

# Mainak Deb

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DOB: November 9th, 2000

## Experience

July 2021 **Google Summer of Code 2021 Student Intern @ INCF**

Worked on DevoLearn, which aims to leverage deep learning to accelerate developmental biology research. Trained deep neural networks from scratch to help map the embryogenesis process in *C. elegans* worm embryo and deployed models live on the web using ONNX. Feel free to check out the detailed [report](#) and [work repository](#)

January 2022 **Research Intern @ Hybrid Design Lab, University of Campania, Italy**

Worked on generating time-varying textures that emulate sea Urchin skeletons using Neural Cellular Automata and experimented with the latent output channels (apart from RGB) to generate vibrant psychedelic patterns. My work would be showcased at the [Echino Design exhibition](#), 24 February 2022 at Città della Scienza, Naples, Italy.

March 2022 **Research Intern @ Department of Structures for Engineering and Architecture of University of Naples Federico II**

I have been working under Prof. Francesco Marmo (and team) on bio-mechanical research that has the goal of geometrically and mechanically characterizing the stereom of echinoid exoskeletons. My goal is to process micro-CT data to extract geometrical models of the stereom using computer vision. Feel free to check out the [Github repository](#).

## Achievements

April 2021 **3rd Prize - MLOps for Good Hackathon**

Organized by Microsoft, Iguazio and MongoDB

Built and hosted Deepfake Shield - an online tool that uses deep-learning to detect deepfakes in an image.

April 2021 **First Prize (Education Track) - Hello World Hackathon**

Organized by CalHacks (University of California, Berkeley)

Built SignLingo - A deep learning based sign-language tutor which works via live webcam video feed.

October 2020 **First Prize - Lights, Camera, Hacktion! Hackathon**

Organized by Major League Hacking

Developed a system that uses Computer Vision to automatically pause/play videos depending on whether the user is paying attention to the screen.

October 2020 **First prize (Google Cloud track) - Hero Hacks**

Organized by Major League Hacking

Built a Java based mobile application that aims to eliminate the use of physical paperwork in hospitals, pharmacies, and clinics to ensure minimal physical contact for the consumers as well as doctors and staff.

September 2020 **Third Prize - New Friends New Hacks**

Organized by Major League Hacking

Built an efficient Computer Vision based face mask detection system powered by OpenCV.

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## Relevant Personal Projects

- April 2022 **Patch me if you can**  
Trained adversarial patches using PyTorch to fool/distract Vision Transformer based image classifiers. The patch is trained to optimize model confidence for a target class, regardless of where its location is over the input image.
- December 2021 **Text-2-Neural Cellular Automata**  
Generates beautiful cellular automata patterns from text prompts, using CLIP-guided Neural Cellular Automata, built using PyTorch.
- December 2020 **Deceptive Digits**  
The aim of this project was to conditionally generate realistic images of handwritten digits. This was accomplished by training two PyTorch based custom neural networks (with label embeddings) simultaneously in a GAN framework.
- November 2020 **Eyes on the Road**  
The aim of this project was to train a PyTorch based Deep Convolutional Neural Network to classify driver activity. The testing accuracy was 93.9%, but I also tested the model on some real life images that I clicked just to be on the safe side.
- August 2020 **Bank me Later**  
Trained a PyTorch dense-net to predict if a client subscribes to a term deposit or not using attributes like job, marital status, age etc with an accuracy of 94%
- March 2020 **Deep Wine Connoisseur**  
The quality of wine is directly correlated to its chemical composition, I used these chemical attributes to train a PyTorch dense-net to predict its quality, and it worked!
- February 2020 **Facial Expression Classifier**  
Trained a PyTorch based Deep Convolutional Neural Network to classify human facial expressions from images. Deployed on live webcam feed, used openCV's Haar-Cascades to crop into the facial region before inference.

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## Areas of Interest

Image processing, Computer Vision, Deep Neural Networks, GANs, Adversarial Attacks

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## Education

- Expected 2023 **Bachelor's of Technology**, *Electrical and Computer Engineering*, ASE, Amrita Vishwa Vidyapeetham, Kollam, India. Current GPA: 8.3/10.0.
- 2016 - 2018 **Higher Secondary**, Amrita Vidyalayam, Kolkata , India. Marks: 89%.

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## Technical Skills

- Programming Python
- Primary Libraries PyTorch, OpenCV, NumPy, SciPy, Pandas, PIL, Matplotlib, Seaborn, Plotly
- OS GNU/Linux, Microsoft Windows
- Tools Jupyter Notebooks, Git, conda
- Web FrontEnd- HTML, CSS
- Development BackEnd- Flask

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## Languages

English, Hindi, Bengali