Srinidhi Hegde

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Education

- **University of Maryland, College Park** **2021 - 2023**
  M.S., Computer Science *Overall GPA: 3.97/4*

  (**Relevant Coursework:** Computer Processing of Pictorial Information, Advanced Numerical Optimization, Advanced Statistical Pattern Recognition, Algorithms in Machine Learning: Guarantees and Analyses, Computational Methods)

- **Indraprastha Institute of Information Technology Delhi** **2013 - 2017**
  B.Tech, Computer Science and Engineering *Overall GPA: 8.63/10*

  (**Relevant Coursework:** Machine Learning, Computer Vision, Convex Optimization, Probabilistic Graphical Models, GPU Computing, Computer Graphics, Artificial Intelligence, Modern Algorithm Design)

Work Experiences

- **Research Assistant, University of Maryland, College Park** **March, 2023 - Present**
  Advisor: Prof. Matthias Zwicker
  - Designing new neural point cloud rendering methods with high fidelity and realism and prototyping and evaluating their performances.
  - Collaborating on scientific exploration and analysis of a mixed AR/VR tool with integrated Lagrangian Dynamics (LD) to help scientists identify, track, and understand the evolution of Earth Science phenomena in the NASA GEOS model.

- **Research and Development Intern, Kitware Inc., Carrboro** **Jun, 2022 - Jul, 2022**
  Advisors: Dr. Brian Clipp, Dr. Chistopher Funk
  - Developing **AR-based multi-modal egocentric activity recognition** framework using RGB-D and hand poses from **HoloLens2**
  - Designing **two-stage neural network architecture** - stream-specific feature extractor and temporal sequence classifier
  - Contributing new features to Kitware's open-source AR-based inspection framework ANGEL system which include - support for **multi-stream inputs** and **synchronized listeners** for mulit-modal data reception via **ROS**

- **Researcher, TCS Innovation Labs, New Delhi** **Aug, 2017 - Jul, 2021**
  Advisors: Ms. Ramya Hebbalaguppe, Dr. Lovekesh Vig
  - **Deep Model Optimization** - Compressing the memory-intensive DNN models using variational methods and knowledge distillation. Compressed CNNs and MLPs by **213**× and **64**× respectively
  - **Unsupervised Animation Transfer** - A geometry invariant animation transfer technique using motion cues from 2.5D (RGB-D) videos to animate target deformable 3D meshes
  - **In-air Gestural Interface for AR** - Hand gesture classification through fingertip coordinate regression for touch-less interactions in AR. Classified hand gestures with an **88%** accuracy
  - **Situated Visualisation in AR** - Visual saliency based non-intrusive and temporally coherent overlay placement solution for AR/video applications

- **Teaching Assistant, GPU Computing** **Jan, 2017 - May, 2017**
  Advisor: Dr. Ojaswa Sharma
  - Designing course curriculum and CUDA assignments (10% course weightage)
  - Guiding graduate and undergraduate students on course projects (25% course weightage)

- **Software Development Intern, HEICO, India** **January,2017 - March, 2017**
  Advisor: Mr. Jattinder Singh
  - Fine-tuning the control of Fatigue Testing Machine(FTM) for testing material strength and fatigue
  - Visualizing sensor data from FTM controller
  - Worked with .NET technology for developing data analysis tool for FTM's PID controller.

- **Research Intern, TCS Innovation Labs, New Delhi** **May, 2016 - Aug, 2016**
  Advisors: Ms. Ramya Hebbalaguppe, Dr. Ehtesham Hasan
  - Designing frugal AR framework (costing only $15) with Google Cardboard for Android Platform
  - Proposing and developing a near-real time (< 0.4s) simple hand gesture interaction technique for a frugal AR framework
  - Implementing deep learning backed industrial inspection framework for repair and maintenance of complex systems

Representative Publications

- **S. Hegde**, K. Kullman, T. Grubb, L. Lait, S. Guimond, M. Zwicker. "NARVis: Neural Accelerated Rendering for Real-Time Scientific Point Cloud Visualization.". Under Review [Preprint]
- M. Gwilliam, **S. Hegde**, L Tinubu, A Hanson. "Rethinking Common Assumptions to Mitigate Racial Bias in Face Recognition Datasets.". Human-centric Trustworthy Computer Vision From Research to Applications, International Conference on Computer

Vision (ICCV) (Oral, **Runner-up, Best Paper Award**), 2021[Paper][Code]

