Pankhuri **Vanjani**

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Education

Karlsruhe Institute of Technology — *Karlsruhe, Germany*
PhD in Intuitive Robots Lab(Robotics and Machine Learning) — *October 2023 - ongoing*

Saarland University | GPA: 1.6 — *Saarbrucken, Saarland, Germany*
Masters of Science in Embedded Systems (Computer Science department) — *October 2020 - September 2023*

The LNM Institute of Information Technology | GPA : 8.06/10 — *Jaipur, Raj., India*
B.Tech in Electronics and Communication Engineering — *July 2016 - July 2020*

St. Xavier's Senior Secondary School | Percentage : 91.6/100 — *Jaipur, Raj., India*
Higher secondary education in science stream — *May 2016*

St. Xavier's Senior Secondary School | GPA : 10/10 — *Jaipur, Raj., India*
Secondary education — *April 2014*

Honors & Awards

2021	**Search and Rescue Challenge ETH Zurich Robotics Summer School 2021: 2nd Position**, Search and Rescue Challenge involved going in and coming out of the site autonomously, creating a map of it and detecting+localizing objects artifacts in the outdoor arena	*Zurich*
2021	**ETH Zurich Robotics Summer School 2021 participant (accepted)** , Among top 40 candidates selected all over the world to the attend ETHZ Robotics Summer School	*Zurich*
2021	**Google Summer of Code Organization Administrator - JdeRobot**, Mentoring 3 project proposals for GSoC 2021(Final results of projects to be announced in May) namely, Deep Learning for Visual Detection, Deep Learning for Visual Control, multirobot version of the Amazon warehouse exercise in ROS2	*JdeRobot*
2020	**Speaker in Google's Mentor Summit 2020** , Selected as Speaker in Google's Mentor Summit 2020, to represent JdeRobot organization	*Online*
2020	**Gold Medalist of Graduating Batch 2020** , for best all rounder performance at LNM Institute of Information Technology	
2020	**Google Summer of Code Mentor- JdeRobot**,	*India*
2019	**Session Speaker on 'Advanced Robotics' for IEEE HMRITM branch** , | Certi Link	*India*
2019	**ROSCON Diversity Scholarship 2019 Recipient (gave a lightning talk in conference)**,	*Macau*
2019	**Google Summer of Code 2019**, **JdeRobot - Universidad Rey Juan Carlos** | GSoC Blog | certi	*India*
2018	**Quarter Finalist**, DST & TI India Innovation Challenge Design Contest	*India*
2015	**Merit Scholarship**, National Talent Search Examination	*Jaipur, India*

Experience

Jan'22-Sep'23	**Student Researcher**, Max Planck Institute of Informatics - Visual Computing and AI	*Saarbrücken*
Jan'22-Dec'22	**Research Assistant**, Augmented Vision group (DKFI)	*Saarbrücken*
Oct'21-Dec'21	**Research Assistant**, Agents and Simulated Reality group (DKFI)	*Saarbrücken*
Dec'19-May'20	**Visiting Research Intern**, Acoustic Research Lab(ARL), National University of Singapore	*Singapore*
2019	**Teaching Assistant: Internet of Things lab** ,	*India*
May'19-ongoing	**Open Source Developer: Jderobot-Universidad Rey Juan Carlos**,	*Spain*
2019	**Teaching Assistant: Microprocessor and Interface lab** ,	*India*
2018	**Summer Research Intern** , Indraprastha Institute of Information Technology (IIIT-D)	*India*

Publications

- N. Paliwal, P. Vanjani, J.-W. Liu, S. Saini, and A. Sharma. "Image processing-based intelligent robotic system for assistance of agricultural crops." International Journal of Social and Humanistic Computing,3(2):191–204, 2019.
- Sharma, A., Vanjani, P., Paliwal, N., Basnayaka, C. M. W., Jayakody, D. N. K., Wang, H. C., Muthuchidambaranathan, P. (2020). Communication and networking technologies for UAVs: A survey. Journal of Network and Computer Applications, 102739.

Projects

Interactive Robot skill learning using diffusion model and multimodal input data

October 2023 - ongoing

- In this project, my research aims to develop new algorithms and architecture to teach skills to robots in human-robot interaction settings. I am using multimodal input data and working on score-based diffusion models for higher-level task planning.

A New Framework for 3D Human Motion Generation under Zero Gravity (Master's Thesis project)

June 2022 - September 2023

- In this work, we present a novel realistic, and physically plausible synthetic dataset for the motion of humans in a zero-gravity setting. The dataset is created using a combination of physics-based simulation and optimization techniques. We then use the dataset to benchmark the performance of existing 3D human pose estimation methods on the the challenging task of estimating pose in zero gravity.

Reactive and Proactive Measures for Adversarial Defense

Jan 2022 - Feb2022

- Studied the effects of reactive and proactive attacks as an adversarial defense particularly on a base reactive defense that maximally separates features in intermediate layers in a deep learning model along with the effects of image transformations on feature space and adversarial example transferability

Assisting with SLAM Tasks for autonomous driving project

Oct 2021 - Dec'21

- As a Hiwi, I worked on SLAM Tasks with Lidar point clouds. I was using hdl graph and interactive slam to improve mapping and localization with the data collected on campus.

Bayesian Information Criterion-based Audio Segmentation

July 2021 - August 2021

- Feature extraction and analysis of audio clip for applying segmentation and clustering algorithms.

Deep Learning based Multi Frame Super Resolution

June 2021 - August 2021

- Using the RAMS Model for ProbaV challenge for Holopix50k dataset using transfer learning for multi-frame super resolution by creating burst images. This project has been done as a part of high level computer vision course project.

