

## Education

### Indian Institute of Technology (IIT) Gandhinagar

Gandhinagar, India

B.TECH. IN COMPUTER SCIENCE AND ENGINEERING (CPI: 8.50/10) [**degree**]

2017 - 2021

## Publications

[**Peer-Reviewed**] **Mrinal Anand**, Pratik Kayal and Mayank Singh, **Adversarial Robustness of Program Synthesis Models**, In *Advances in Programming Languages and Neurosymbolic Systems Workshop*, at **NeurIPS-21** [**paper**]

[**Peer-Reviewed**] **Mrinal Anand**, Pratik Kayal and Mayank Singh, **AutoCoder: Leveraging Transformers for Automatic Code Synthesis**, In *Advances in Programming Languages and Neurosymbolic Systems Workshop*, at **NeurIPS-21** [**paper**]

[**Peer-Reviewed**] **Mrinal Anand\***, Nidhin Harilal\*, Chandan Kumar\*, and Shanmuganathan Raman **HDRVideo-GAN: Deep Generative HDR Video Reconstruction** In *Proceedings of 12th Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP'21)* [**paper**]

[**Peer-Reviewed**] Harsh Patel\*, Shivam Sahni\*, Varun Jain\*, Praveen Venkatesh\*, **Mrinal Anand** and Mayank Singh. **Program Synthesis: Does Feedback Help?** In *YRS at ACM India Joint International Conference on Data Science and Management of Data (CoDS-COMAD 2022)* [**paper**]

[**Committee-Reviewed**] Pratik Kayal, **Mrinal Anand**, Harsh Desai, Mayank Singh **ICDAR 2021 Competition on Scientific Table Image Recognition to LaTeX**. In: Lladós J., Lopresti D., Uchida S. (eds) *Document Analysis and Recognition – ICDAR 2021*. ICDAR 2021 Lecture Notes in Computer Science, vol 12824. Springer, Cham. [**paper**] [**competition**]

[**Survey Paper**] **Mrinal Anand**, Aditya Garg. **Recent Advancements in Self-Supervised Paradigms for Visual Feature Representation**. [**paper**]

[**Preprint**] **Mrinal Anand**, Pratik Kayal, and Mayank Singh (2021). **On Adversarial Robustness of Synthetic Code Generation**. ArXiv, abs/2106.11629. [**paper**]

[**Under-Review**] Pratik Kayal, **Mrinal Anand**, Harsh Desai, and Mayank Singh **Tables to LaTeX: Structure and Content Extraction from Scientific Tables** In *Proceedings of International Journal on Document Analysis and Recognition (IJ DAR-21)*

\* indicates equal contribution

## Awards & Honors

2021	<b>Awarded Professor Nitish Thakor Scholarship</b> , Grant of 1500 USD for overall academic excellence	IIT GN, India
2021	<b>Awarded LaunchPad Fellowship-21</b> , Grant of 2500 USD as pre-seed funding for startup	IIEC, India
20'15-21	<b>Academic Excellence</b> , Secondary(10/10), Senior Secondary(92.3%), and Dean's list in 3/8 semesters of UG	IIT GN, India
2020	<b>Best Research Proposal Award</b> , Eastern European Machine Learning Summer School (EEML-2020)	Virtual, Europe
2020	<b>Awarded Financial Grant (EEML-2020)</b> , Waived registration fees and selection process for EEML-2021	Virtual, Europe
2020	<b>Selected for GoogleAI Summer School</b> , Among top 150 applicants out of 5000+ nation wide applicants	Virtual, India
2020	<b>Selected by University of Saskatchewan (cancelled due to covid-19 pandemic)</b> , Research Internship	Sask., Canada
2020	<b>Selected by Aalto University (cancelled due to covid-19 pandemic)</b> , International Research Program	Espoo, Finland
2018	<b>Bronze Medalist</b> , Secured 3 <sup>rd</sup> position among 23 IITs in 7 <sup>th</sup> Inter IIT Tech Meet for Eye in the sky challenge	IIT Bombay, India
2018	<b>Runner up</b> , Secured 2 <sup>nd</sup> position in hackathon organised by Infostretch Corporation	Ahmedabad, India

## Selected Experiences

### INDUSTRIAL EXPERIENCES

#### Software Developer

##### Enphase Energy

Banglore, India

MANAGER: VINOD TIGADI

July. 2021 - Present

- Working on developing and maintaining Enlighten app that empowers the Enphase system owners to track their energy production, monitor their system's health, and share their data with family and friends.
- Enlighten app has a rating of 4.7 on **App Store** and 4.2 on **Play Store** with 100000+ downloads.
- Developed the frontend functionalities to support Enphase New Product PES (Portable Energy System) in the Enlighten App.

#### Data Analyst Intern

##### Ernst & Young

Bombay, India

MANAGER: RAJESH RIZWANI

Dec 2018 - Jan 2019

- Identified the root causes for major skill gap which leads to youth unemployment in south Asian countries.
- Performed exploratory data analysis using ML models to identify redundancy and ineffectiveness in vocational training programs.
- Minimized the overall expenditure invested in vocational training programs conducted by government and private sectors.