- A. Khattar, **S. Hegde**, R. Hebbalaguppe. "Cross-Domain Multi-task Learning for Object Detection and Saliency Estimation.". Workshop on Continual Learning in Computer Vision, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2021 [Paper]
- **S. Hegde**, R. Prasad, R. Hebbalaguppe, V. Kumar. "Variational Student: Learning Compact and Sparser Networks in Knowledge Distillation Framework". IEEE 45th International Conference on Acoustics, Speech, and Signal Processing (ICASSP) (Oral), 2020 [Paper]
- **S. Hegde**, J. Maurya, R. Hebbalaguppe, A. Kalkar. "SmartOverlays: A Visual Saliency Driven Label Placement for Intelligent Human-Computer Interfaces". IEEE Winter Conference on Applications of Computer Vision (WACV), 2020 [Paper][Website]
- S. Yalburgi, T. Dash, R. Hebbalaguppe, **S. Hegde**, A. Srinivasan. "An Empirical Study of Iterative Knowledge Distillation for Neural Network Compression". 28th European Symposium on Artificial Neural Networks (ESANN), 2020 [Paper]
- N. Rakholia*, **S. Hegde***, R. Hebbalaguppe, "Where To Place: A Real-Time Visual Saliency Based Label Placement for Augmented Reality Applications". International Conference on Image Processing (ICIP), 2018 [Paper][Website]
- G. Garg*, **S. Hegde***, R. Perla, V. Jain, L. Vig, R. Hebbalaguppe. "DrawInAir: A Lightweight Gestural Interface Based on Fingertip Regression". Observing and Understanding Hands in Action, European Conference on Computer Vision (ECCV), 2018 [Paper][Website]
- **S. Hegde**, G. Garg, R. Perla, R. Hebbalaguppe. "A Fingertip Gestural User Interface Without Depth Data for Mixed Reality Applications". Demo Track, IEEE International Symposium on Mixed and Augmented Reality, 2018
- **S. Hegde**, R. Perla, R. Hebbalaguppe, E. Hassan. "GestAR: Real Time Gesture Interaction for AR with Egocentric View". IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2016[Paper][Video]

Technical Skills

- **Expertise Area:** *Computer Vision, Machine Learning, Computer Graphics, and Mixed Reality*
- **Programming Languages:** *Python, C++, C, Java, MATLAB, R*
- **Tools:** *Pytorch, Nerfstudio, OpenGL/GLSL, CUDA, Blender, Android Studio, Unity, CryEngine*

Academic Projects

- **Robust 3D Reconstruction of Indoor Scenes using Deep Learning**
  Advisors: Dr. Saket Anand and Dr. Ojaswa Sharma *[PDF] [Dataset] [Video]*
  - CNN based end-to-end reconstruction of the indoor scenes through 3D camera relocalization and depth estimation
  - Inferring with a single RGB image and registering the 3D reconstructed patches through ICP algorithm
  - Tools & technology: Caffe, KinectFusion, Theano, PCL, OpenCV

- **American Sign Language Recognition Using Hierarchical Rank Pooling** **Sep,2016 - Nov,2016**
  Advisors: Dr. Saket Anand and Dr. Anubha Gupta

  Recognizing sign language videos as glosses automatically using hierarchical rank pooling features, for generating video length invariant features, in a modified CaffeNet architecture.

- **Fault Tolerant Area Coverage in Multi-Agent Systems** **Jan, 2016 - May, 2016**
  Advisor: Dr. P.B Sujit *[Video]*
  - Solving the patrolling problem of Multi-Agent Systems by developing a distributed fault tolerant area coverage algorithm
  - Results in quick detection of the faulty agent under limited communication constraints and redistributing the area without conflicts
  - Tools & technology: MATLAB

- **Vision Based Outdoor Localization of IIIT-Delhi Campus** **Feb,2016 - Apr,2016**
  Advisor: Dr. Saket Anand

  Estimating GPS location of a single RGB image of outdoor environment by, firstly, *GPS coordinate retrieval from image classification* and secondly, fine tuning the location estimate using *structure from motion and and position triangulation*. This application was interfaced by an Android mobile application.

