

# Chethana Nilesch Suriyarachchi

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## Fields of Interest

- Autonomous Vehicle Control and Planning
  - Multi-agent Communication and Cooperation
  - Robust Control, Optimization and Deep Reinforcement Learning
  - Autonomous Navigation and Exploration Algorithms
  - Mobile Robot Localization Algorithms
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## Education

- **University of Maryland College Park** **Maryland, USA**  
*Ph.D. in Electrical and Computer Engineering - Ongoing* *2018 – Present*
    - **PhD Candidate** (Jan 2022) - Research Advisor: **Prof. John S. Baras**
    - Master of Science in Electrical Engineering* *Awarded: 2022*
      - **GPA - 3.89** (out of 4.0)
  - **University of Moratuwa, Faculty of Engineering** **Moratuwa, Sri Lanka**  
*B.Sc.Eng (Hons) in Electronic and Telecommunication Engineering (First Class)* *2013 – 2017*
    - **GPA - 4.03** (out of 4.2) - **Class rank - 3<sup>rd</sup>** (out of 100) - **Dean's List**
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## Honors and Awards

- **MRC GRA Program Fellowship Award** *Maryland Robotics Center - University of Maryland, 2022-23*
  - **Ann G. Wylie Dissertation Fellowship** (Declined) *The Graduate School - University of Maryland, 2022-23*
  - **Outstanding Graduate Research Assistant Award** *The Graduate School - University of Maryland, 2021-22*
  - **Best Student Paper Award** *IEEE International Conference on Intelligent Transportation Systems, 2021*
  - **ITS Maryland Student Scholarship Award** *Intelligent Transportation Society of Maryland, 2021-2022*
  - **Student Best Paper Award** *IEEE International Conference on Control, Automation and Systems, 2017*
  - **Dean's Fellowship** *University of Maryland, College Park, 2018/2019*
  - **Migara Ratnatunga Trust Award for University Undergraduates, Industrial Training** *IESL, 2016/2017*
  - **Dean's List - All Academic Semesters** *Faculty of Engineering, University of Moratuwa, 2013-2017*
  - **Mahapola Higher Education Merit Scholarship** *Government of Sri Lanka, 2013-2017*
  - **Dr. G.C.L. Memorial Prize for distinctions in both A/L and O/L examinations** *Royal College, 2011*
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## Publications

- Nilesh Suriyarachchi, Faizan M. Tariq, Christos N. Mavridis and John S. Baras, "Real-time Priority-based Cooperative Highway Merging for Heterogeneous Autonomous Traffic," in proceedings of the Intelligent Transportation Conference (ITSC), 2021. (**Best Student Paper Award**)
- Nilesh Suriyarachchi, Rohan Chandra, John S. Baras and Dinesh Manocha, "GAMEOPT: Optimal Real-time Multi-Agent Planning and Control for Dynamic Intersections," in proceedings of the Intelligent Transportation Conference (ITSC), 2022.
- Nilesh Suriyarachchi, Erfaun Noorani, Faizan M. Tariq and John S. Baras, "Multi-agent Deep Reinforcement Learning for Shock Wave Detection and Dissipation using Vehicle-to-Vehicle Communication," in proceedings of the Conference on Decision and Control (CDC), 2022.
- Faizan M. Tariq\*, Nilesh Suriyarachchi\*, Christos N. Mavridis and John S. Baras, "Cooperative Bidirectional Mixed-Traffic Overtaking using Inter-vehicle Communication among Autonomous Agents," in proceedings of the Intelligent Transportation Conference (ITSC), 2022. (**\*Co-first Authors**)
- Nilesh Suriyarachchi, Christos N. Mavridis and John S. Baras, "Cooperative Multi-Lane Shock Wave Detection and Dissipation via Local Communication," in proceedings of the Mediterranean Conference on Control and Automation (MED), 2022.
- Nilesh Suriyarachchi and John S. Baras, "Shock Wave Mitigation in Multi-lane Highways using Vehicle-to-Vehicle Communication," in proceedings of the Vehicular Technology Conference (VTC), 2021.
- Faizan M. Tariq, Nilesh Suriyarachchi, Christos N. Mavridis and John S. Baras, "Autonomous Vehicle Overtaking in a Bidirectional Mixed-Traffic Setting," in proceedings of the American Control Conference (ACC), 2022.
- Nilesh Suriyarachchi, Peshala G. Jayasekara and Takashi Kubota, "3D Pose Tracking for GPS-denied Terrain Rovers by Fast State Variable Extension and Enhanced Motion Model," in proceedings of the IEEE International Conference on Control, Automation and Systems (ICCAS), 2017. (**Student Best Paper Award**)
- Christos N. Mavridis, Nilesh Suriyarachchi and John S. Baras, "Reinforcement Learning Robot Control with Progressive State-Action Aggregation," in proceedings of the Conference on Decision and Control (CDC), 2021.
- Christos N. Mavridis, Nilesh Suriyarachchi and John S. Baras, "Detection of Dynamically Changing Leaders in Complex Swarms from Observed Dynamic Data," in proceedings of the Conference on Decision and Game Theory for Security (GameSec), 2020.
- Fatemeh Alimardani, Nilesh Suriyarachchi, Faizan M. Tariq and John S. Baras, "Intelligent Highway Routing for Human-Driven and Connected-and-Automated Vehicles," in Transportation Systems for Smart, Sustainable, Inclusive and Secure Cities edited by Prof. Stefano De Luca, 2021.

