative models for image restoration” won Qualcomm Innovation Fellowship-India

Rajiv Gandhi University of Knowledge Technologies **May 2015**
B. Tech in Electronics and Communications Engineering *Basar, India*

PROFESSIONAL EXPERIENCE

Houston Methodist Hospital **Nov 2024 – present**
Research Scientist (AI/ML), Neal Cancer Center *Houston, TX*

- Building comprehensive dataset of cancer epidemiology
- Building state-of-the-art AI models for cancer prevention and control

Texas Children’s Hospital (Baylor College of Medicine) **Nov 2024 – present**
Visiting Scientist, Child Nutrition Research Center (CNRC) *Houston, TX*

- Advise on machine learning and computer vision efforts in maintaining objective screentime (TV, mobile use) measurement tools for an NIH grant (#P01HD109876)

Rice University **Nov 2018 – Nov 2024**
Research Engineer, [Digital Health Initiative](#), ECE *Houston, TX*
Visiting Researcher, CNRC, Baylor College of Medicine

- Led machine learning and computer vision efforts in developing, FLASH-TV, technology for objectively measuring screentime (TV, mobile use) for NIH grant (#R01DK113269)
 - addresses **pressing** needs of pediatricians to study **screentime** effects on early **childhood obesity**
 - provides **objective** measurements, more **accurate** over parents’ self-report
 - **>85% accuracy** using **state-of-the-art** face detection, recognition, and gaze estimation methods.
 - runs **real-time** on edge devices, deleting images after analysis, **preserving privacy**
- Collaborated across a diverse team of pediatricians, behavioral researchers, and engineers
 - Led iterative, alpha, beta, and validation test studies to refine FLASH-TV
 - performed classification, regression and reliability evaluations (*Kappa, ICC*)

- o Managed large-scale video databases and labeling tools
 - quality checks (*reliability Kappa*) and controls for human-coding of gold standard from video data
 - analysis, storage and processing of high dimensional video and image data for downstream tasks
- Our RO1 efforts led to an ongoing NIH PO1 grant (#P01HD109876)
 - o **First robust data** for the influence of technology and digital media (TDM) use on preschool children's health (weight gain, sleep status, and executive function) to inform future guidelines
 - o Led two sub-awards of PO1 grant - TECH study and Digital Assessment Core (DAC)
 - o Press releases:
 - Houston Chronicle (www.houstonchronicle.com/news/houston-texas/health/article/How-does-screen-time-affect-child-development-17574295.php)
 - Baylor College of Medicine (www.bcm.edu/news/researchers-to-study-effects-of-screen-use-in-young-children)

Indian Institute of Technology Hyderabad

Research Internship, LFOVLA Lab

May 2014 – Aug 2014

Hyderabad, India

- Applied deep Boltzmann machines for facial image quality assessment

GRANTS & FELLOWSHIPS

Leveraging Passive Objective Assessment Methods of Preschooler's Media Use to Examine Multiple Paths of Influence on Sleep, Executive Function and Weight Status (NIH Grant #P01HD109876)

Oct 2022 - Mar 2022

PIs: Dr. Teresia O'Connor, CNRC, BCM; Dr. Ashok Veeraraghavan, ECE, Rice University

Role: Led a team of engineers to ensure real-time data collection via embedded devices

reporter.nih.gov/project-details/10532289

Development and Validation of an Automated Measurement of Child Screen Media Use: FLASH (NIH Grant #R01DK113269)

Nov 2018 - Mar 2022

PIs: Dr. Teresia O'Connor, CNRC, BCM; Dr. Ashok Veeraraghavan, ECE, Rice University

Role: Lead engineer developing algorithms via alpha, beta and validation tests

reporter.nih.gov/search/vQDI.3LGxi0uQMkV-k1gyJg/project-details/9288252

Qualcomm Innovation Fellowship India (super winner)

July 2017 - June 2018

PI: Dr. Kaushik Mitra, Computational imaging lab, IIT Madras, India

- Capturing lightfield (3D) data from a regular DSLR camera

Qualcomm Innovation Fellowship India

July 2016 - June 2017

PI: Dr. Kaushik Mitra, Computational Imaging lab, IIT Madras, India

www.qualcomm.com/research/university-relations/innovation-fellowship/winners

- Generative image models for solving inverse problems in computational imaging

PROFESSIONAL SERVICES

- Reviewer for journals - IEEE TPAMI, IEEE TCI, Optics Express, IJCV
- Reviewer for conferences
 - o ECCV 24, CVPR 24, WACV 24, CVMI 24, ICIP 24, Face & Gesture 24, ICHI 24, IEEE BHI 24
 - o ICHI 23, ICIP 23, CVPR 22, ICIP 22, WACV 2022, CVPR 21, FG 2021, CVPR 19
 - o ICVGIP 2018, SPCOM 2016

