

# BHAVYA BHATT

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## EDUCATION

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### **Bachelor of Technology(Computer Science and Engineering)**

2016 - 2020

Indian Institute of Technology, Mandi

Overall GPA: 7.9/10

School of Computing and Electrical Engineering

### **CBSE(Higer Secondary)**

2016

MDS Public School, Udaipur, Rajasthan

Percentage: 93.5%

### **CBSE(Matriculation)**

2014

St. Gregorios Sen. Sec. School, Udaipur, Rajasthan

CGPA: 9.6

## TECHNICAL STRENGTHS

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### **Computer Languages**

C, C++, Python, JAVA (for android development)

### **Frameworks**

PyTorch (Advanced), Keras (Medium), Android Studio (JAVA)

### **Other Interest**

Mathematics of Deep Learning and Machine Learning,  
Stochastic Processes, Non-Euclidean geometrical methods,  
Group Theory

## PUBLICATIONS

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### **Path Integral formulation for all particle dynamics**

June 2018 - August 2019

*Summer Research Intern*

- Proposed a new derivation for path integrals of collapse models and other all particle dynamics theories which resulted into a paper "path integrals, spontaneous localization and classical limit". <https://arxiv.org/abs/1808.04178>.

## EXPERIENCE

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### **Siemens Technology & Services Pvt. Ltd.**

June 2019 - August 2019

*Software Research Intern*

- Used program analysis tools like Atlas to run control flow analysis on large codebase which can further be used for extracting knowledge graphs.
- Implemented four different types (Tensor Product Composition, HOLE, ComplEx, QuatE) of Knowledge Graph embedding probabilistic architectures in PyTorch.
- Learned about Non-Euclidean real (for symmetric relations) and complex (for asymmetric relations) background geometries for embeddings in order to learn effective hierarchical patterns from the Knowledge Graph.
- Proposed a model for learnable background geometry (components of metric tensor itself are learnable parameters) along with embeddings (entity and relations) which can further be useful in manifold learning and other embedding visualization techniques.

**Siemens Technology & Services Pvt. Ltd.**  
*Software Research Intern*

December 2018 - February 2019

- Processing internal service logs for building shift-right testing application.
- Used recurrent neural networks (LSTM) to predict most probable test cases which user can execute.
- Analyse the data for anomaly detection in the logs sequence dataset by probability estimation method.
- Also tested static probabilistic methods like PAM algorithm to achieve the above task.
- Documented the relevant codebase and procedures.

**Tata Institute of Fundamental Research, Mumbai**  
*Summer Research Intern*

June 2018 - July 2018

- Proposed a new derivation for path integrals of collapse models and other all particle dynamics theories.
- Argued that  $\hbar$  tends to zero is not the limit to classical mechanics but rather some more robust mechanism to kill macroscopic superpositions.
- Explained that the above mechanism can be achieved through appropriate limit on collapse model parameters and formalised these limits mathematically.

## OPEN SOURCE PROJECTS

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**PyGlow - Information Theory of Deep Learning**  
*Author and Maintainer*

June 2019 - Present

- Author and maintainer of a python library for Information Theory in Deep Learning named 'PyGlow' which is currently on its 0.0.6 version on Test PyPI and can be installed from <https://test.pypi.org/project/PyGlow>.

**EinsteinPy - Numerical Relativity in Python**  
*Coauthor*

February 2018 - Present

- Coauthor of a python library for numerical relativity and relativistic astrophysics related computations 'EinsteinPy' - <https://einsteinpy.org/team/>

## TECHNICAL PROJECTS

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**Why Neural Networks work ?**

Major Technical Project

- This is an Ongoing final year major technical project in the field of "Mathematics of Deep Learning".
- Project aims at developing new theoretical ideas which can provide mathematically formal answers to some of the profound questions in the field of deep learning.
- These questions include the mechanism of generalization, optimal architectures, phase transitions between memorization and compression phase etc.
- The project demands the need for exploring cross field topics from information theory, statistical physics, group theory and complexity theory and experiment with these ideas in code.
- As a result of this project, all the experimentation code is available in form of a Python library package **PyGlow** which can be installed from PyPI with command "pip install -i <https://test.pypi.org/simple/PyGlow>".
- This library is also one of the attempts to develop keras like API in PyTorch backend.

### Himachal Firespot Datapackage

- Forest Fire Notification App under Himachal government which provides an interface for the user to upload an image alert of the forest fire.
- This then circulate the GPS location of the sender to the registered authorities like fire brigades, government officials and reporters.
- This reduces the time to spot the location and prevent deaths of village people around the active forest fire region.

### Euler Notes

2<sup>nd</sup> year Topcoder Hackathon

- A web application indented for hearing impaired people.
- The app processes the real-time speech data into text and produces short summaries of the whole speech lecture with the use of machine learning (used extensions).
- It identifies main keywords and produces educational links in the same interface.

## ACADEMIC ACHIEVEMENTS

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Secured 1st position in TopCoder Hackathon for-Eulers Notes.

Secured 1st position in paper presentation and debate event held at technical fest of STAC club - Astrax 2019.

Secured All India Rank (AIR) 2324 in JEE Advanced (IIT-JEE) examination 2016.

## RELEVANT COURSES

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### Core Courses

Advanced Data Structures and Algorithms  
Pattern Recognition  
Deep Learning and its Applications  
Advance Database Practicum  
Large Application Practicum  
System Practicum (Operating System and Networking)

### Other Courses

Linear Algebra  
Real Mathematical Analysis  
Probability and Statistics  
Biotechnology  
Statistical Mechanics

## POSITION OF RESPONSIBILITY

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### Speaker at STAC

*Space Technology and Astronomy Cell*

*IIT Mandi*

- Held position as a speaker and gave two talks on various topics of mathematics.

### Teaching Assistant

- for the course on Advanced Data Structures and Algorithms, and Data Science Lab.

## EXTRA-CIRRICULAR

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Participated in Vibgyor event organised by Art and craft club - Art Geeks, for two years (2017-2018).

Participated in flash mob event in the Tech-Cult fest of IIT Mandi, Exodia.