# ARITRA MUKHOPADHYAY

**Student, School of Physical Sciences (SPS), NISER**

aritra.mukhopadhyay@niser.ac.in | +91 6290887099 | Room 319, Bhagirathi Hostel, NISER
Bhubaneshwar, INDIA | aritra-mukhopadhyay-88ab9b213 | PeithonKing

## ABOUT ME

I am a **Physics Major** student (Int. MSc.) at the **National Institute of Science Education and Research** (NISER). Apart from Physics, I have a keen interest in **Robotics and Technology**. I also love programming from the core of my heart. I am a **self-taught programmer** and have been learning new things on my own. These days I am finding myself more invloved in topics like **Machine Learning**, **Deep Learning** and **Image Processing**. As a member of the **RoboTech Club (RTC)** of NISER, I am trying to develop an autonomous rover using my **Reinforcement Learning** skills.

## OUTSIDE COURSEWORK

### Quantum Computation Internship

**Prof. Prasanta K. Panigrahi**

June 2022 – July 2022 | IISER Kolkata

Here I learned the basics of quantum computation and various aspects of it. I read a lot of papers suggested by my instructor and also did some activities on my own. Finally, I read a paper on a Quantum Robot and felt I could solve the problem addressed in the paper better. So I learned more about the topic and submitted my report on the same.

Internship Report: **Quantum Robot**

### PyaR Seminar 2021

**Prof. Raja GuhaThakurata**

July $29^{th}$ to $31^{st}2021$ | Online

Here we learned the python programming language and how it can be used with Jupyter Notebook. We also learned the basics of astronomical data analysis using libraries like Numpy, Pandas, matplotlib etc. We were also briefed about some clustering algorithms used daily in this field.

GitHub Repository (materials): **PeithonKing/PyaR-2021**

### Quantum Computation Course

**IISER Tirupati & Qkrishi**

2022 Summer Break | Online

I did a course on the basics of Quantum Computation and Quantum Information jointly organised by IISER Tirupati and Qkrishi. We learned the basic theory and had a hands-on experience with the IBM Quantum Experience. We also submitted a term project of Attacking Quantum Key Distribution Protocols. We demonstrated QKD algorithms like BB84 and E91 protocols in multiple devices on the same network using python libraries like Flask and Qiskit.

GitHub Repository: **PeithonKing/Attacking_QKD_Protocols**

*"Start by doing what's necessary; then do what's possible; and suddenly you are doing the impossible!"*

## MOST PROUD OF

**Came first in the ML4SCI Hackathon**
(The Higgs Challenge)

Nov 2021 - Jan 2022

I, with my friend, participated in this competition. We were given 6 problems and were supposed to solve one (or more) of them using our Machine Learning skills. We went with the Higgs Challenge. We were given a dataset of 11 million data points and were expected to predict the presence of Higgs boson. We used an ensemble model which consisted of 5 neural network architectures and an XGBoost architecture. We were able to achieve an area of 0.88 under the ROC Curve.

GitHub Repository: **PeithonKing/ML_comp**

## CURRENTLY WORKING ON

**Improvement on the Quaternion-based models: extension to larger datasets and Batch Normalization**

I am addressing the shortcomings of earlier research on the lottery ticket hypothesis for quaternion-based models as part of my term project for the CS460 ML Course. Even while earlier work had success with smaller models and datasets, it had difficulties with batch normalisation code that ran slowly and didn't test bigger datasets and models. In order to overcome these restrictions and develop the field of quaternion based models, I am concentrated on increasing the efficiency of Batch Normalization to enable trials with bigger data sets and models.

GitHub Repository: **smlab-niser/quatLT23**

**Autonomous Rover Development at RTC**

At RTC, we are training an autonomous rover using reinforcement learning (RL) techniques. We are starting with simulation environments like Carla and plan to implement the trained model on a 6-wheel rover equipped with sensors such as cameras and GPS for real-world deployment. More on it here: https://www.niser.ac.in/~smishra/project/rtcrover2022/.

### Building a Drone

**RoboTech Club, NISER**

June – July 2021 NISER

We built an autonomous drone with aid from RTC. The structure of the drone was built from scratch using aluminium box pipes, switchboard sunmica plates and some small 3D-printed parts. We used pixhawk 4 as the flight controller. It can fly in both manual mode or follow a predefined path using GPS. This drone can be developed further for learning.

### Machine Learning Internship

**Prof. Kripabandhu Ghosh**

Dec 2021 - Jul 2022 IISER Kolkata

Here I specifically focussed on the Natural Language Processing (NLP) and Information Retrieval part of ML. I learned more about the different steps of doing NLP, their problems and the different processes to solve them. I also learned about some scoring algorithms for sorting documents in a corpus concerning relevance to a query. Finally, I succeeded in bringing a MAP value of 0.21 for the AILA dataset provided to me (the maximum MAP value achieved before that was 0.14).

GitHub Repository: **PeithonKing/AILA**

### Member of the RoboTech Club of NISER

**Prof. Subhankar Mishra's Lab**

Jan 2021 - Present smlab-niser

Here I specifically focussed on the Natural Language Processing (NLP) and Information Retrieval part of ML. I learned more about the different steps of doing NLP, their problems and the different processes to solve them. I also learned about some scoring algorithms for sorting documents in a corpus concerning relevance to a query. Finally, I succeeded in bringing a MAP value of 0.21 for the AILA dataset provided to me (the maximum MAP value achieved before that was 0.14).

## SKILLS

Hard-working | Eye for detail | Tenacious | Self-motivated

Physics | Handling Telescopes | Python | C++ | JavaScript | Web Dev | Robotics | Arduino | Development Board Programming

## LANGUAGES

**English** — Speaking, reading, writing

**Bengali** — Speaking, reading, writing

**Hindi** — Speaking, reading

**German** — Learning

## EDUCATION

### Integrated M.Sc. (Physics Major)

**National Institute of Science Education and Research**

2020 - Present Bhubaneshwar

Currently Studying here.

### Higher Secondary Examination (12th)

**Patha Bhavan High School**

2020 Kolkata

**WBCHSE** Marks: $469_{/500}$ (93.8%)

### Madhyamik Parikhsha (10th)

**Patha Bhavan High School**

2018 Kolkata

**WBBSE** Marks: $636_{/700}$ (90.86%)