Rashik Shrestha

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More about me: rashik.info.np

About Me

My research interest lies in the intersection of **Robotics** and **Spatial Intelligence**. I am facinated by how human brains can percieve the 3D environment and act accordingly. My long-term research goal is to develop a robotic system that can accurately perceive, reason about, and interact with its surrounding 3D environment.

I have worked on

Computer Vision	**Robotics**	**Artificial Intelligence**
Photogrammetry, Multi View Geometry	ROS	Transformers
3D reconstruction	Probablistic Robotics	Diffusion Models
NeRFs	Kinematics	etc..
Visual SLAM	Embedded Programming	
	Circuit design and fabrication	

Publications

- **Rashik Shrestha**, Bishad Koju, Abhigyan Bhusal, Danda Pani Paudel, François Rameau, *CaLDiff: Camera Localization in NeRF via Pose Diffusion*, **Pre-Print**
  Abstract: Traditional feature-based hierarchical localization works really great until the environment lacks textures for point feature extraction. This project leverages the power of NeRFs and diffusion models for robust pose estimation in low textured environment.
  (https://rashik.info.np/2023/11/07/caldiff/) (https://arxiv.org/abs/2312.15242)
- **Rashik Shrestha**, Ajad Chhatkuli, Menelaos Kanakis, Luc Van Gool, *Residual Learning for Image Point Descriptors*, **Pre-Print**
  Abstract: Handcrafted point features like SIFT, SURF still work good for most of the tasks (3D reconstruction, localization) with a properly tuned pipeline. This project focuses on enhancing the existing handcrafted features by learning only what they already don't know. This creates a lightweight model that is fast and robust.
  (https://rashik.info.np/2022/10/07/residual-feature-learning/) (https://arxiv.org/abs/2312.15471)

Academics

- **West Virginia University** — Morgantown, West Virginia
  Ph.D. in Computer Science — *Sep 2024 - Now*
- **Pulchowk Campus, Tribhuwan University** — Lalitpur, Nepal
  Bachelor in Electronics and Communication engineering (79.27%) — *Nov 2016 - Mar 2021*

Projects

- **Visual SLAM for Mobile Robot in a dynamic environment**: Used a monocular camera as its only sensor to build a 3D map of indoor environmant and localized the camera in the built map using Visual SLAM algorithm. Masked out dynamic content of the environment like moving person for better accuracy.
- **ABU Robocon 2019**: Designed, fabricated and tested the robots to take part in ABU Robocon 2019 competition held at Ulaanbaatar, Mongolia.
- **Precision Livestock Farming**: Designed and tested an automated system for poultry farming that monitors various environmental factors and regulates them accordingly. Used images to estimate the weight and distribution behavior. Used sound analysis to estimate the feeding behavior.
- **Streetfood Vending Machine**: Designed, built and launched fully automated vending machine for a popular Nepali street food
- **Low Cost Spin Coater**: Designed and fabricated low cost spin coating device to use on molecular labs.

etc ...

More details on my projects: https://rashik.info.np/categories/Project/

Work Experiences

- **Interactive Robotics Laboratory (IRL) (*yugu.faculty.wvu.edu*)** (on-site) WVU, Morgantown
  Graduate Research Assistant *August 2024 - Now*
  - Working on accurate pose estimation of flowers for precision pollination. Under the supervision of Prof. Yu Gu
- **NAAMII (*naamii.org.np*)** (on-site) Kathmandu, Nepal
  Research Assistant *May 2021 - July 2024*
  - Worked on project **CaLDiff: Camera Localization in NeRF via Pose Diffusion** under the supervision of Dr. Danda Pani Paudel and Prof. Francois Rameau
  - Worked on project **Residual Learning for Image Point Descriptors** under the supervision of Dr. Ajad Chhatkuli
- **GeoAutomation (*geoautomation.com*)** (remote) Montréal (QC), Canada
  Computer Vision Engineer *June 2021 - July 2024*
  - Develop softwares for Structure from motion (SFM), Panorama Stitching and image retrieval algorithms
  - Worked with various GenICam standard machine vision cameras for the data acquisition system for mobile mapping
  - Experienced developing the highly efficient systems in **C++** to handle huge amount of real-time data (3GBps) for image data acquisition
  - Develop and Deploy programs for AWS Lambda, Batch and EC2 instances
- **NAAMII (*naamii.org.np*)** (on-site) Kathmandu, Nepal
  Research Intern *Jun 2020 - Nov 2020*
  - Worked on Visual SLAM, Feature Matching, Indoor navigation, ROS
- **Robotics Club, Pulchowk Campus (*robotics.pcampus.edu.np*)** (on-site) Lalitpur, Nepal
  Robotics Engineer *Nov 2016 - March 2019*
  - Embedded Programming for AVR and ARM processors
  - Circuit design, fabrication
  - Control Systems, forward/reverse kinematics, 3D modeling

