# UTPAL RAJ

**Third year Undergraduate Student**
**Integrated Masters of Science in Physics**
**Indian Institute of Technology (IIT) Kharagpur-721302**
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## EDUCATION

| Year | Degree | Institute | CGPA/Percentage |
|---|---|---|---|
| 2020-2025 | Integrated-MSc | IIT Kharagpur | 8.12/10 |
| 2020 | Class XII (CBSE) | DPSI Garhan, Muzaffarpur | 94.6% |
| 2018 | Class X (ICSE) | North Point's children's School, Muzaffarpur | 90% |

## SKILLS AND EXPERTISE

**Programming languages:** Python | C | C++| SQL.
**Libraries and frameworks:** NumPy | Pandas | Matplotlib | SciPy | Seaborn | Scikit Learn | TensorFlow | MATLAB
**Tools:** Jupyter Notebook | Visual Studio Code | LATEX | Microsoft Office| Power BI |
**Skills:** Data Analysis | Problem Solving | Machine Learning |Deep Learning | Data Structure and Algorithms in Python.

## CERTIFICATIONS AND EXPERIENCE

**Virtual Internship | Tata |** Data Visualization and Analysis: Empowering Business **|**
**Virtual Internship | Boston Consulting Group**| Business Understanding & Hypothesis Framing**|**
**Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning by DeepLearning.AI** |
**Data Science and Machine Learning Internship at YBI Foundation| Data Structure and Algorithms** in Python by CodeBasics
**Machine Learning Specialization by Stanford University-Coursera** (**Supervised Machine Learning**: Regression and Classification **| Advanced Learning Algorithms**| **Unsupervised Learning, Recommenders, Reinforcement Learning**) |
**Deep Learning Specialization by Stanford University-Coursera***(Sequence Models | Neural Networks and Deep Learning | Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization | Structuring Machine Learning Projects | Convolutional Neural Networks) | **Data Analysis Zero to Pandas** by Jovian.ai| *Ongoing

## PROJECT AND INTERNSHIPS

### Sentiment Analysis:

- Extracted textual data from a list of URLs of tech. articles (provided by a company through a excel file) using web scrapping. Performed cleaning of the texts using list of four different files containing stopwords provided by them. Used a list of custom positive and negative words as provided by them and then performed textual analysis like - Sentimental Analysis (Positive Score, Negative Score, Polarity Score, Subjectivity Score), Analysis of Readability (Average Sentence Length, Percentage of Complex words, Fog Index, Syllable count, personal pronouns, avg word length etc.). Provided the output of these variables for the better understanding of how their article would perform based on these metrics.

### Skin Cancer Detection:

- Worked on SKIN CANCER MNIST ham 10000 dataset which contains a large collection of multi-sources dermatoscopic images of common pigmented skin lesions. Used A CNN based Model and a pre trained model of MobileNETV2 for the classification.

### Big Mart Sales Analysis:

- Data scientists at Big Mart have collected 2013 sales data across 10 stores in different cities. Performed data cleaning using different methods rigorously. Used this dataset to perform extensive data analysis different hidden patterns in the data. Created a pipeline for preprocessing the data and predicting the Outlet Sales using ML models.

### Bank Customer Churn Model:

- predicting whether a customer is going to leave the bank or not on the dataset provided by the **YBL Foundation** during the Internship under them. Performed Data Analysis for understanding the trends in the data. Performed data cleaning, preprocessing and dataset balancing. Performed Hyperparameter tuning for the model and predicted the outcome.

### Car Price Predictor:

- used a dataset from Quikr-Car website to develop a model to predict the price of the second-hand car price provided various parameters like- purchase year, purchase price, fuel type, kms driven etc.

**Modelling of Solitons in phenomena like - Tsunamis, Undular Bore, and Rossby waves:** Jan 2023-May 2023
*Guide: Prof. Vishwanath Shukla, IIT Kharagpur*

- Used Nonlinear Shallow water model for describing Tsunamis, Undular Bores and Rossby waves. Used MRLW equations to derive a solitonic solution for Undular bore using permanent profile method. Used Method of Lines and Runge Kutta-4 method for discretizing the temporal and spatial domain for numerically solving the forced kdv method for modelling Tsunamis as solitons. Used **Python, NumPy, Seaborn, Matplotlib** for modelling these solitonic solutions and LATEX for final report. Used combined Zk-mzk method for deriving Rossby solitons.
  **Link**: https://drive.google.com/file/d/1aXTvPiSUH5xSnUly8f4wgwV0wHX7js9a/view?usp=share_link

**DEVI MA-T (Device for Ease in Vehicle Movement Around Turnings)** Dec 2020 - Feb 2021
*DIY LAB, IIT Kharagpur*

- Used PIR and HB 100 sensor to detect incoming vehicles without any lag and provided the required signal. Using ARDUINO, the PIR sensor was implemented using the principle of infrared ray detection. To enhance the effectiveness of the sensors the field of view of these sensors was set in such a way that it signals the presence of object being 5-6 meters away from the point of turning

## RELEVENT COURSEWORK

Waves and Solitons, Nuclear Physics*, Atomic and Molecular Physics, Condensed Matter Physics*,Statistical Physics, Computational Physics*, Programming and Data Structures*, Quantum Mechanics, Quantum Physics, Photonic Quantum Information Technology, Electrodynamics, Electromagnetism*, Spectroscopy, Probability and Statistics, Mathematics for Physics II, Mathematical Methods I, Optics*, Advanced Calculus, Linear Algebra, Numerical and Complex Analysis, Thermal Physics*, Classical dynamics and Special relativity, Classical Mechanics, Electrical Technology, Engineering Drawing and Computer Graphics, Chemistry*, Environmental Science, Basic Electronics*, General properties of matter lab, Modern Physics Lab, Physics of Waves, Basic Engineering Mechanics.
*- Has a separate theory and lab course.

## EXTRA-CURRICULAR ACTIVITIES

Team member at NSO-Health and Fitness, IIT Kharagpur. Actively participated in the fitness and meditation sessions held weekly |
Won Silver in Bridge games at General Championship, IIT Kharagpur