

Nitish Vikas Deshpande

JUNIOR UNDERGRADUATE STUDENT

Indian Institute of Technology, Kanpur · Electrical Engineering

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Education

Indian Institute of Technology, Kanpur

Kanpur, India

BACHELOR OF TECHNOLOGY, MAJOR IN ELECTRICAL ENGINEERING

July 2017 - PRESENT

- C.G.P.A of **9.1/10** at the end of 4th semester

R.W.J.C College

Mumbai, India

HSC 12TH STD

July 2015 - April 2017

- Scored 94 % in Science Stream with Electrical Maintenance as vocational subject

S.E.S High School

Mumbai, India

SSC 10TH STD

2005 - 2015

- Scored 96 %, School Topper

Research Interest

Signal Processing and Communication, Machine learning, Music Information Retrieval, Natural Language Processing, Robotics and Automation, Reinforcement learning

Honors & Awards

INTERNATIONAL

2019 **3rd Place**, IEEE International Conference on Robotics and Automation, Robomaster AI Challenge *Montreal, Canada*

DOMESTIC

2019 **SURGE scholarship awardee**, Students-Undergraduate Research Graduate Excellence, IITK *Kanpur, India*

2019 **Best Research and Development project award**, for the project “**Through the wall human tracking**” among 45+ projects in Science and Technology Council, Students’ Gymkhana, IITK *Kanpur, India*

2019 & **Academic Excellence Award**, Awarded to top 10% of the batch for distinguished **Academic Performance** in IITK *Kanpur, India*

2018 **2nd Award**, for the research problem statement of “**Television Audience Measurement**” by **BARC INDIA** in the 7th INTER IIT Tech Meet held at IITB *Mumbai, India*

2017 **All India Rank 656**, Joint Entrance Exam, Advanced, 2,50,000 candidates *India*

2017 **All India Rank 1621**, Joint Entrance Exam, Mains, 1.4 million candidates *India*

2016 **KVPY Scholarship Awardee**, Indian Institute of Science and Government of India *Bangalore, India*

2015 **Regional Mathematics Olympiad**, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research *Mumbai, India*

2014 **INSPIRE Scholarship Awardee**, Department of Science and Technology, Government of India *Mumbai, India*

Projects

Score Following: Audio to Score Alignment

IITK, Kanpur, India

SURGE 2019 PROJECT UNDER GUIDANCE OF **PROF. VIPUL ARORA** (MUSIC INFORMATION RETRIEVAL LAB)

May, 2019 - Present

- Studied and analysed various time frequency representations of audio signals and performed experiments to compare accuracy of various representations like **STFT** and **CQT** fed as input to conventional **automatic music transcription** systems
- Developed a score following system which uses state-of-the-art techniques like using **convolutional gated auto-encoders** for feature extraction and variants of **Dynamic Time Warping** like ShapeDTW and FastDTW for alignment of performance audio to score MIDI
- The system after evaluation on the 10 songs of Bach10 collection reports median deviation in the range of 20ms-40ms
- Ongoing work for developing a music tutoring system which will evaluate the performance of a musician informing him the substitutions, insertions and deletions in his performance

Development of autonomous robots for AI based warfare

IITK, Kanpur, India

MEMBER OF EQUIPE DE ROBOTIQUE AUTONOME (ERA-IITK) UNDER GUIDANCE OF **PROF. LAXMIDHAR BEHERA**

Sept.2018 - Present

(INTELLIGENT SYSTEMS AND CONTROLS LABORATORY)

- Formulated the 3 minute game as a **reinforcement learning problem** consisting of an **agent** which can shoot in a span of 180° and move based on a mecanum wheel system; an **environment** consisting of obstacles, enemy with similar capabilities as our agent, bonus zone and projectile supply zone; with **states** as Health Points and time left; the **rewards** as number of successful shots on the enemy; the **action space** consisting of firing speed, direction as well as the chassis speed, direction. Simulations of game done using **PyGame**. Algorithms like **Actor-Critic** were used
- First Indian Team** from IITK to qualify for the competition held at Montreal, Canada

