ISHA DUA

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EDUCATION

International Institute of Information Technology Hyderabad *2016–2019*
MS by Research in Computer Science and Engineering *GPA: 8.2/10*

- Supervisor: **Prof. C.V. Jawahar**, Centre for Visual Information Technology (CVIT)

College of Engineering Roorkee *2012–2016*
BTech in Computer Science and Engineering *Aggregate: 80.2%*

- Secured second position in the Computer Science and Engineering Department.

EXPERIENCE

Mercedes Benz R&D, India ***Senior ML Engineer*** ***Sept 2019 – Present***

- **Mobile Bounding Box Detection in Cars using Synthetic Data**
  - Led the initiative to integrate mobile detection capabilities within cars exclusively using synthetic data.
  - Developed a novel training strategy leveraging a pre-trained model, enabling mobile detection on resource-constrained devices.
  - Led the dataset team, establishing comprehensive guidelines for generating high-quality synthetic datasets for mobile bounding box detection.
  - Achieved the first production deployment using solely synthetic data for training.
  - **Presented demos to leadership**, earning high praise for innovation and effectiveness.
  - Generated significant cost savings for the company by eliminating the need for extensive data collection and annotation, saving millions of dollars.
- **Seat Occupancy Detection (SOD) in Cars using Unsupervised Domain Adaptation (UDA)**
  - Led the development of multiperson human pose estimation using synthetic datasets in IR images.
  - Created an innovative unsupervised domain adaptation training strategy that leverages synthetic data, achieving robust real-world performance.
  - Directed the development and generation of photorealistic synthetic data.
  - Received the **Process Innovation Award 2022** from Mercedes-Benz R&D.
  - Saved the company millions by employing synthetic data for deep learning model training.
- **Resolution of Human Pose Estimation Failure Cases using Semi-Supervised Domain Adaptation (SSDA)**
  - Developed a training strategy using synthetic data to address challenging failure cases in human pose estimation, while preserving performance on real-world data.
  - Successfully integrated the solution into the production line, directly improving the company's product capabilities.
  - Advanced the companys capability to handle complex scenarios with synthetic data.
- **Effective Data Sampling for Human Pose Estimation**
  - Created an innovative data sampling strategy for human pose estimation that significantly improved performance on complex and rare poses.

- Mentored an intern at Mercedes-Benz R&D, guiding them in research advancement and paper submissions to top-tier conferences.
- Achieved acceptance of the workshop paper at **NeurIPS 2023** and submitted the extended work as a full paper to arXiv.
- Received the **Technical Publication Award 2023** from Mercedes-Benz R&D.

- **Dailib: Accelerated Deep Learning Framework**
  - Spearheaded the development of a Python library to significantly accelerate deep learning model training.
  - Demonstrated a 6x reduction in training time for a multi-person human pose estimation model.
  - **Secured a patent** for the technology and received the **Patent Award 2022** from Mercedes-Benz R&D.
  - Received the **Silver Star Award**, and **Process Innovation Award (2021)** by Mercedes-Benz R&D.
  - Training Cost: 6x Faster Training.

Microsoft Research, India ***Research Intern*** ***May 2018 – July 2018***

- **Mentors: Dr. Venkat Padmanabhan and Dr. Akshay Nambi**.
- **AutoRate: How Attentive is the Driver?**
  - Led a project to predict driver attention ratings by integrating spatio-temporal features based on driver state and behavior, such as head pose, eye gaze, eye closure, yawns, and cellphone use.
  - The work was accepted as an **oral paper at Faces and Gestures 2019**.
- **Evaluation and Visualization of Driver Inattention Rating from Facial Features**
  - Enhanced AutoRate by adding a soft attention mechanism, improving accuracy by 10%. Utilized temporal and spatial attention to visualize key frames and actions that justified the model's predicted ratings.
  - The work was **accepted as a journal paper in TBIOM**, IEEE Biometrics 2019.

AIML Course ***Mentor*** ***Jan 2018 – May 2018***

- Teaching Assistant at AIML course conducted by Professor C.V. Jawahar and Professor Anoop M. Namboodiri in collaboration with Talent Sprint.

PATENTS

- **Isha Dua**, Thrupthi Ann John, C.V. Jawahar, **System and Method for Generating Gaze Mapping Dataset and Predicting Gaze Point on Environment**, The Patent Office, Government of India. Indian Patent Application No. 202041052016. Filed: November 2020. Granted: Feb 2025, Status: Published.

PUBLICATIONS

- **Isha Dua***, Arjun Sharma*, Shuaib Ahmed, Rahul Tallamraju, **ACTUPose: Active Curriculum Training for Unsupervised Domain Adaptation in Pose Estimation**, *Synthetic Data for Computer Vision Workshop*, ***CVPR 2025***.
- **Isha Dua***, Arjun Sharma*, Shuaib Ahmed, Rahul Tallamraju, **Towards Effective Synthetic Data Sampling for Domain Adaptive Pose Estimation**, *Synthetic Data Generation with Generative AI*, ***NeurIPS 2023***.