## Submitted Patents

- US PATENT : US 62/604,673 : **Method For Localizing a Mobile Robot in a Dynamic Indoor Environment**

## Professional Experience

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| • <b>Graduate Research Assistant</b><br>Department of Electrical and Computer Engineering           | <b>University of Maryland College Park, USA</b><br>2018 Aug – Present            |
| • <b>Robotics Research Intern</b><br>Coordinated Control of Mixed Traffic and Traffic Light Systems | <b>Mitsubishi Electric Research Laboratories, MA, USA</b><br>2022 May – 2022 Aug |
| • <b>Robotics Engineering Intern</b><br>Cloud based SLAM Research                                   | <b>Nokia Bell Labs, NJ, USA</b><br>2020 Jun – 2020 Aug                           |
| • <b>Robotics Engineering Intern</b><br>Autonomous Vehicle Research                                 | <b>STEER Tech, MD, USA</b><br>2019 May – 2019 Aug                                |
| • <b>Electronic Engineer</b><br>Retail Robotics Unit  | <b>Zone24x7 (Pvt) Ltd, Sri Lanka</b><br>2017 Apr – 2018 Jul                      |

- **Robotic Systems Consultant**

*Retail Robotics Sector*

**Kohl's Innovation, Milpitas, California, USA**

*2017 Jul – 2018 Jul*

- **Trainee Associate Electronic Engineer**

*Retail Robotics Unit*

**Zone24x7 (Pvt) Ltd, Sri Lanka**

*2015 Nov – 2016 Jun*

## Teaching Experience

- **Graduate Teaching Assistant**

*ENEE 633: Statistical Pattern Recognition*

*ENES 489P: Hands-On Systems Engineering Projects*

**University of Maryland College Park, USA**

*2021 Fall*

*2021 Spring*

- **Mentoring**

*Fields: Exploration Algorithms, Navigation Algorithms*

**Zone24x7 (Pvt) Ltd. Sri Lanka**

*2017 Aug – Present*

- **Volunteer teacher**

*Subjects: Electronics, Mechanics, Programming, Chemistry, English*

**Josef Stephan Technical School, Trieste, Italy**

*2013 Dec - 2014 Jan*

- **Student Development Lecturer**

*Subjects: Business Mathematics, Management Accounting Fundamentals*

**Achievers Lanka Business School, Sri Lanka**

*2011 Dec - 2012 Apr*

## Technical Skills

- **Programming Languages**

Coding experience: *Python, C, C++, Java, MikroC, Matlab, OpenCV, Arduino, Verilog, VHDL*

- **Software and Systems**

- SUMO, Carla and Gazebo simulation frameworks
- Pytorch based Deep-RL algorithms
- Gurobi optimization and Matlab framework
- Robot Operating System (ROS)
- Solidworks and Auto-CAD based design

## Projects Involved

- **Nokia Bell Labs Internship - Focus on Cloud based systems for autonomous indoor Visual SLAM and navigation**

Leverage cloud based computing capabilities to perform indoor navigation, localization and task assignment on low cost robotic platforms with simple sensor modules such as IMU, depth and RGB cameras.