- **3D Vegetation Modelling with L-systems using an Image**
  Advisor: Dr. Ojaswa Sharma *[PDF] [Code]*
  - Generating 3D vegetation models from RGB images by procedural skeletonization using L-Systems
  - Developing a UI to convert a single captured image of tree to a 3D model using user-guided brush strokes
  - Tools & technology: Qt/C++, OpenGL, GLSL

- **Learning Individually Fair Graph Neural Networks**
  Advisor: Dr. Furong Huang *[PDF] [Code]*

- Modeling the Individual Fairness through Lipschitz Criteria and Variational Dropout for Graph Neural Networks (GNN)
- Exploring the properties of a dataset to train Individually Fair NN
- Tools & technology: Python, PyTorch

- **Evaluating Complex Visual Question Answering**
  Advisors: Dr. Jordan Boyd-Graber *[Poster]*
  - Creating a new VQA dataset comprising of 3000 beyond "What is?" questions with 10% perturbation with increasing lexical complexity measured with Question length, readability, complexity, and question and answer difficulty.
  - Fine-tuning OFA multi-tasking model for evaluation. Evaluation metrics used Accuracy and WUPS.
  - Tools & technology: Pytorch, Huggingface Transformers

- **Virtual Campus Project** **May, 2015 - Aug, 2015**
  Advisor: Dr. Ojaswa Sharma *[Website]*
  - Modeling and immersive rendering of the virtual architectural model of the IIIT Delhi campus
  - Terrain generation using spot level elevation data.
  - Tools & technology: 3DS Max, Cryengine3, QGIS

Teaching Experiences

- Graduate Teaching Assistant, at UMD: CMSC 216 - Introduction to Computer Systems (Spring'22, Spring'23), CMSC 132 - Object-Oriented Programming II (Fall'22).
- Undergraduate Teaching Assistant, CSE 560 - GPU Computing at IIITD, Winter 2017, graduate Refresher Module of Data Structures and Algorithms, 2015.

Patents

- Sparsity Constraints And Knowledge Distillation Based Learning Of Sparser And Compressed Neural Network (Filed)
  ***Srinidhi Hegde**, Ramya Hebbalaguppe, Ranjitha Prasad*
- Multi-label Placement For Augmented And Virtual Reality And Video Annotations (Filed)
  *Ramya Hebbalaguppe, **Srinidhi Hegde**, Jitender Maurya*
- Real Time Overlay Placement In Videos For Augmented Reality Applications (Granted)
  ***Srinidhi Hegde**, Ramya Hebbalaguppe*

Professional Services

- Reviewer: SIGGRAPH'24, AAAI'22,'23, TCSVT'21,'22
- Student Reviewer: Admissions 2022 at the University of Maryland
- Member: The Computer Vision Foundation, IEEE Signal Processing Society

Awards and Achievements

- **Dean's Teaching Excellence Award** 2017 for best teaching assistant for GPU Computing course offered at IIIT Delhi.
- Received **TCS Citation Award** and **IP Creation Award** from Tata Consultancy Services for an outstanding contribution to the organization through publications.
- Awarded **IP Creation Award** by Tata Consultancy Services for an outstanding contribution to the organization's IP Assets.
- Selected for **Eastern European Machine Learning Summer School 2019**, held at Politehnica University of Bucharest, Romania.
- Qualified for **Computer Vision and Machine Learning Summer School 2017**, organised by Centre for Visual Information Technology, IIIT Hyderabad.
- Selected for fully-funded scholarship for attending **CVS Vista Summer School 2017** conducted at **York University, Canada**.
- 1^{st} runner-up in semi-finals of **Annual Science Quiz 2009**, held at National Science Center, Delhi.
- **Junior Science Talent Search Examination** (JSTSE) 2009 by Directorate of Education, Delhi State Govt. Obtained **34th rank (top 99.4th percentile)** in Delhi State.

Positions of Responsibility

- Mentor for PanIIT Hackathon. Mentored the teams that finished at 3rd and 4th positions in the event. - TCS-PanIIT Conclave 2019 - Jan, 2019
- Publicity & Jury Team - Research Showcase'17, IIITD - Feb, 2017 - Apr, 2017
- Event Head - BrainFuzz, the algorithm design contest, at Esya'16, IIITD - May,2016 - Aug,2016
- Rendering Team and Core Team, Virtual Campus Project at IIITD - May,2015 - Dec,2015
- Teaching Assistant at IIITD for graduate Refresher Module of Data Structures and Algorithms - Jun,2015 - Aug,2015
- Moderator for Rebuttal - Online Debate Event at Esya - IIITD's Tech Fest - Aug,2014