RESEARCH PROJECTS

Technology and digital media's influence on children's sleep and weight status

Oct 2023 – Present

with Dr. Teresia O'Connor, Dr. Ashok Veeraraghavan Young and Uzair Alam

- Led TECH study for sub-award of an NIH PO1 grant (<https://www.bcm.edu/healthcare/clinical-trials/h-52282>) (reporter.nih.gov/project-details/10532290)

- Addresses critical gaps in screenmedia research with objective data using FLASH-TV and FLASH-Mobile
 - mediators for the association of screenmedia use and increased risk of overweight and obesity
 - role of screenmedia use in affecting children's sleep and circadian rhythms
- **Specific aim - 1:** Examine preschool children's screenmedia exposure using real-time, passive objective assessment in the home setting and how screenmedia exposure interacts with preschooler's family and environmental factors to influence their sleep, EF, and weight status.
- **Specific aim - 2: Inform guidelines**, to provide actionable, practical recommendations that parents can use to help mitigate adverse effects of screenmedia use on children's health and development.

Digital Assessment Core

Oct 2023 – Present

with Dr. Jennnette Moreno, Dr. Joseph Young, Uzair Alam, and Rohitaa Ravikumar

- Sub-award of NIH PO1 grant (reporter.nih.gov/project-details/10532294)
- Managed software pipeline and hardware components (embedded devices) for data collection
 - developed a Linux application (systemd) for standalone execution of software once initialized
 - completed 25% of data collection in year-1 with **zero failure rates**
- Managed a team of engineers for data collection, ensuring quality control and checks
 - database management, query, and conflict resolution
 - driving insights, developing prediction models and behavioral patterns from the screen use data

Family Level Assessment of Screen use in the Home (FLASH-TV)

Nov 2018 – Oct 2023

with Dr. Teresia O'Connor and Dr. Ashok Veeraraghavan

- Built an integrated system using state-of-the-art computer vision methods - face detection (RetinaFace), recognition (ArcFace), and gaze estimation (Gaze360) to measure screen-time (TV) among children.
- Addressed the domain gaps using adversarial domain adaptation, data augmentation, and regularization methods.
- Extensive evaluation of the system through iterative alpha tests under challenging conditions. Performs **with 85% accuracy**, overcoming the recall errors associated with self-report.
- Built an easily portable embedded system that runs our deep learning-based algorithms in real time. Runs on edge devices, deleting images after analysis, ensuring user privacy.
- FLASH-TV paved way for an ongoing 5-year NIH PO1 grant (2022-2027) to study impact of screentime on children's health (childhood obesity, weight gain, sleep status - circadian rhythm, and executive function).

Family Level Assessment of Screen use in the Home (FLASH-Mobile)

Nov 2018 – Oct 2023

with Dr. Teresia O'Connor, Matt Barnett, and Dr. Ashok Veeraraghavan

- Helped develop an app to identify meaningful device usage for Android phones and tablets
- Proposed and validated methods to separate a specific child's use from others who share the device

Bias-for-action: implicit neural networks for video modeling

Oct 2023 – Jan 2024

with Dr. Guha Balakrishnan and Dr. Vishwanath Saragadam, Rice University

- Bias variables in implicit representations tend to act similarly to motion fields; controlling them enables video editing and compression capabilities.

Reconstructing CT Volume from a few Chest X-ray images

Oct 2022 – Dec 2024

with Yiran Sun and Dr. Guha Balakrishnan, Rice University

- Extended PixelNeRF architecture to reconstruct 3D CT volume from a few X-ray projections. This application significantly reduces the time and cost-effective alternative to obtaining CT volume with expensive hardware.

Perceptual loss functions for medical imaging restoration

June 2022 – Oct 2022

with Dr. Guha Balakrishnan, Rice University

- Pretrained unsupervised CNN models for medical imaging restoration perceptual loss. Popular imagenet pretrained models are not perfect for medical imaging applications.

Lightfield Reconstruction from Focus-Defocus Pairs using CNNs

Oct 2017 – Apr 2018

with Dr. Kaushik Mitra, IIT Madras

- We learn to estimate disparity from focus-defocus pair via view-supervision using deep neural networks. The

disparity map is used to synthesize light field.

