Hardaat Singh Baath

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EDUCATION

B.E. in Computer Science   Nov 2021 – present
Birla Institute of Technology and Science, Pilani ⧉   Sancoale, Goa, India

RESEARCH EXPERIENCE

CSIR - CEERI, Pilani ⧉   Jun 2023 – Aug 2023
Research Intern   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

Damage Segmentation and Restoration of Ancient Wall Paintings for Preserving Cultural Heritage ⧉   Nov 2023
International Conference on Computer Vision and Image Processing, 2023
    <u>Hardaat Singh Baath</u>, Soham Shinde, Jinam Keniya, Priyanshu Ranjan Mishra, Anil Saini, Dhiraj Sangwan

PROJECTS

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, YOLOv5, OpenCV and Python**.
- Implemented **RTK-GNSS**-based GPS coordinates system and **PID-based** algorithm to navigate to the specified points. Achieved accuracy of 10 cm.
- Implemented **Elevation Terrain Mapping** algorithm using Point Cloud information received from Zed2i stereo camera.
- Implementing **global and local path planning** algorithms for autonomous navigation in unknown environment 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.

LSTM for Stock Market Prediction   Feb 2024 – present
Supervised Project (ongoing)
- Advisor: Dr. J K Sahoo ⧉
- Exploring and implementing an LSTM-based time series algorithm for Stock Market Prediction using features like Signal line, MacD line, EMA etc.
- Implementing a trading algorithm with transaction costs and taxation for realistic simulation of stock markets.
- Exploring various ensembling techniques for profit maximization.

Distributed Deployment Platform   Jan 2024 – present
Course Project
- Instructor: Dr Arnab K. Paul ⧉

- Implemented a distributed deployment platform that deploys Github repositories on web using AWS S3 and ECS services.
- Implemented backend with API server and Reverse Proxy using NodeJS.
- Logs saved on PostgreSQL Database, using Kafka Server as an intermediate service.

Using Haar Wavelets for Mapping   Sep 2023 – present
Supervised Project (ongoing)
- Advisor: Dr Amit Setia ⧉
- Designing and implementing a HAAR wavelets-based computationally efficient mapping algorithm for drones using point cloud.
- Implementing an obstacle avoidance algorithm using the above mapping algorithm.

SKILLS

Programming Languages
C, C++, Python, Java, NodeJS, MATLAB
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Libraries
Numpy, Matplotlib, Pandas, Seaborn, OpenCV, Scikit-learn

Framework
ROS, PyTorch, Tensorflow, Keras
.

Tools
Gazebo, CoppeliaSim, Docker, AWS, Git and GitHub

Soft Skills
Public Speaking, Canva, Creative Writing

Languages
English, Hindi, Punjabi

RELEVANT COURSES

Computer Programming | Data Structures and Algorithms | Database Management Systems | Operating Systems | Computer Networks | Computer Architecture | Probability and Statistics | Linear Algebra | Differential Equations | Multivariate Calculus | Machine Learning | Brain Inspired Deep Learning

Online Courses
- AMRx: Autonomous Mobile Robotics, ETH Zurich ⧉
- CS231n Stanford Computer Vision ⧉
- IBM AI Engineering Specialization *(ongoing)*

AWARDS

Excellence Award (Overall) ⧉   Jan 2023
Internation Rover Competition, Bangalore
- Won **Best Overall Rover** award.
- Stood 2nd in the Autonomous Challenge and 4th overall.

MENTORSHIP

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