

# Hardaat Singh Baath

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## EDUCATION

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### B.E. in Computer Science

Birla Institute of Technology and Science, Pilani [🔗](#)

Nov 2021 – present

Sancoale, Goa, India

## RESEARCH EXPERIENCE

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### CSIR - CEERI, Pilani [🔗](#)

Research Intern

Jun 2023 – Aug 2023

Pilani, Rajasthan, India

- Advisor: Dr. Dhiraj Sangwan [🔗](#)
- Developed a novel pipeline utilizing Deep Learning techniques for the generation, segmentation, and restoration of Rajasthani Wall Murals.

## PUBLICATIONS

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### Damage Segmentation and Restoration of Ancient Wall Paintings for Preserving Cultural Heritage [🔗](#)

Nov 2023

International Conference on Computer Vision and Image Processing, 2023 [🔗](#)

Hardaat Singh Baath, Soham Shinde, Jinam Keniya, Priyanshu Ranjan Mishra, Anil Saini, Dhiraj Sangwan

## PROJECTS

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### Project Kratos, A Mars Rover [🔗](#)

May 2023 – present

Club Project

- Worked on a **P-controlled visual servo** algorithm to follow Arrow and ArUco tags detected using **YOLOv3, OpenCV and Python**.
- Implementing **RTK-GNSS**-based GPS coordinates system and **PID-based** algorithm to navigate to the specified points.
- Implementing **Probabilistic Terrain Mapping** algorithm using Point Clouds, Pose Estimates and Transformations.
- Implementing **global and local path planning** algorithms for autonomous navigation using Zed 2i camera and Jetson Xavier AGX.

### Deep Learning Techniques for Damage Restoration

Jun 2023 – Aug 2023

Supervised Project

- Advisor: Dr Dhiraj Sangwan [🔗](#)
- Developed a DL-based pipeline for damage generation, segmentation and restoration of Rajasthani Wall Murals.
- Used models like **StyleGAN2-ada-PyTorch** for damage generation, **UNet++** and **DeepLabV3+** for damage segmentation and **AOT-GAN** and **Partial Convolutional Network** for image inpainting.

### Using Haar Wavelets for Mapping

Oct 2023 – present

Supervised Project (ongoing)

- Advisor: Amit Setia [🔗](#)
- Designing and implementing a mapping and path planning algorithm for drones utilizing the **Haar wavelets** model.

## SKILLS

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### Programming Languages

C, C++, Python, Java, MATLAB

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### Libraries

Numpy, Matplotlib, Pandas, Seaborn,  
OpenCV, Scikit-learn

### Framework

ROS, PyTorch, Tensorflow, Keras

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### Tools

Gazebo, CoppeliaSim, Git and  
GitHub

### Soft Skills

Public Speaking, Canva, Creative  
Writing

### Languages

English, Hindi, Punjabi

## RELEVANT COURSES

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Computer Programming | Data Structures and Algorithms | Database Management Systems | Operating Systems | Network Programming | Probability and Statistics | Linear Algebra | Differential Equations | Multivariate Calculus | Machine Learning

### Online Courses

- AMRx: Autonomous Mobile Robotics, ETH Zurich [↗](#)
- CS231n Stanford Computer Vision [↗](#)
- IBM AI Engineering Specialization (*ongoing*)

## AWARDS

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### Excellence Award (Overall) [↗](#)

Jan 2023

Internation Rover Competition, Bangalore

- Won **Best Overall Rover** award.
- Stood 2nd in the Autonomous Challenge and 4th overall.

## MENTORSHIP

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### Subsystem Lead [↗](#)

May 2023 – present

Autonomous Subsystem, Project Kratos

Sancoale, Goa, India

- Leading a team of 10+ members in the Autonomous System.
- Doing Research and Development of the current system and involved in collaboration with other subsystems.

### Project Mentor [↗](#)

Jun 2023 – Sep 2023

Quark Summer Technical Projects, BITS Goa

Sancoale, Goa, India

- Mentored a summer course on ROS, Robot Automation and Computer Vision for university freshers.
- Conducted instructional sessions hands-on tutorials and evaluated weekly assignments

### PMP Mentor [↗](#)

Oct 2022 – Jul 2023

Peer Mentorship Program, BITS Goa

Sancoale, Goa, India

- Mentored university freshmen throughout the first year via counselling and assistance for academic and non-academic fields