Recurrent Generative Priors for Computational Photography

June 2016 – Aug 2017

with Akshat Dave and Dr. Kaushik Mitra, IIT Madras

- Data-driven priors for compressive imaging reconstruction, we achieved a 3dB improvement on avg. over traditional methods like TV-L3 and D-AMP.

Face Quality Assessment for Face Recognition in The Surveillance Scenario

June 2014 – Aug 2014

with Dr. Sumohana Channarayana, IIT Hyderabad

- Here, we used Gaussian Binary Restricted Boltzmann Machine (RBM) for modeling the distribution of facial features. We then used this model to perceptually assess the face image for face recognition i.e. whether a face is recognizable in the given image.

Butterfly Communication strategies: A prospect for soft-computing

Jan 2014 – Mar 2015

with Chakravarthi Jada, RGUKT Basar

- In this work, we have developed a multi-modal optimization algorithm inspired by the communication strategies deployed by butterflies. We evaluated it on benchmark functions and practical applications like unsupervised clustering of satellite images.

RoboG: Robo Guide based on simple learning strategy

Aug 2013 – Feb 2014

with Chakravarthi Jada, RGUKT Basar

- We developed a navigation guiding robot for our university (RGUKT). We formulated the navigation as a regression problem and solved it with neural networks.

JOURNAL PUBLICATIONS

- Teresia M. O'Connor, Tatyana Garza, Uzair Alam, **Anil Kumar Vadathya**, Jennette P. Moreno, Alicia Beltran, Sheryl O. Hughes, Deborah Thompson, Salma M.A. Musaad, Tom Baranowski, Joseph Young, Akane Sano, Ashok Veeraraghavan, "The feasibility of passively tracking children's TV viewing, mobile device use, and sleep in naturalistic settings," *under review at Computers in Human Behavior*, 2024.
- **Anil Vadathya et al.** "FLASH-TV a machine learning pipeline to passively measure children's TV viewing: validation studies of the system," in print at *Nature Scientific Reports*, 2024.
- **Anil Vadathya et al.** "Development of family level assessment of screen use in the home for television (FLASH-TV)," *Multimedia Tools and Applications* (2024): 1-19
- Perez, Oriana, Tatyana Garza, Olivia Hinder, Alicia Beltran, Salma M. Musaad, Tracey Dibbs, Anu Singh et al. "Validated assessment tools for screen media use: A systematic review." *Plos one* 18, no. 4 (2023): e0283714.
- Oriana Perez and **Anil Vadathya et al.** "The Family Level Assessment of Screen Use–Mobile Approach: Development of an Approach to Measure Children's Mobile Device Use." *JMIR Formative Research* 6, no. 10 (2022): e40452.
- **Anil Vadathya et al.** "An Objective System for Quantitative Assessment of Television Viewing Among Children (Family Level Assessment of Screen Use in the Home–Television): System Development Study," *JMIR Pediatric and Parenting*, 2022
- Moukaddam, Nidal, Vishwanath Saragadam, Mahsan Abbasi, Matt Barnett, **Anil Vadathya**, Ashok Veeraraghavan, and Ashutosh Sabharwal. "Evolution of Mood Symptomatology Through the COVID-19 Pandemic: Findings From the CovidSense Longitudinal Study." *Cureus* 14, no. 10 (2022)
- **Anil Vadathya**, Sharath Girish, Kaushik Mitra, "A unified learning-based framework for light field reconstruction from coded projections," *IEEE Transactions on Computational Imaging*, 2019
- Akshat Dave, **Anil Vadathya**, Ramana Subramanyam, Rahul Baburajan, Kaushik Mitra, "Solving Inverse Computational Imaging Problems using Deep Pixel-level Prior," *IEEE Transactions on Computational Imaging*, 2018

CONFERENCE PUBLICATIONS

- **Anil Kumar Vadathya**, Sai Kiran Cholleti, Gautham Ramajayam, Vijalakshmi K, and Kaushik Mitra. "Learning Light Field Reconstruction from a Single Coded Image." *Asian Conference on Pattern Recognition*, 2017.