## RESEARCH AND ACADEMIC EXPERIENCES

### Research Intern

#### Computer Vision and Intelligence Research Lab (CVIR), IIT Karagpur

Kharagpur, India

SUPERVISOR: DR. ABIR DAS

May. 2019 - Aug. 2019

- Build a multimodal architecture which can inpaint an object in an image, given a corresponding natural language expression of an object.
- Implemented a two-stage pipeline, Stage-1 generates the segmentation mask using the query, and Stage-2 does the inpainting using the mask.
- Reduced the inpainting artifacts (blurring and distortion) by implementing contextual attention layer. Final presentation is available [here](#).

### Teaching Assistant

#### ES 654: Machine Learning (Spring 2021) and CS 614: NLP (Fall 2020)

Gandhinagar, India

SUPERVISOR: PROF NIPUN BATRA (ES 654: MACHINE LEARNING) AND PROF MAYANK SINGH (CS 613: NLP)

Aug. 2020 - May. 2021

- Designed the course syllabus for both the courses. Delivered four practical sessions on Deep learning in NLP. Developed open-source code for student assignments and reference notebooks. Carried out weekly project discussion sessions. Prepared questions for quizzes and exams.
- Mentored a total of 8 student projects in both the courses. Topics ranging from **Reinforcement learning**, **AI Safety**, **Program Synthesis** etc.
- **Publication:** One of the mentored projects (**Program Synthesis: Does Feedback Help?**) is accepted in YRS at CoDS-COMAD 2022.

## STARTUP

### Co-Founder

#### SZone, IIEC

Gandhinagar, India

OTHER CO-FOUNDERS: ANUBHAV JAIN, CHANDAN MAJI, AND ROHIT PATIL

Part-time | Dec. 2020 - Present

- SZone is a B2B Augmented Reality based platform for salon and beauty franchises.
- Ideated and brainstormed on the prototype, business model, product road-map and marketing strategies.
- Raised pre-seed funding of 2500 USD to develop the working prototype.

**Note:** Complete list of experiences is available [here](#)

## Selected Projects

### Adversarial Robustness of Code Generation Systems

[Paper-1](#)

[Paper-2](#)

[Presentation](#)

IIT Gandhinagar

MENTOR: PROF. MAYANK SINGH

Jan 2020 - March 2021

- Devised five classes of black-box adversarial attacks. Demonstrated the brittleness of SOTA code generation model under adversarial settings.
- Proposed a new data augmentation algorithm to construct an adversarially robust dataset (AlgoLisp++) compared to AlgoLisp.
- Proposed a gated-attention transformer model and showed its superior adversarial performance than vanilla attention model.
- Published two papers in AIPLANS at NeuIPS-21 and one manuscript under review. Presented the work at EEML-2020.

### Rethinking Softmax Cross-Entropy Loss for Adversarial Robustness

[Repository](#)

[Paper](#)

IIT Gandhinagar

REPRODUCIBILITY CHALLENGE 2020

Sept. 2020 - Dec. 2020

- Studied the [\[ICLR-2020 Paper\]](#) and reproduced the results present in the paper.
- Reimplement the MMC center generation algorithm and MMC loss (originally present in keras) in PyTorch.
- Added additional experiments to showcase the strength and limitations of Max-Mahalanobis center (MMC) loss over SCE loss.

### Monsoon Rainfall Prediction

[Presentation](#)

IIT Gandhinagar

MENTOR: PROF. UDIT BHATIYA

Nov. 2019 - July. 2020

- Implemented a deep learning model to predict the rainfall in India during the monsoon season.
- Clustered the whole country into different zones to account for spatiotemporal distribution of rainfall in India. Distance-based clustering methods, e.g. Netwon-Raphson method, gives the best performance compared to K-Means, DBSCAN etc.
- Concluded that variability of monsoon are governed by local factors like surface temperature and pressure rather than global factors like SSTs.

### HDRVideo-GAN: Deep Generative HDR Video Reconstruction

[Paper](#)

IIT Gandhinagar

MENTOR: PROF. SHANMUGA R

Jan. 2020 - Oct. 2020

- Proposed a temporally stable GAN-based mode for HDR video reconstruction model. Our GAN based model achieves state-of-the-art results.
- Implemented self-supervised denoising block to extract clean LDR from noisy LDR frames. Incorporated light-weight FlowNet for coherency.
- The work is accepted in [ICVGIP-21](#).

### Survey on Matching in the Graph-Stream Model

[Paper](#)

IIT Gandhinagar

MENTOR: PROF. ANIRBAN DAS GUPTA

March. 2020 - April. 2020

- Survey plethora of papers on the matching problem for graph streams under both single pass and multi-pass streaming settings.
- Discussed the need, ongoing trends, limitations and future research direction on graph streams.

