Apratim **Mukherjee**

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Education

Manipal Institute of Technology, Manipal — *Karnataka, India*

Bachelor's in Computer Science and Engineering (Minor in Intelligent Systems) — *July. 2016 - Expected April. 2020*

- Relevant Coursework: Artificial Intelligence, Machine Learning, Optimization Techniques, Computer Vision, Natural Language Processing, Object Oriented Programming, Data Structures, Design and Analysis of Algorithms, Parallel Architecture and Programming.

Research Experience

Worcester Polytechnic Institute (WPI) — *Worcester, MA*

Research Intern — *Jun. 2019 - July 2019*

- Worked with the **SmartWAnDS** group at Fuller Laboratories under Prof. Emmanuel Agu.
- Focused on bettering segmentation methods for **pixel-wise classification** of wound images.
- Performed a systematic study of the performances of **AHRF** and different **Deep Learning** models which are presented in our paper.

Indian Institute of Science, Bangalore (IISc) — *Karnataka, India*

Research Intern — *May 2019 - Jun. 2019*

- Worked at the **Artificial Intelligence and Robotics Lab** in the Aerospace Department under Prof. Suresh Sundaram.
- Mainly focused on **Visual Odometry** and **VSLAM** methods for robot localization in GPS-denied environments.

Project MANAS (www.projectmanas.in) — *Karnataka, India*

AI Member/Mentor — *Feb. 2017 - Present*

- Oversaw the completion of an AGV for the 26^{th} and 27^{th} **Intelligent Ground Vehicle Competition**, and a **self-driving car** for the Mahindra **$1Million Rise Prize** challenge.
- Worked on different algorithms for tasks such as **Lane Detection**, **Speed bump Detection**, **Sensor and Data Fusion**, **Localization** etc. using **Image Processing** and **Deep Learning** which were used on all the vehicles.

Projects

Semantic Segmentation of Wound Images: A Systematic Comparison of Convolutional Neural Networks and AHRF Approaches — *Literature Review Stage*

Worcester Polytechnic Institute (WPI) — *Jun. 2019 - July 2019*

- Co-authored the paper along with Ameya Wagh and Shubham Jain, where we compared the performances of **AHRF vs CNNs** on a wound segmentation dataset collected at **UMass Medical Center**.
- Compared various pre- and post- processing methods such as CLAHE and CRFs along with different architectures including **dilations** and **spatial pyramid pooling** while benchmarking on different subsets of the dataset which helped us draw a number of useful inferences.

Autonomous Ground Vehicle for IGVC 2019 — *Completed*

Manipal Institute of Technology — *Jan. 2019 - Jun. 2019*

- Integral part of the team that won the **grand prize at IGVC 2019**, beating teams from across the world like **Georgia Tech** and the **IITs**.
- Improved on the 2018 perception stack, bettering the lane and bump detection systems while integrating newer localization and mapping methods.

Autonomous Ground Vehicle for IGVC 2018 — *Completed*

Manipal Institute of Technology — *Jan. 2018 - Jun. 2018*

- Headed the perception team responsible for **scene understanding** and mapping the environment around the map for localization.
- Different Computer Vision and Deep Learning approaches to achieve the most desirable results were used.
- Placed 9^{th} among 27 teams from across the globe and 2^{nd} in India.

Localized Generation of Classes for Augmentation — *Work In Progress*

Manipal Institute of Technology — *Feb. 2018 - Present*

- Research revolves around a novel method of **augmentation** and studying its effects on the performance of **Deep Neural Networks**.
- Benchmarking on various datasets have shown a **significant boost** in performance of object detection and segmentation networks because of our augmentation.

Self-Driving Car for the Mahindra Rise Prize Challenge *Work in Progress*

Manipal Institute of Technology *Feb. 2017 - Present*

- Currently working on getting the car to level 2-3 autonomy.
- Successfully implemented **Lane Detection, Speed Bump Detection, Data Fusion** amongst other things for Indian road conditions.
- Continuously involved in other tasks of **Traffic Light and Sign Detection** as well as Localization using a sensor array consisting of 2D/3D Lidars, Radars and Mono/Stereo cameras.

NumJ *Completed*

Manipal Institute of Technology *Oct. 2017 - Nov. 2017*

- Attempted to build a completely multi-threaded **NumPy counterpart** for Java to ease the flow of weights through a neural network.
- Were successful in integrating most of the **matrix operations** required for the **propagation of weights in a neural network**.

Java Deep Learning Library (JDL) *Completed*

Manipal Institute of Technology *Oct. 2017 - Nov. 2017*

- Built a **Deep Learning Library** from ground up in Java using **NumJ**.
- Were successful in creating different networks using **JDL** for tasks like classification.

Skills

Programming	C, C++, Python, Java, Matlab, GNU Octave, SQL
Libraries & Tools	Pytorch, Tensorflow, Keras, ROS/ROS2, OpenCV, Cuda, MPI, Scikit-Learn
Experienced in	Artificial Intelligence, Deep Learning, Computer Vision, Robotics, Machine Learning, Image Processing

Extracurriculars

- One of the **13** out of **153** teams remaining for the **Rise Prize Challenge**.
- Finalists for the **Philips Hackathon 2017**.
- Core Committee member of **Data Science Club, Manipal**.
- Member of **Teach Code for Good, Manipal**.
- **Deep Learning Specialization** by **deeplearning.ai** (Certificate)
- **Mathematics for Machine Learning Specialization** by **Imperial College London** (Certificate)
- **Parallel, Concurrent and Distributed Programming in Java Specialization** by **Rice University** (Certificate)
- **Robotics: Aerial Robotics** by **University of Pennsylvania** (Certificate)
- **Bayesian Statistics : From Concept to Data Analysis** by **UC Santa Cruz** (Certificate)
- **An Introduction to Practical Deep Learning** by **Intel** (Certificate)
- **Intro to Tensorflow** by **Google Cloud** (Certificate)