Teaching Experiences

- **Fourth Annual Nepal AI School (*nepalschool*)** (on-site) Kathmandu, Nepal
  Teaching Assistant *May 2023*
  - Assisted in teaching following topics: Mobile robotics, Photogrammetry, SLAM, NeRF, Image retrieval techniques, Hierarchical localization
- **Third Annual Nepal AI School (*nepalschool*)** (on-site) Bhaktapur, Nepal
  Teaching Assistant *Dec 2021*
  - Conducted lab sessions, assisted in Lab exercises and lecture assignments, prepared teaching materials for lab sessions in 10 days-long school in AI
- **Hardware Fellowship, LOCUS (*locus*)** (on-site) Lalitpur, Nepal
  Trainer/Mentor *Nov 2019*
  - Worked as trainer/mentor for 10 days hardware fellowship program. I got to share my knowledge about basic electronics, sensors, actuators, Arduino programming, soldering, and many more.

Leadership and Volunteering Experiences

- **Cohere For AI - The Aya Project (*aya.for.ai*)** (remote)
  Nepali Language Ambassador *Sep 2023 - Jan 2024*
  - Aya is an Open Science Initiative to Accelerate Multilingual AI Progress. I volunteer to represent Nepali Language by helping in data collection.
- **IEEE Pulchowk (*ieee-pulchowk*)** (on-site) Lalitpur, Nepal
  Events Supervisor *Feb 2020 - Feb 2021*
  - Conducted and supervised events such as talk shows, blood donations, reading sessions, training programs, etc.
- **Engineering Students Group of Bhaktapur (*esgb*)** (on-site) Bhaktapur, Nepal
  President *Nov 2019 - May 2021*
  - Successfully organized and executed a variety of programs and initiatives to support and engage the engineering student community
  - Provided assistance with study materials and transportation services

Trainings

- **Nepal AI School** — Pokhara, Nepal
  (nepalschool) — *Dec 2019*
  - Topics covered: Geometric Deep Learning, NLP, 3D Vision, VAEs and GANs, Computational Neuroscience, Robotic Vision (SLAM)
- **First Nepal winter school in AI** — Kathmandu, Nepal
  (firstwinterschool) — *Dec 2018*
  - Participated in a 10 days long winter school about machine learning and AI. Topics covered: Probability and Statistics, Linear Algebra, Computer Vision, AI and Society, Bioinformatics, Reinforcement Learning, Graphical Modeling, Deep learning

Certifications

- Machine Learning with Python-From Linear Models to Deep Learning
- Code Foundation for ROS
- ROS For Beginners
- Neural Networks and Deep Learning

Honors and Awards

- **Rohm Award (Team)**: 2019 - ABU Robocon 2019
- **LOCUS Best Thematic Hardware**: 2019 - Winner of National Level Competition held by LOCUS, Pulchowk
- **Institute of engineering (IOE) full scholarship**: 2016 - Full scholarship for studying Bachelor degree in one of the most reputed engineering college of Nepal

References

Prof. Yu Gu (Ph.D. Supervisor)
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Adjunct Associate Professor - Lane Department of Computer Science and Electrical Engineering
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Homepage

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