Madhukant

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Education

Present	Bachelor of Technology, Indian Institute of Technology Kanpur Major : Department of Computer Science & Engineering	CGPA: 8.53/10
2014	Class XII,Central Board of Secondary Education Kendriya Vidyalaya, Rohini	Score: 95.6%
2012	Class X, Central Board of Secondary Education Kendriya Vidyalaya, Rohini	Score: 10.0/10.0

Scholastic Achievements

- Secured **All India Rank 867** among 0.15 million candidates in Joint Entrance Examination - Advanced 15
- Secured **All India Rank 1390** among 1.5 million candidates in Joint Entrance Examination - Main 15
- Received **Top 1%** Certificate for exemplary performance in CBSE Class XII Board Examination 2014

Internship

Agilo Technologies' *evive*

Embedded Developer, IIT Kanpur — *May'16-Jul'16*

Helped in developing Agilo Technology's Arduino based embedded prototyping platform **evive** and its use cases -

- **Obstacle avoiding robot** with integrated IMU which helped robot to follow particular path to reach its destination
- **Smartphone controlled skateboard** using bluetooth module and proximity sensor to prevent accidental collision
- **Home automation system** with a digital password protected door lock, smartphone controlled home appliances, and capable of detecting human presence and light up the rooms accordingly
- Various **IoT Applications** like Chat Bot, Twitter Bot (Tweet via Arduino) & Plant Monitoring system
- Made detailed instructions tutorial for these projects as well on Instructables, Hackster.io etc.

Projects

Swarm Robots

Prof. Indranil Saha, Deptt. of CSE — *May'17-Jul'17*

- Developed cost efficient robots with **Raspberry pi** as their Processing unit to map an unknown area
- Established wireless communication between robots & server via WiFi using **ROS Communication Protocol**
- Designed motion primitives for the robot and build ROS Packages for assigning and executing the motion commands

Multi-robot Coverage Planning Framework

Prof. Indranil Saha, Deptt. of CSE — *Aug'17-Apr'18*

- Implemented **Receding Horizon Algorithm** on custom built swarm robots for mapping partially known environment
- Used **Vicon** as the localisation method & built ROS packages for data simplification, frame reduction and map calibration
- Implemented **Oblu** as secondary localisation method and upgraded robot structure for mapping outdoor environment

Abhyast Phase 8 : UGV-UAV Collaboration

Boeing-IIT Kanpur Joint Venture, Prof. Shantanu Bhattacharya & Prof. S. Kamle — *Jul'17-Feb'18*

- Aimed to develop a dual vehicle system for **autonomous** searching and interaction with the suspicious objects
- Built ROS packages to generate 3D map of arena using **LiDAR** (using GMapping) and PixHawk altitude data
- Implemented Visual Odometry in quadcopter using **Semi-direct Visual Odometry** algorithm
- Extracted relevant data from a 3D map of the unknown environment using **OpenCV** and implemented **A* Path Planning Algorithm** to find optimal path for the ground bot to reach its end goal

Medipad : ACA IIT Kanpur

Digital alternative for health booklet *Sep'15-Feb'16*

- Developed a web app on NodeJs framework as a digital alternative for the health booklet, currently used manually in IITK
- Had different view portals for patient, doctor and chemist all connected through MongoDB Database

Course Projects

End-to-End Compiler for COOL (Classroom Object-Oriented Language)

Coolmate to MIPS Compiler in Python *Prof. Subhajit Roy | Jan'18 - Apr'18*

- Developed a full fledged programming language **Coolmate** - derived from java based programming language COOL
- Implemented **OOP** feature, **Inheritance**, **file handling** and other java based programming constructs
- Developed a sublime-text editor **plugin** for the language having correct **color coding** & **auto-complete** for language constructs

Nano Machine Learning

Machine Learning Algorithms for Low Memory Devices *Prof. Purushottam Kar | Aug'17 - Nov'17*

- Implemented computationally demanding machine learning algorithms such as **kNN** on memory deficient systems with less than 2KB of RAM using **Online ProtoNN** and self designed **coresets** based clustering algorithm **ballgorithm**
- Modified the current state-of-the-art method **ProtoNN** to train online, hence eliminating need for server generated models

Relevant Coursework

Data Structure & Algorithm	Discrete Mathematics	Abstract Algebra	Linear Algebra
Computer Organisation	Operating Systems	Computer Systems Security	Compiler Design
Probablity & Statistics	Introduction to Machine Learning	Algorithms II	Theory of Computation
Database Management Systems	Introduction to Electronics		

**Ongoing*

Technichal Skills

Languages	C | C++ | python | Shell | MIPS | Java
Softwares and Tools	Gazebo | ROS | OpenCV | LaTeX | Git | Octave | SolidWorks | R | Fritzing
Micro Controller & Onboard Computers	Arduino | FPGA Board | Raspberry Pi | Odroid
Development	NodeJS | JavaScript | MongoDB | MySQL

Positions of Responsibility

Academic Mentor, Counselling Service, IIT Kanpur *Mar'16-Feb'17*

- Took Institute level remedial classes teaching ESC101 : An Introductory course for Programming to 200+ students
- Helped academically struggling student in coping up with their academics

Miscellaneous

- Represented the school in **National Children's Science Congress** at Regional level, Delhi for 3 consecutive years and proposed new innovative ideas :
  - **2012** - Proposed efficient way to make roads by using plastic content in place of bitumen as binding agent
  - **2013** - Proposed more efficient street light system by using energy stored in Piezoelectric crystal in roads
  - **2014** - Proposed unique method to utilize the heat energy of Air Conditioners and generate useful energy
- Participated in Inter Hall competition **Takneek'16**, made a Hand gesture controlled Robot which got 2^{nd} prize
- Secured 6th rank in the city in National cyber Olympiad 2014 in New Delhi
- **Electromania, Techkriti 16** : Implemented a Brick Breaker game on a self fabricated 8*8 LED matrix using **Arduino** microcontroller and was responsible for programming the micro-controller with self designed algorithm
- Secretary of Hindi Sahitya Sabha in the session 2016-17
- Attained Yellow Belt in Taekwondo affiliated by Taekwondo federation of India in 2016