Niraj Basnet

541-908-2271 | niraj.basnet2020@gmail.com | linkedin.com/in/nirajbas | github.com/nirajbasnet

Technical Skills

Robotics: Motion planning, Control, Optimization, Mapping, Localization, Machine learning, Deep learning
Languages: C/C++, Python, MATLAB
Software Tools: ROS, Gazebo, Rviz, CARLA, OMPL, Tensorflow, Pytorch, OpenCV, Git, Jenkins, Docker, Linux

Experience

Graduate Research Assistant, *Oregon State University* June 2019 – Dec 2020

- Automated racetrack mapping and its relevant data extraction and pre-processing for autonomous cars racing.
- Developed a model predictive contouring controller for generating locally optimal, high speed racing trajectories using kinematic and dynamic model of the car.
- Adapted an evolutionary algorithm(CMA-ES) for raceline-optimization of a given racetrack.
- Developed a real-time(40Hz) hierarchial motion planner with conformal lattice planner on top, passing most viable trajectory for tracking to lower MPC.
- Evaluated trajectory tracking performance of various control strategies like PID, LQR, MPC and Pure Pursuit.

Graduate Teaching Assistant, *Oregon State University* Sept. 2018 – June 2019

- Conducted various workshops on version control, interfacing sensors, ROS, etc. as an IOT community coordinator.
- Provided course support and assisted in development of new course material for Autonomous car racing course.

Robotics Engineer, *Paaila Technology, Nepal* Dec. 2016 – Sept. 2018

- Led development of motion planning and control stack for waiter and service robot within 9 months.
- Developed a multi-robot path planner based on M* to plan for multiple robots.
- Implemented and compared Extended Kalman filter and Unscented Kalman filter for indoor pedestrian tracking.
- Built simulation interfaces for integration testing of various components of navigation stack, thereby reducing the code deployment time by over 30%.

Projects

Motion planning for Self-driving cars in city traffic using Carla simulator | *Python, Carla, ROS* Oct. 2020

- Implemented finite state machine based behaviour planner, and conformal lattice planner to plan collision-free trajectories for self-driving car in city traffic.

Implementation of Mapping, Localization and Motion planning algorithms | *C++, Python, ROS* Feb. 2019

- Implemented various approaches like A*, Hybrid A*, PRM, RRT, RRT*, potential fields, etc.
- Implemented occupancy grid mapping and particle filter(Monte Carlo Localization) on simulated robots.

Deep Cross-Entropy Method based planner | *Python, Pytorch* Jan. 2020

- Trained a Deep Cross-Entropy Method-based planner that uses the learnt state-space model of the environment to get feasible motion plans for a car driving in a track.

Multi-robot task allocation for warehouse environment | *Python, Pytorch* Dec. 2018

- Explored cooperative co-evolutionary algorithms for distributed task-allocation in a warehouse environment.

Autonomous wheelchair navigation in an indoor environment | *C++, Python, Arduino, ROS* July 2016

- Converted a normal wheelchair to an autonomous one by adding sensors, motors and developing a light-weight navigation stack. Automated mapping of indoor environment by using frontier-based exploration.

Autonomous badminton playing robot | *C++, Python, Arduino, ROS* July 2015

- Developed holonomic drive controller(PID) and shuttlecock trajectory predictor for badminton playing robot.
- Led team to get Best idea and Best Engineering award in ABU Robocon International robotics competition.

Publication

- **N. Basnet** and H. Abbas, "Logical signal processing: A fourier analysis of temporal logic," in *Runtime Verification*, (Cham),pp. 359–382, Springer International Publishing, 2020. **(Best paper nominee)**

Education

Oregon State University Corvallis, OR
Masters in Computer Science *Sept. 2018 – Dec 2020*

Institute of Engineering, Pulchowk Campus Lalitpur, Nepal
Bachelors in Electronics and Communication Engineering *Sept. 2012 – Sept. 2016*