* denotes equal contribution
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- Abhay Rawat, **Isha Dua**, Saurav Gupta, Rahul Tallamraju, **Semi-Supervised Domain Adaptation by Similarity based Pseudo-label Injection**, *L2ID Workshop at European Conference on Computer Vision*, ***ECCV 2022***. [paper]
- Thrupthi Ann John, **Isha Dua**, Vineeth N Balasubramanian, C.V. Jawahar, **ETL: Efficient Transfer Learning for Face Tasks**, ***VISAPP 2022***. [paper]
- **Isha Dua**, Thrupthi Ann John, Riya Gupta, C.V. Jawahar, **DGAZE: Driver Gaze Mapping on Road**, *International Conference on Intelligent Robots and Systems*, ***IROS 2020***. [paper]
- **Isha Dua**, Akshay Uttama Nambi, Venkat Padmanabhan, C.V. Jawahar, **Evaluation and Visualization of Driver Inattention Rating from Facial Features**, *IEEE Transactions on Biometrics, Behavior, and Identity Science*, ***TBIOM 2019***. [paper]
- **Isha Dua**, Akshay Uttama Nambi, Venkat Padmanabhan, C.V. Jawahar, **AutoRate: How Attentive is the Driver?**, *IEEE International Conference on Automatic Face and Gesture Recognition*, ***FG 2019*** **(Oral paper)**. [paper]
- Thrupthi Ann John, **Isha Dua**, Vineeth Balasubramanian, C.V. Jawahar, **Low Cost Transfer Learning of Face Tasks**, *Arxiv preprint*. [paper]
- **Isha Dua**, Pushkar Shukla, Ankush Mittal, **A Computer Vision Framework for Detecting and Preventing Human-Elephant Collisions**, *Visual Wildlife Monitoring Workshop, International Conference on Computer Vision*, ***ICCV 2017***. [paper]
- **Isha Dua**, Pushkar Shukla, Ankush Mittal, **A Vision-Based Human-Elephant Collision Detection System**, *International Conference on Image Information Processing*, ***ICIIP 2015***. [paper]

ACHIEVEMENTS AND AWARDS

- **Silver Star Award 2024:** Awarded by Brijesh Pillai and Arpit Awasthi for outstanding contribution in applying synthetic data for perception tasks.
- **AAAI Program Committee Member 2025:** Contributed as a reviewer and evaluator for the Good-Data Workshop at AAAI 2025.
- **Speaker 2023:** Presented work on Synthetic Data for Intelligent Interiors at **Mercedes-Benz R&D AI Day 2023**.
- **Technical Publication Award 2023:** Awarded by Mercedes-Benz R&D India for research on effective synthetic data sampling for domain adaptive pose estimation.
- **Patent Award 2022:** Received for a patented system improving keypoints localization and its method.
- **Process Innovation Award 2022:** Recognized by Mercedes-Benz R&D for innovation in multiperson human pose estimation using synthetic datasets.
- **Process Innovation Award 2021:** Awarded by Mercedes-Benz R&D for developing an accelerated deep learning framework for efficient and faster training.
- **Silver Star Award 2021:** Received from manager Brijesh Pillai for novel contributions to the team, including the accelerated deep learning library and bridging the domain gap between synthetic and real data.
- **Outstanding Mentor Award:** Recognized at the Foundations of AIML course led by Talent Sprint in collaboration with Prof. C.V. Jawahar.
- **First Prize, ML Track:** Won at Google Hackathon 2018 for a project on waste segregation using machine learning.
- **First Position:** Secured at Microsoft Code.Fun.Do 2018.
- **6th Position:** Achieved in the Grand Finale of IndiaHacks 2017 Hackathon.
- **Second Position:** Secured in CSE Department, B.Tech 2016.

- **PyTorch Tutorials:** Conducted at CVIT Summer School in 2018 and 2019.
- **Reviewer and Volunteer:** Served as a reviewer and volunteer at top Computer Vision and Machine Learning conferences, including NeurIPS, ECCV, CVPR.

PROJECTS

Eye Gaze Gaming 2017

- Advisors: Prof. C.V. Jawahar
- Developed a webcam-based first-person shooter game controlled by head pose and eye gaze, enhancing the gaming experience.
- Extended the algorithm for article browsing, demonstrating its versatility.

As-Projective-As-Possible Image Stitching with Moving DLT 2017

- Advisors: Prof. Anoop Namboodiri
- Improved image stitching by proposing as-projective-as-possible (APAP) warps.
- Addressed local non-projective deviations to enhance image stitching accuracy.

Animation Effects using Image Morphing 2016

- Advisors: Prof. Vineet Gandhi
- Utilized the Triangulation method for morphing between human faces.
- Generated intermediate images to represent the transition between original images.

Breathing Rate using Camera 2017

- Developed a computer vision algorithm to determine breathing rate using a webcam or mobile camera.
- Potential applications include healthcare and fitness monitoring.

REFERENCES

- **Prof. C.V. Jawahar**
  Director, CVIT
  International Institute of Information Technology, Hyderabad
  c.v.jawahar@iiit.ac.in
- **Prof. Venkat Padmanabhan**
  Managing Director, Microsoft Research India
  padmanab@microsoft.com
- **Dr. Brijesh Pillai**
  Manager, Mercedes-Benz R&D India
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- **Prof. Anoop Namboodiri**
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- **Prof. Vineeth N Balasubramanian**
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