Semantic segmentation in images using neural networks

Team member | Feb 2021 - March 2021

- On Pascal VOC and cityscapes dataset semantic segmentation task was performed by implementing R2Unet and it's variation.

Creative image rendering using ray tracer

Nov 2021 - Jan 2021

- A Ray tracer was built from scratch in C++ as a part of Computer Graphics Course and a creative image based on 'parallel reality' theme was rendered

MuSACNet: Multi-scale Structured Attention guided CRF based network for Stereo Matching

Jan 2021 - Feb 2021

- Stereo matching project based on graphical models and deep learning as a part of course project of Probabilistic Graphical Models and Applications.

Research and application of ROS2 Navigation with Unity for underwater vehicles)

Jan 2020 - June 2020

- This project involved research with ROS, ROS2 and micro-ROS for application in local underwater robots. A major part of the work involved software for control systems and navigation of robots.

Vision based navigation for Unmanned Vehicle (Bachelor's Thesis)

Project Lead | Nov 2018 - Dec 2019

- Experimental study of Visual odometry, SLAM algorithms, Obstacle avoidance and Path Planning for Vision based navigation especially in GPS denied regions. This work was focused and implemented on indoor environment navigation system.

RBC Segmentation

Team Member | Nov 2019 - Nov 2019

- Image processing based RBC Segmentation from blood using watershed algorithm

Migration of JdeRobot tools to ROS2

Developer | May 2019 - Aug 2019

- I am working on creating an interface to support both ROS and ROS2 for JdeRobot tools like visualizers, visual states tools. Work also involves detaching these tools for creating standalone libraries and removing ICE drivers. This project is being done under guidance of Dr. José María Cañas and Vinay Sharma

Real time Audio transmission on FPGA board and DSP processor

Team MMember | March 2019 - April 2019

- This project involves transmitting audio files on Zedboard and DSP processor. This is being done in C++, Matlab and simulink

Smart Farming Bot

leader | Dec 2017 – March 2018 | Project Video

- Smart farming bot with Beaglebone Black as the core microprocessing unit, controlled by web server has been designed to assist farmers.

PREDICTION OF ARRHYTHMIA

Project Lead | Aug 2016 – Dec 2016

- A MATLAB based project which analyzes heartbeat signals, particularly QRS complex using various algorithms

Microcontrollers based PROJECTS

Project Lead | Aug 2016 – Dec 2016

- IR controlled water tap and password secured case as a prototype using arduino
- line follower robot using Atmega development Board.
- Fitness device and traffic light controller using TIVA launchpad

SKills

Programming, •ROS•ROS2 • Python • Matlab • C • C++ • Linux

Software, • Gazebo • Blender • Pybullet • Isaac Sim • open3d• openCV •PCL(Point cloud library) • Vivado • Xilinx SDK • Tensorflow • Keras • Pytorch • Docker • Gtk •Arduino IDE • Anaconda • Eclipse • Multisim • Keil • AVR Studio • Flask • GTK and Qt

Hardware, • Nvidian Jetson Nano • Beaglebone Black • Arduino• Intel atom board • Intel Galileo • Raspberry Pi • NodeMCU (ESP8266) • Embedded Artist • Microchip PIC •TI TM4C123G •STM32 microcontroller • Zybo board • Pixhawk

Relevant Courses

2021	**High-Level Computer Vision**,	*Saarland University*
2021	**Neural Networks: Theory and Implementation**,	*Saarland University*
2021	**Probabilistic Graphical Models and their Applications**,	*Saarland University*
2022	**Computer Vision and Machine Learning for Computer Graphics**,	*Saarland University*
2022	**Image Processing and Computer Vision**,	*Saarland University*
2022	**Machine Learning in Cybersecurity)**,	*Saarland University*
2019	**Intel® Edge AI Scholarship Foundation Course Nanodegree Program (Udacity)**,	*India*
2019	**Intro to Deep Learning with PyTorch by Facebook AI (Udacity)**,	*India*
2019	**OpenCV in Python and Machine Learning (Udemy)**,	*India*
2019	**Estimation and Learning (Coursera)| link**,	*India*
2019	**Robotics: Vision Intelligence and Machine Learning (Edx)**,	*India*
2017	**Autonomous Navigation for Flying Robots (Edx)**,	*Jaipur, India*
2017	**Realtime Bluetooth Networks (Edx)**,	*Jaipur, India*
2016	**Embedded Systems - Multi-Threaded Interfacing (Edx)**,	*Jaipur, India*
2016	**UT.6.03x: Embedded Systems - Shape the World (Edx)| link**,	*Jaipur, India*

Roles and Responsibilities

Dec'18-	**Chairperson, IEEE SB**, The LNM Institute of Information Technology	*Jaipur, India*
2019	**Subcordinator, Computer Vision division**, Phoenix (Robotics Club), LNMIIT	*Jaipur, India*
2019-	**Associate Coordinator, Counselling Cell** , The LNM Institute of Information Technology	*Jaipur, India*
2019-	**Student Mentor, Counselling Cell** , The LNM Institute of Information Technology	*Jaipur, India*
2018	**Vice-Chairperson, Women In Engineering (WIE), IEEE SB**,	*India*
2018	**Event Lead, Tech-fest Plinth** , The LNM Institute of Information Technology	*Jaipur, India*
2017	**InterMedia-The LNM Institute of Information Technology**, Member	*Jaipur, India*
2017	**The LNM-IIT Centre for Smart Technologies**, Core Nuclear Member	*Jaipur, India*
2017	**The LNM-IIT Centre for Robotics and Artificial Intelligence**, Core Nuclear Member	*Jaipur, India*