### PERL: Protecting Elections using Reinforcement Learning

[Presentation](#)

IIT Gandhinagar

MENTOR: PROF. NIPUN BATRA

Jan. 2020 - April. 2020

- Tackled the problem of Vote trading (stackelberg model). Studied by Computational Social Choice community and Game Theoreticians.
- Created a dataset of strong examples using heuristic based approach to mimic vote trading problem.
- Formulated the game theory problem as a reinforcement learning based problem using Deep Q-Learning Algorithm.

## MiniNim | A High-Level Programming Language Inspired from NIM Repository

IIT Gandhinagar

MENTOR: PROF. BIRESWAR DAS

Jan. 2020 - April. 2020

- Implemented a compiler for a tiny subset of the Nim Programming Language (MiniNim). The compiler outputs a MIPS Assembly code which can be run in simulators like MARS.
- MiniNim supports variable declaration, conditional statement, arithmetic operations, boolean logic, for loop, while loop, and break statements.

## MapReduce Presentation

IIT Gandhinagar

MENTOR: PROF. NIPUN BATRA

Sept. 2019 - Nov. 2019

- Research and studied the MapReduce Algorithm. Implemented MapReduce in C.
- Evaluated the mapping algorithm (scheduling policies) on uneven workload. Used Min-Heap to implement sorting and partitioning.
- Bechmarked the implementation using word count, matrix multiplication and mutual friend problem.

## Anomaly Detection In Blockchain Network Report

IIT Gandhinagar, India

INDEPENDENT PROJECT

Aug. 2019 - Sept. 2019

- Learned Blockchain network and used unsupervised techniques like k-means, DB-SCAN, Isolation Forest for detecting the anomaly.
- Created two Bitcoin transaction graphs - the first graph has users as nodes, and the other has transactions as nodes.
- Generated features like Indegree, Outdegree, net total amount in BTC, net incoming amount and net outgoing amount for each node.

## Satellite Image Segmentation Presentation

IIT Bombay

7<sup>th</sup> INTER IIT TECH MEET

Oct. 2018 - Dec. 2018

- Implemented an image segmentation model with an overall pixel wise accuracy of 92.3% on the given dataset.
- Designed a variant of U-net model specifically suited for satellite imaging. Used ensembling of both supervised and unsupervised learning.
- Used edge detection, texture detection techniques to extract important boundary features that are lost during down-sampling the image.

**Note:** Complete list of projects is available [here](#)

## Postions of Responsibility

2022-2021 **Reviewer in AIPLANS at NeurIPS-21**, Reviewed two research papers

India

2022-2021 **Teaching Assistant**, Short Course on Data Science & Analytics, IIT Gandhinagar

India

2022-2021 **Teaching Assistant - Machine Learning**, Prof. Nipun Batra, IIT Gandhinagar

India

2021-2020 **Teaching Assistant - NLP**, Prof. Mayank Singh, IIT Gandhinagar

India

2018-2020 **Project Mentor**, Coding Club (Metis), IIT Gandhinagar

India

2018-2019 **Senior Executive**, Entrepreneurship Initiative, IIT Gandhinagar

India

2018-2019 **Team Leader**, 7<sup>th</sup> Inter IIT Tech Meet, IIT Gandhinagar Team

India

2018-2019 **Senior Executive**, Amatheas'18-Tech Summit, IIT Gandhinagar

India

2017-2018 **Executive**, Amatheas'17-Tech Summit, IIT Gandhinagar

India

## Technical Knowledge

**Programming Languages:** Python, C, C++, Bash Scripting, MATLAB, Javascript, HTML, CSS, Ruby, R, MySQL.

**Tools and Frameworks:** Git, Jax, PyTorch, Keras, Tensorflow, OpenCV, Autodesk Inventor,  $\LaTeX$ , Mathematica, Django, Flask, MongoDB, Vim, Reactjs, Ruby on Rails.

## Relevant Coursework

**At IIT Gandhinagar:** Advance Machine Learning, Natural Language Processing, Machine Learning, Networks, Introduction to Data Science, Databases, Operating Systems, Probability and Random Processes, Discrete Maths, Data Structure and Algorithms, Computer Architecture and Organization, Calculus, Linear Algebra, Real and Complex Analysis, Numerical Methods, Differential Equations, Vector Calculus.

## Social Contributions

### Teaching Assistant

IIT Gandhinagar

TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAMME (TEQIP-III INITIATIVE BY MHRD, GOVT. OF INDIA & NPIU)

2021-2022

- Worked with course instructor to conduct *Data Science & Analytics* sessions. The objective of this course is to impart the necessary knowledge of the foundations needed for one of the NASSCOM identified digital technology: data science and analytics.
- The participants of the offered course was faculties from other institutions across India.
- Prepared jupyter notebooks to demonstrate several ML algorithms. Created homework assignments. Conducted doubt clearing sessions.

### Mentor GSOC Presentation

IIT Gandhinagar

CODING CLUB (METIS)

2018-2020

- Mentored several student-run projects. Guided junior undergrad students on Inter-IIT Tech Meet projects.
- Conducted sessions on GSOC and other opportunities in Computer Science. Conducted sessions on Keras and Django framework.