

# 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

<b>Research Intern</b> Robotics Research Center, IIIT-Hyderabad Researching on dynamic scene reconstruction and anomaly detection in LiDAR point cloud.	Jul 2023 – present Hyderabad, India
<b>Research Intern,</b> Center of Excellence in Visual Intelligence, KLE Technological University Researched 3D computer vision, representational learning, and refinement of point cloud data. Published a paper in ICCVW-2023	Jan 2023 – May 2023 Hubli, India
<b>Student Researcher,</b> Center of Excellence in Visual Intelligence, KLE Technological University 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.	Aug 2021 – May 2023 Hubballi, India

## PUBLICATIONS

<b>ASUR3D: Arbitrary Scale Upsampling and Refinement of 3D Point Clouds Using Local Occupancy Fields</b>  <b>Akash Kumbar</b> , Tejas Anvekar, Ramesh Ashok Tabib, Uma Mudenagudi <i>Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2023</i> Proposed a method for arbitrary scale point cloud upsampling using proposed local occupancy fields.
<b>TP-NoDe: Topology-Aware Progressive Noising and Denoising of Point Clouds Towards Upsampling</b>  <b>Akash Kumbar</b> , Tejas Anvekar, Tulasi Amitha Vikrama, Ramesh Ashok Tabib, Uma Mudenagudi <i>Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2023</i> Proposed TP-NoDe, a novel Topology-aware Progressive Noising and Denoising technique for 3D point cloud upsampling. For bringing topology awareness we proposed Density Aware $k$ -Nearest Neighbours(DA- $k$ NN).

## EDUCATION


<b>B.E.</b> , KLE Technological University Electronics and Communication Engineering CGPA: 8.42/10.0	2019 – Jul 2023 Hubli, India
<b>Pre University College (12th grade)</b> , JSS SMPU Percentage: 82%	2017 – 2019 Dharwad, India
<b>Tenth grade</b> , JSS SMCS CGPA: 9.2/10.0	2017 Dharwad, India

## SKILLS


<b>Programming</b> Python, C/C++, MATLAB, Simulink	<b>Machine learning/Deep Learning</b> PyTorch, Tensorflow, popular Anaconda libraries	<b>Computer Vision</b> 3D vision, 3D deep learning, Images, Gesture recognition
<b>Embedded systems</b> Embedded C, 8051, ARM microcontrollers	<b>Computer Graphics</b> OpenGL	<b>Simulators</b> CARLA

## PROJECTS


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**3D Point Cloud Instance Segmentation,** Implemented 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

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**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

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**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

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**Uma Mudenagudi,**

Director, Center of Excellence in Visual Intelligence, KLE-TechU | Dean R&D, KLETechU | Professor, SoECE, KLETechU  
uma@kletech.ac.in

**K Madhava Krisna,**

Head, Robotics Research Center, IIIT-H | Head, Kohli Center of Intelligent Systems, IIIT-H | Professor, IIIT-H  
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## DECLARATION

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



**Akash Kumbar**