Nitish A Gupta

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EDUCATION

North Carolina State University — Raleigh, NC

Ph.D. *in Computer Science [transferred from UCF] (GPA: 4.0)* — *Aug. 2021 – Present*

Advisors: Dr. Zhishan Guo

Research: Autonomous Systems, Real-time Systems, Optimal Control & Reinforcement Learning

University of Central Florida — Orlando, FL

M.S. *in Computer Engineering (GPA: 3.84)* — *Aug. 2016 – Aug. 2018*

Thesis: Real-time SIL Emulation Architecture for Cooperative Automated Vehicles

Advisor: Dr. Yaser P. Fallah

Research: Intelligent Transportation Systems, Robotics & Automation, Vehicular Networks, ADAS

University of Mumbai — Mumbai, India

Bachelors *in Electronics Engineering (GPA: 3.90)* — *Aug. 2010 – May 2014*

Ranked *1st* amongst 120 students in the Electronics dept.

Creative team head at Annual college festival – *Pegasus*

TEACHING

CSC 216 Software Development Fundamentals Lab — Raleigh, NC

North Carolina State University — *Aug. 2022 – Dec. 2022*

CSC 714 Real-Time Computer Systems Lectures — Raleigh, NC

North Carolina State University — *Aug. 2022 – Dec. 2022*

EECS 140 Introduction to Digital Logic Design Lab — Lawrence, KS

University of Kansas — *Jan. 2021 – May. 2021*

WORK EXPERIENCE

Real-Time & Intelligent Systems Lab — Raleigh, NC

Graduate Research Assistant — *Aug. 2022 - Present*

- Pursuing research on application of reinforcement learning to real-time scheduling and autonomous control
- Mentoring & advising multiple F1tenth teams with over 10 research students
- Led the development of several control algorithms for autonomous racing including Adaptive Pure Pursuit & Model-based approaches
- ICRA 2022 F1tenth competition achievements: **USA** - 2nd position overall, **International** - 4th in time-trial & 5th in head-to-head racing

Unknot.id — Orlando, FL

Research Scientist — *May 2022 - Aug. 2022*

- Research & implementation of policy-based deep reinforcement learning algorithms for real-time localization in GPS-denied setting
- Development of multi-modal data acquisition and visualization user tool with experiment management features

Knights Auto Team at UCF — Orlando, FL

Founder & Interim President — *Jan. 2022 - Aug. 2022*

- Built a first of it's kind multi-disciplinary community of students in Orlando aiming at developing Autonomous vehicles of 1/10th and 1/5th scales
- Grew to over 50 student members within two weeks of launch, team advised & sponsored by two faculties at UCF
- Actively leading, organizing & hosting workshops, and races along with website & resource management

Real-Time & Intelligent Systems Lab — Orlando, FL

Graduate Research Assistant — *Aug. 2021 - May 2022*

- Led the F1tenth-autonomous racing platform development team of 3 undergraduate students

- Carried research in applications of ML and RL in real-time cyber-physical systems
- Enabled communication & research collaboration of UCF with my previous employer NHK-I

NHK International Corporation Novi, MI

Research Engineer II - Research & Analysis Team *Nov. 2018 - July 2020*

- Prototyping and development of factory automation systems based on robotics and SOTA computer vision algorithms for a highly dynamic industrial environment
- Developed pipeline to acquire point cloud data from sensor, integration with ROS, point cloud segmentation, model fitting using RANSAC and ICP, model perception, robot motion & path planning with MoveIt

CAVREL at UCF Orlando, FL

Graduate Research Assistant *Feb. 2017 - Aug. 2018*

- **Real-Time SIL Emulator for ADAS Testing and Validation** – *Sponsor: Ford Motor Company*
  Designed and developed a unique and easily configurable emulation/simulation architecture to allow Software-In-Loop testing and validation of connected vehicle applications
- **Small-scale Connected Autonomous Vehicle** – *Sponsor: NSL*
  Mentored a team of 5 undergraduate students to build a fleet of vision sensors equipped small-scale autonomous vehicles to navigate using advanced planning algorithms and thus provide a test-bed for V2X safety applications
- **Vehicle Safety Communications Applications** – *Sponsor: CAMP*
  Research and development in DSRC based V2V Safety Networks, Model-based Information Networking for situation awareness in Automated vehicles

