Ekansh Bajpai

Robotics Engineer – SLAM, Visual-Inertial Odometry, Neuromorphic Vision
Paderborn, Germany
ekansh.bajpai712@gmail.com — ekansh.is-a.dev — GitHub: ekansh-bajpai — LinkedIn: ekanshbajpai

PROFESSIONAL SUMMARY

Robotics engineer specializing in Simultaneous Localization and Mapping (SLAM), visual-inertial odometry, event-based vision, and optimization-based perception systems. Strong experience with ROS, C++, sensor fusion, and neuromorphic computing. Currently pursuing an M.Sc. in Electrical Systems Engineering with a thesis focused on event-based SLAM using spiking neural networks.

EXPERIENCE

Robotics Engineering Intern Aug 2022
Cellgo GmbH

- Developed low-level embedded communication software for a carrier robot platform
- Implemented and validated I2C and SPI communication protocols on Arduino and ESP32 devices
- Designed master-slave communication architecture for multi-sensor data acquisition
- Defined communication rules for reliable and deterministic sensor data transfer

RESEARCH & PROJECTS

Master's Thesis – Neuromorphic Event-Based SLAM Ongoing

- Designing a spiking neural network (SNN) based patch selection mechanism for event-based visual odometry
- Integrating SNN front-end with DEVO visual odometry pipeline
- Extending visual odometry into full SLAM using pose-graph optimization
- Implementing loop closure detection for long-term drift correction

Autonomous Mapping & SLAM Optimization – Master's Project

- Enhanced LOAM-based SLAM pipeline with tightly-coupled IMU pose estimation
- Designed templated C++ architecture supporting multiple optimization backends
- Integrated and benchmarked g2o and SE-Sync for pose-graph optimization
- Developed ROS wrapper nodes for systematic optimizer evaluation
- Implemented YAML-based parameterization for reproducible experiments

Visual-Inertial Odometry System

- Implemented camera-IMU sensor fusion using Extended Kalman Filter (EKF)
- Developed feature extraction, tracking, and IMU preintegration pipelines
- Built real-time pose estimation system in C++ using Eigen and OpenCV
- Evaluated system performance on EuRoC and TUM benchmark datasets

Bachelor's Thesis – Self-Balancing Object Tracking Robot

- Designed PID-controlled inverted pendulum system for a two-wheeled mobile robot
- Implemented IMU sensor fusion for real-time tilt and state estimation
- Developed OpenCV-based object detection and centroid tracking pipeline
- Integrated vision feedback with autonomous motion and balance control
- Achieved stable self-balancing and dynamic target following

SKILLS

Programming: C++, Python, Java
Robotics & SLAM: ROS, ROS2, SLAM, Visual SLAM, Visual-Inertial Odometry, LOAM
Optimization: Pose-Graph Optimization, g2o, SE-Sync, Bundle Adjustment
Computer Vision: OpenCV, Event Cameras, LIDAR, IMU Fusion, Point Clouds
Machine Learning: CNNs, Spiking Neural Networks, PyTorch

EDUCATION

M.Sc. Electrical Systems Engineering In Progress
University of Paderborn
Focus: SLAM, Signal Processing, Neural Networks, CNNs, SNNs
B.Tech Electronics & Communication Engineering 2019
Madan Mohan Malaviya University of Technology