- **STEER Tech Internship - Focus on Navigation and Control problems for Autonomous Vehicle Parking. "Your car needs to park. You don't."**

Participate in development and refinement of spot detection algorithm, parking maneuver algorithm, PID control and various speed models.

- **PhD Research: Cooperative Multi-agent Sensing, Planning and Control for Connected Autonomous Vehicles (ECE/ISR - UMD)**

Research focused on leveraging the control and communication capabilities of connected autonomous vehicles (CAVs) in order to solve many existing transportation problems and bottlenecks such as highway merge junction bottlenecks, highway traffic shock waves and smart intersection management, with the use of robust control, optimization and deep reinforcement learning methods.

- **Rapidly Exploring Random Tree based multi-agent exploration using Deep RL (Project - UMD)**

Development of RL-based multi-agent RRT exploration and planning algorithm for indoor environments.

- **Undergraduate Research Project - 3D Pose Tracking for GPS-denied Terrain Rovers by Fast State Variable Extension and Enhanced Motion Model** (*UOM*)  
Research on particle filter based real time 3D position tracking of a GPS denied terrain rover.
- **Undergraduate Final Year Project - Autonomous exploration and 3D mapping of indoor retail environments using an active-SLAM capable mobile robot platform** (*UOM*)  
Development of a robotic platform incorporating an exploration algorithm which provides autonomous navigation goals to aid loop closing during SLAM to obtain better 2D and 3D maps.
- **AZIRO - Autonomous Inventory Management Robotic Platform** (*Zone24x7*)  
R&D on a robotic platform for RFID-based inventory management in retail environments. Involving, hardware design, navigation and SLAM, exploration, sensor fusion, firmware design and RFID tag localization.
- **AZIRO Robot Store Test - Macy's Systems and Technology - Atlanta, Georgia** (*Zone24x7*)  
Deployment and testing of the AZIRO robotic platform at a store test in the Macy's Store, Gwinnett Mall, Atlanta. Tasks included robot assembly, mapping, navigation tuning, data collection and test monitoring.
- **SLRC 2014 Autonomous Robot and Remote Controlled Manual Robot** (*Sri Lanka Robotics Competition*)  
Development of two robotic platforms. One with line following, grid solving, object detection and gripping capabilities and another with gripping arm and remote controlled rough terrain navigation.

## Personal Skills

- English language proficiency (*TOEFL Score - 116, GRE Verbal Score - 166*)
- Strong communication, presentation and team work skills

## Service and Other Activities

- **ECE chair search committee - University of Maryland College Park**  
Graduate Representative for the Electrical and Computer Engineering department chair search
- **National Representative - JENESYS 2016 - Tokyo, Japan**  
Electronic & Telecommunication workshop - Japan SAARC Network Program of People-to-People Exchange
- **Youth Model United Nations - 2011 Conference - Sri Lanka**  
Vice Chairperson - General Assembly 2
- **Management Accounting**  
Chartered Institute of Management Accounting - *CIMA Adv. Dip MA*
- **Social Service**
  - Rotaract Club of University of Moratuwa
  - Interact Club of Royal College
- **Professional Development**
  - Sri Lanka Robotics Competition – Participant & Organizing committee member
  - Batch Representative (2012 Batch) – Department of Electronics and Telecommunication Engineering
  - Leadership training program held at the Advanced Naval Training Center – SLNS Nipuna, Sri Lanka
- **Extra Curricular**
  - Rugby – Under 18 Rugby team of Royal College
  - Athletics – Medalist in 100m, 200m, 200×4 Relay and High Jump in years 2003 to 2008
  - Basketball – Under 16 Basketball team of Stafford International School
  - Member of high-school senior and junior choirs, obtaining national level victories in multiple choir competitions. Play both the piano and guitar as a hobby.