



# IISER Bhopal

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH BHOPAL

## J Harishwar Rao

📍 Bhopal/Hyderabad 📩 jamindar23@iiserb.ac.in 📞 +91-8790711815 💬 LinkedIn 🐧 github 🌐 Website

### Personal Statement

I am a Computer Science Junior at IISER Bhopal with a strong interest in **Deep Generative Models and Computer Vision**. I have worked with **Diffusion Models**, especially the score and SDE based approaches, and have built them from scratch for image generation tasks in astronomy as well as for downstream vision problems. This Summer, I was a Research Intern at **CVIT, IIIT Hyderabad**, where I worked on **conditional (part level awareness) Diffusion models for semantic object generation**. I am now looking for new research opportunities in **image and video generation, editing, and understanding** using generative vision methods.

### Research Experience

#### Research Intern at CVIT, IIIT Hyderabad, India

Apr,2025 - Present

*CVIT is one of the leading Academic labs for research in Computer Vision in India*

- Working under **Prof. Ravi Kiran** at CVIT
- I am broadly working on semantic image generation techniques using Diffusion Models, that translate structured layouts or object level specifications into realistic and diverse images.
- We generate structured layouts for images with part specifications, then using Conditional Diffusion based Modeling(conditioned on the generated layout) we generate diverse images.

#### Project Intern at JINR, Dubna

Feb,2025 - Apr,2025

*Selected for the INTEREST Program*

- Worked on application of CNNs to Particle Physics experiment (OPERA) carried out at CERN and JINR
- Built Visual Tools for the same and analysed of the Experiment Data.

### Education and Achievements

#### Indian Institute of Science Education and Research, Bhopal (IISER-B)

Aug 2023 - Present

*BS in Computer Science*

- GPA: 8.98/10.0
- **Coursework:** Data Structures and Algorithms, Discrete Mathematics, Linear Algebra, Single Variable Calculus, Multivariable Calculus, Probability and Statistics, Programming with C, Complex Variables, Econometrics, Basic Electronics, Signals and Systems.
- **Activities:**
  - Recipient of Prestigious **Reliance UG Scholarship**
  - Winner of Institute wide Competitive Coding Contest
  - Member of IISERB Coding Community

### Technologies and Skills

**Languages :** C++, C, Java, Python, Lua

**Machine Learning :** Supervised Learning, Unsupervised Learning, Deep Learning

**Frameworks/Libraries:** PyTorch, Numpy, Matplotlib, Scikit-learn, Tensorflow(beginner)

**Software & Tools :** Git, Github, LateX, AutoCAD, VS Code, Visual Studio

**Web Development :** HTML, CSS, JavaScript

**Scientific Computing :** MATLAB, Simulink

## Projects

---

### DiffuseSeg : Synthetic Data and Segmentation from a Single Diffusion Model

[github ↗](#)

- The project demonstrates how a single, unconditionally trained DDPM can serve as a backbone for both high fidelity image generation and label-efficient semantic segmentation.
- Implemented a two stage pipeline: (i) training an unconditional DDPM for image synthesis, (ii) freezing the UNet to extract multiscale features and training lightweight pixel-wise segmentation heads.
- Achieved strong segmentation performance on CelebAHQ with very few labeled samples (mIOU > 0.35 using only 100 images).
- Designed efficient feature extraction from specific decoder blocks and timesteps to construct rich pixel descriptors for semantic part segmentation.
- Released trained models, a starter synthetic dataset with masks, and reproducible training/inference scripts. Find these from the Github repo.
- Tools Used: Python, PyTorch, Diffusers, HuggingFace Datasets, Colab

### GravLensDiffusion

[github ↗](#)

- The Project aims to generate high quality images of Strong Gravitational Lensing.
- Implemented the DDPM model from scratch and trained it to generate images of Strong Gravitational Lensing.
- Achieved high accuracy in the Generation task despite limited compute resources. Evaluated using standard metric FID between the source images and generated images.
- Tools Used: Python,PyTorch,Root Software

### GravLensNet

[github ↗](#)

- The Project aims to achieve high accuracy in classifying images of Strong Gravitational Lensing.
- Implemented custom ResNET architecture after reading the seminal paper "Deep Residual Learning for Image Recognition".
- Achieved high accuracy in Classifying Astronomical Data. Evaluated using standard metrics like ROC and AUC.
- Tools Used: Python,PyTorch,Root Software

### Mystery\_Maze : 2D Game in Java

[github ↗](#)

- A 2D Maze Navigation Game written in Java.
- Uses Depth First Search Algorithm to generate a new Maze in every Game.
- Timed Bomb mechanic
- AI enemy agent following the player
- Tools Used: Java