Giant Health Events Remote

Machine Learning Intern *May 2017 - June 2017*

Tata Consultancy Services Ltd. Mumbai, India

Business Intelligence Developer *Sept. 2014 - July 2016*

AWARDS

Recipient of 2021 Dean's Fellowship @UCF
Recipient of 2021 Hoglund Fellowship @KU
Recipient of 2014 Dean's Award @PCE

ONLINE DEGREES

Machine Learning by Andrew Ng @Coursera
Self-Driving Car Nanodegree @Udacity
Robotics Engineer Nanodegree @Udacity

TECHNICAL SKILLS

Languages: Python, C++, C, MATLAB

Hardware: LiDAR, Depth Cameras, NVidia Jetson Series, Arduino, Raspberry Pi, FPGA

Libraries: TensorFlow, Keras, PyTorch, StableBaselines, OpenAI Gym, PCL, VTK, OpenCV, Eigen, Pandas

Tools: ROS 1 & 2, Git, Gazebo, Moveit, CloudCompare, NS3, SUMO simulator, Qt, VSCode

PROJECTS

Vehicle Detection and Tracking *Oct. 2017 – Nov. 2017*

- Trained an SVM classifier to distinguish between car and non-car images with 98.56 % accuracy
- Accurately tracked vehicles using a stream of sliding bounding boxes of different scales
- Developed a heat-map of all positively detected vehicles to remove false positive based on a threshold

Driver's Behavior Cloning *Sep. 2017 – Oct. 2017*

- Designed a CNN to predict steering wheel angles in a challenging simulated environment based on the human driving behavior (Validation Loss $< 0.35\%$)

Traffic Sign Classification using Camera *Aug. 2017 – Sep. 2017*

- Built and fine-tuned a CNN over a small dataset to classify traffic signs, using a mounted camera
- Attained 97% test accuracy on a German traffic sign dataset

Autonomous Rescue Robot *Feb. 2017 – Apr. 2017*

- Built a 4-wheeled autonomous car for search and rescue operations in a disaster-affected area to explore and identify victims (Led to publication)
- Programmed ROS (Robot Operating System) nodes for gathering the odometry data along with the scans from a Kinect sensor (to create 2D Occupancy maps) into a raspberry pi
- Implemented a Particle Filter for localization and a Path Planning algorithm for navigation to various goals using offline maps created during the training phase

Path Planning and Q-Learning in a grid world *Feb. 2017 – Mar. 2017*

- Implemented A-star path planning algorithm with Manhattan and Euclidean distance choice in an interactive grid world GUI using python's tkinter library
- Designed a Reinforcement learning engine with deterministic and stochastic behavior in the grid world

Concurrent Physics Engine *Oct. 2016 – Nov. 2016*

- Linearized a Physics Engine consisting of circles moving with random velocities around the screen and colliding with each other
- Implemented concurrent (Lock-free) version of SAP (Sweep and Prune) and Hash grid

Surveillance based on Tracking and Targeting *Oct. 2013 – Mar. 2014*

- Built a MATLAB based security system to tackle the situations like 2008 Mumbai attacks
- Led a team of three members to develop a real-time object detection and tracking algorithm, which controlled a camera-laser mounted robotic arm to continuously track and target the suspect

PUBLICATIONS

1. **N. Gupta**, K. Wilson, and Z. Guo, Optimizing Real-Time Performances for Timed-Loop Racing under F1TENTH. Proceedings of the 43rd IEEE Real-Time Systems Symposium (RTSS), Industry Challenge, Houston, US, Dec. 2022
2. G. Shah, R. Valiente, **N. Gupta**, SM Gani, B. Toghi, Y. P. Fallah, S. D. Gupta, Real-Time Hardware-In-the-Loop Emulation Framework for DSRC-based Connected Vehicle Applications, 2nd IEEE Connected and Automated Vehicles Symposium, Sept., 2019
3. **N. Gupta**, Real-time SIL Emulation Architecture for Cooperative Automated Vehicles (2018). Electronic Theses and Dissertations, University of Central Florida. 6047.
4. **N. Gupta, S. J. A. Raza**, G. R. Sukthankar, N. Chitalaya, Real-World Modeling of Path Finding Agent Using Robot Operating System (ROS), FCRAR, vol.30, May 2017

REFERENCES

Dr. Yaser P. Fallah	Dr. Zhishan Guo	Dr. Tadashi Sakai
Associate Professor @UCF	Associate Professor @UCF	Analysis team Manager
Graduate Research Advisor	Graduate Research Advisor	NHK International Corp
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Note: Due to different timezones, it is preferred to contact me via email for scheduling a meeting/call.