- Akshat Dave, **Anil Kumar Vadathya**, and Kaushik Mitra. “Compressive Image Recovery Using Recurrent Generative Model.” *IEEE International Conference on Image Processing*, 2017.
- Sowmya C, Anjumara Shaik, Chakravarthi Jada, **Anil Kumar Vadathya**. “Butterfly Communication Strategies: A Prospect for Soft-Computing Techniques.” *Proc. of IEEE International Joint Conference on Neural Networks (IJCNN)*, 2014.
- Harish Y, Kranthi Kumar R, Irfan Feroz G MD, Chakravarthi Jada, **Anil Kumar Vadathya**, Mounika Mesa. “ROBOG: Robo-Guide with simple learning strategy.” *Proc. of IEEE Student’s Technology Symposium, India*, 2014.
- Chakravarthi Jada, **Anil Kumar Vadathya**, Anjumara Shaik, Sowmya Charugundla, Parabhaker Reddy Ravula, and Kranthi Kumar Rachavarapu. “Butterfly Mating Optimization.” In *Intelligent Systems Technologies and Applications*, Springer International Publishing, 2015.
- Kranthi Kumar R, Irfan Feroz G MD, Chakravarthi Jada, Harish Y, **Anil Kumar Vadathya**. “ROBOG An Autonomously Navigating Outdoor Robo-Guide.” In *Swarm, Evolutionary, and Memetic Computing*, Springer International Publishing, 2014.

ABSTRACTS

- Teresia M. O’Connor, Tatyana Garza, Uzair Alam, **Anil Kumar Vadathya**, Jennette P. Moreno, Alicia Beltran, Sheryl O. Hughes, Deborah Thompson, Salma M.A. Musaad, Tom Baranowski, Joseph Young, Akane Sano, Ashok Veeraraghavan, “The feasibility of passively tracking children’s TV viewing, mobile device use, and sleep in naturalistic settings,” *ISBNPA 2025*.
- Teresia M. O’Connor, **Anil Kumar Vadathya**, Tatyana Garza, Uzair Alam, Alicia Beltran, Alex Ho, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Jennette P. Moreno, Tom Baranowski, Ashok Veeraraghavan, “FLASH-TV 3.0: Validation of FLASH-TV methods for estimating TV-viewing among children,” *ISBNPA 2024*.
- Teresia M. O’Connor, **Anil Kumar Vadathya**, Alicia Beltran, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Tom Baranowski, Ashok Veeraraghavan, “Development of an automated, objective assessment of children’s mobile device use: FLASH-Mobile,” *ISBNPA 2022*.
- Teresia M. O’Connor, **Anil Kumar Vadathya**, Alicia Beltran, Salma Musaad, Sheryl O. Hughes, Jason Mendoza, Tom Baranowski, Ashok Veeraraghavan, “FLASH-TV 2.0: Refining and assessing the FLASH-TV methods for TV viewing estimation,” *ISBNPA 2022*.

TALKS & PRESENTATIONS

- Live demo of FLASH-TV at *Children and Screens Congress 2023*, Oct 2023, Washington DC.
- Talk on “Solving inverse problems using Deep Generative Image models” at LFOVIA Lab, IIT Hyderabad, Aug 2018.
- Poster on “A Deep Learning Framework for Light Field Reconstruction from Minimal Measurements” at *ICCP 2018*, CMU, Pittsburgh.
- Talk on “Compressive Lightfield Reconstruction using Deep Neural Nets” at Qualcomm, Bangalore, May 2017.
- Poster on “Compressive Image Recovery using Recurrent Generative Model” at ICCP 2017, Stanford.
- Talk on “Single Pixel Camera(SPC) Reconstruction using Recurrent Generative Model”, at Qualcomm Bangalore, Feb 2016.
- Presented “Deep Generative Networks For Image Processing” at a workshop by the Interdisciplinary Lab on Data Sciences (ILDS), IIT Madras, 2016.

TEACHING & MENTORING EXPERIENCE

- Mentorship
 - Anurag Kumar, an intern for summer of 2023, *currently an undergrad at CMU*
 - Alex Ho, a research assistant from Aug 2021 to July 2022, *currently a research engineer at BCM*
- Teaching assistance for Deep Learning for Image Processing (Fall 2017)
- Teaching assistance for Machine Learning for Computer Vision (Spring 2017)

- Teaching assistance for Computational Photography (Fall 2017)
- Teaching assistance for Machine Learning for Computer Vision (Spring 2016)

SCHOLASTIC ACHIEVEMENTS

- M.S. thesis was awarded Qualcomm Innovation Fellowship (India) 2016
- Received IEEE SPS Travel Grant award for ICIP 2017
- Granted MHRD, India scholarship for masters at IITM (Jul 2015 to Feb 2018)
- Selected for Summer Fellowship 2014 of Indian Academy of Sciences