WiTrack: Through the wall human tracking

IITK, Kanpur, India

ELECTRONICS CLUB PROJECT UNDER GUIDANCE OF **PROF. A R HARISH** (MICROWAVE LAB)

May,2019 - July, 2019

- Mentored and worked with a team of **9 second year UG students**, implemented a **Frequency Modulated Carrier Wave RADAR** capable of tracking human beings over a distance of 3m in presence of a solid obstacle between the walking human and the antenna pair
- Hardware setup consisted of a sweep generator, signal generator, mixer, a pair of antenna and oscilloscope
- Established a serial communication system between laptop and oscilloscope using **PyVISA library** for data logging
- Won the **best RnD project** award in SnT council

Television Audience Measurement

Mumbai, India

COLLABORATION WITH BROADCAST AUDIENCE RESEARCH COUNCIL UNDER GUIDANCE OF **DR. SUMIT CHOWDHURY**

Dec. 2018 - Exp. Aug. 2019

- Implemented a non intrusive real time room occupancy estimation system using a single **PIR sensor**
- Performed the filtration of the fast motion behaviour and extracted small motion behaviour from raw data using **infinite hidden markov model** and analysed the **Laplace Spread parameters** of the data corresponding to different number of people present in the room
- Implemented a speaker recognition system using **MFCC features and Gaussian Mixture Model**
- Used Audio fingerprinting, Remote IR decoder and Speech-to-text modules for automatic recognition of channels played on television

FPGA based Real Time Image Convolution

IITK, Kanpur, India

PROJECT UNDER ELECTRONICS CLUB, SnT COUNCIL

May. 2018 - July. 2018

- Implemented single convolution filters like sobel filter on real time video data on Virtex 5 board after performing simulations on Xilinx ISE
- Designed a data pipeline for the convolutional filter using **FIFO** (First In First Out) data structure in **VHDL** language

Extracurricular Activity

Electronics Club, Science and Technology Council, Students' Gymkhana

IITK, Kanpur, India

COORDINATOR AND CORE TEAM MEMBER

March. 2019 - PRESENT

- Working in a team of **4 coordinators and 25 secretaries** managing and maintaining Electronics Club, a hub of electronics activities and projects with annual budget of **1.5L**
- Envision, plan and organize institute wide lectures, workshops, hackathons for electronics enthusiasts, mentoring project teams and representing the club in national level competitions like INTER IIT Tech Meet
- Organized Institute wide lecture on **"Machine Learning for Signal Processing"** with demo of live training and testing of speaker recognition system
- Initiative of collaborating with faculty members and PhD students of Electrical Engineering Department for club projects

Counselling Service, IITK

IITK, Kanpur, India

STUDENT GUIDE AND ACADEMIC MENTOR

July 2018 - LIFE LONG

- Assisted **4 first year students** academically as well as emotionally, ensuring the smooth transition to college life
- Helped in smooth conduction of Orientation Session for the incoming batch consisting of 900 students
- Mentored academically weak students in the 1st year Institute Core Physics Course on Mechanics.

Relevant Courses

* ongoing

Signals, Systems and Networks	Probability and Statistics	Differential Equations(ODE & PDE)	Micro-Electronics(BJT & MOSFET)	Data Structure and Algorithms	Machine Learning for Signal Processing*
Linear Algebra	Control Systems	Communication Systems*	Power Systems*	Digital Electronics*	Complex & Real Analysis

Skills

Languages Python, C/C++, Verilog, VHDL

Software Octave, Xilinx ISE, Arduino IDE, LabView, Proteus, ROS, LaTeX

Hardware FPGA, micro-controllers boards like arduino/NodeMCU, Single Board Computers like Rpi, IOT boards like ESP, USRP
software defined radio