# Akash S Kumbar

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## ABOUT ME!

Enthralled by the captivating realm of **robotics** and **AI** and its potential to revolutionize the world, my primary focus lies in the field of robotics. With a strong **research background** in **3D computer vision** and a comprehensive understanding of **Electronics and Communication Engineering (ECE)**, I possess a deep-seated enthusiasm for **machine learning**, **deep learning**, and **embedded systems**. Continuously seeking new challenges to push the boundaries of my knowledge and skills, I thrive on innovation and remain dedicated to developing cutting-edge solutions that enhance human experiences. By leveraging my diverse interests and expertise, I am committed to utilizing my skills in pursuit of technological advancements that redefine the way we interact with and benefit from technology.

## PROFESSIONAL EXPERIENCE

**Research Intern,** Jan 2023 – present
Center of Excellence in Visual Intelligence, KLE Technological University Hubli, India
Researching on 3D computer vision, representational learning and refinement of point cloud data.

**Student Volunteer,** Aug 2021 – present
Center of Excellence in Visual Intelligence, KLE Technological University Hubballi, India
Worked on the refinement of 3D point clouds. Additionally, I volunteered as a resource person and mentor to help others explore the point cloud domain.

## PUBLICATIONS

**Research paper under review [IEEE's PReMI]**

## EDUCATION

**B.E.,** KLE Technological University 2019 – present
Electronics and Communication Engineering Hubli, India
CGPA: 8.30/10.0 (till 7th sem)

**Pre University College (12th grade),** JSS SMPU 2017 – 2019
Percentage: 82% Dharwad, India

**Tenth grade,** JSS SMCS 2017
CGPA: 9.2/10.0 Dharwad, India

## SKILLS

**Programming**
*Python, C/C++, MATLAB, Simulink*

**Embedded systems**
*Embedded C, 8051, ARM microcontrollers*

**Machine learning/Deep Learning**
*PyTorch, Tensorflow, popular Anaconda libraries*

**Computer Graphics**
*OpenGL*

**Computer Vision**
*3D vision, 3D deep learning, Images, Gesture recognition*

## PROJECTS

**Refining Point Clouds: Upsampling, Denoising and Completion through Implicit Representation,** [Internship project]Proposed a point cloud encoder that learns the features of point cloud with complex topology and leverages occupancy functions to give an implicit representation of point cloud.
**Tools used:** Python, C++, Cython, Pytorch, Pytorch3D

**3D Point Cloud Refinement Using Explicit Prior,** [Completed as a part of Sponsored Research Project][Under revision] introduced a new variant of KNN that is topology and density aware, and applied it to develop a novel methodology for upsampling and denoising 3D point clouds considering the topology of the data for better representation and recovery of missing information.
**Tools used:** Python, PyTorch, PyTorch3D, Open3D

**3D Point Cloud Instance Segmentation,** Proposed a U-Net based deep learning architecture for instance segmentation of 3D point clouds, we devised an encoder that was capable of learning the global features of the point cloud.
**Tools used:** Python, PyTorch, PyTorch3D, Open3D

**Camera based vehicle functions,** [Completed as a part of Bosch's PRIXEL program] Designed a computer vision solution to detect potholes and speed breakers on roads, utilizing a custom-engineered dataset that was collected and annotated in-house.
**Tools used:** Python, PyTorch, ONNX, OpenCV

**Learning based refinement of 3D point clouds through hole filling,** Developed a deep learning model to identify and repair point cloud gaps caused by occlusion and reflections. Designed an algorithm to generate datasets with realistic holes in point clouds for training and testing purposes.
**Tools used:** Python, PyTorch, PyTorch3D, Open3D

**Gesture based hand-cricket game,** Developed a computer vision-based game of 'hand-cricket' playable against a computer through webcam. The backend is powered by a Tensorflow image classification model, with the front-end built on OpenCV and PyGame.
**Tools used:** Python, Tensorflow, OpenCV

**Guitar Bot,**
Created a bot using Arduino that can play guitar and built an android application that lets you select the music.
**Tools used:** Arduino, Embedded C, MIT app inventor

## COURSES AND CERTIFICATIONS

**3D Vision Summer School,** International Institute of Information Technology, Hyderabad

**Advanced Computer Graphics,**
Collaboratively offered by Indian Institute of Technology-Delhi and KLE Technological University

**PyTorch for Deep Learning and Computer Vision,** Udemy

**Data Structures,** UC San Diego, Coursera

## AWARDS

**Certificate of appreciation in Bosch's PRIXEL Program,** Bosch Global software technologies
Awarded for developing a robust, real-time computer vision-based, speed breaker, and pothole detection model.

**Best project award in CEVI summer workshop,**
Center of Excellence in Visual Intelligence, KLE Technological University
Awarded Best Project at CEVI Summer Workshop for Gesture-based Hand-Cricket game.

**Certificate of appreciation for engineering exploration course project,**
Centre for Engineering Education Research, KLE Technological University
Awarded as an outstanding project for making a Guitar bot using Arduino that plays music through a mobile app.

## REFERENCES

**Uma Mudenagudi**,
*Director, Center of Excellence in Visual Intelligence, KLE Technological University | Dean R&D, KLE Technological University | Professor, SoECE, KLE Technological University*
uma@kletech.ac.in, 9343392667

**Ramesh Ashok Tabib**,
*Asst. Professor at SoECE, KLE Technological University | Researcher at Center of Excellence in Visual Intelligence, KLE Technological University*
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## DECLARATION

I hereby declare that the details and information given above are complete and true to the best of my knowledge.

**Akash Kumbar**
6th June 2023