# Dominic Carrillo

## Contact Information


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## Biography

PhD. candidate specializing in Autonomous systems; Computer Vision, Object Detection, Registration, and Simultaneous Localization and Mapping (SLAM), under Dr. Qing Yang at the University of North Texas.

## Education

**PhD. Computer Science and Engineering** — Aug. 2019 - Expect 2025
University of North Texas, Denton, TX, USA†

**B.S. Computer Science and B.S. Mathematics** — Aug. 2015 - Dec. 2018
Sul Ross State University, Alpine, TX, USA‡

**International Summer School Program** — July 2018 - Aug. 2018
Yonsei International Summer School, Seoul, Korea

**General Studies** — Aug. 2014 - May 2015
Midland College, Midland, TX, USA

## Publications

### Journals

[**J1**] Jingda Guo, **Dominic Carrillo**, Qi Chen, Qing Yang, Song Fu, Hongsheng Lu, Rui Guo. "*Slim-FCP: Lightweight Feature-Based Cooperative Perception for Connected Automated Vehicles*". IEEE Internet of Things Journal. 2022.

[**J2**] Jingda Guo, **Dominic Carrillo**, Sihai Tang, Qi Chen, Qing Yang, Song Fu, Xi Wang, Nannan Wang, Paparao Palacharla. "*CoFF: Cooperative Spatial Feature Fusion for 3-D Object Detection on Autonomous Vehicles*". IEEE Internet of Things Journal. 2021.

### Conferences

[**C1**] Dhakal, Sudip, Qi Chen, Deyuan Qu, **Dominic Carillo**, Qing Yang, and Song Fu, "*Sniffer Faster R-CNN: A Joint Camera-LiDAR Object Detection Framework with Proposal Refinement*". IEEE International Conference on Mobility, Operations, Services and Technologies. 2023.

[**C2**] Sudip Dhakal, Deyuan Qu, **Dominic Carrillo**, Qing Yang, Song Fu. "*OASD: An Open Approach to Self-Driving Vehicle*". MetroCAD. 2021.

## Research

### Lab & Partnerships

[**R1**] **SuperTruck3 with PACCAR (Under NDA)†**
Jan. 2023 -
Developing cutting-edge technologies such as an intelligent system to optimize fuel efficiency, reduce carbon emissions, and reshape the future of the trucking industry.

[**R2**] **Connected Autonomous Vehicles Lab†**
Aug. 2019 -
Exploration research in multiple different topics within the Autonomous Vehicle field e.g. Object Detection using 2D and/or 3D data fusion, Deep Learning models, Cooperative Perception with data sharing between vehicles, and Edge computing. Implement our models or system on our Polaris GEM vehicle and utilize Autoware/ROS to test and verify our projects.

**[R3] F1TENTH Environment System in CIIMS Lab†**

June 2020 - May 2022

Constructed the F1TENTH system for the CIIMS project. F1TENTHs are designed as an Autonomous Vehicle System, a versatile open-source platform, for research and education e.g. reinforcement learning, robotics, communication systems, and much more.

### Projects

**[P1] FR-Cooper: Feature Map Region based Cooperative Perception using 3D Point Clouds†**

Aug. 2023 -

In the context of autonomous vehicles, effective data sharing between vehicles is essential, but network bandwidth restrictions provide a barrier. The current method is to transmit these feature maps, which can be large, between vehicles. We developed the FR-Cooper approach to overcome this restriction while maintaining object association. FR-Cooper extracts specified object regions out of the feature map to minimize data transmission. Only these relevant object regions will be sent between vehicles rather than the complete map.

**[P2] Raw Data Cooperative Perception on Autonomous Vehicles†**

Feb. 2021 - May 2021

First preliminary study utilizing the F1TENTH Environment. Presented this work at 2021 CPS-IoT Week for Student Design Competition Networked Computing on the Edge which I have received award of $200 for an Honorable Mention on the Presentation. This study utilizes ROS to demonstrate that cooperative perception allows a vehicle to benefit from other vehicles to detect objects that are obscured from itself.

**[P3] Comprehensive Analysis of TEASER and NDT for Autonomous Vehicle Applications†**

Aug. 2021 - Dec. 2021

Evaluated algorithms performance between TEASER and NDT registration utilizing MATLAB and C++ to compare both algorithms, which have claimed to be efficient and have a low computation over ICP. However, there is no correlated research of the two approaches to demonstrate their performance between each other. The project goal is to conduct an experiment implementation of TEASER and the NDT algorithm on our vehicle.

**[P4] The Impact of Accommodated Vehicle to Vehicle Communication‡**

June 2017 - Oct. 2017

Study of Vehicle-to-Vehicle communication to verify the response of vehicles to decrease accidents on roadways. Vehicles can relay information to each other which allows other vehicles to prepare to stop or respond with the correct course of action. The simulation is built in Unity to have repeatability to showcase the impact of this communication system.

**[P5] Creation of a Perfect Hockey Bracket: Use of Matrices to Depict the Outcome of the Stanley Cup‡**

June 2016 - Oct. 2016

Input National Hockey League statistical data into the Colley Method to manipulate matrices to rank the teams. From the ranks collected we deduce who is the potential 2016 Stanley Cup Champion and compare it to actual results.

### Poster, Presentations, Talks

- *Honorable Mention for Presentation* in CPS-IoT Week - D. Carrillo, D. Qu, S. Dhakal, S. Tang, and Q. Yang, "*Raw Data Cooperative Perception on Autonomous Vehicles*," CPS-IoT Week 2021 Student Design Competition on Networked Computing on the Edge, Virtual Conference, May 2021

### Professional Activities

**Reviewer**

- IEEE International Conference on Mobility: Operations, Services, and Technologies (MOST), 2024.
- IEEE International Conference on Computer Communications (INFOCOM), 2023.

**Graduate Representative Officer †**
Society Hispanic of Professional Engineers Apr. 2021 -

- Promote the pursuit of graduate school to undergraduate members.

## Work Experience

**Graduate Research Assistant†** June 2020 -
Delegation of duties in the construction and development of the Polaris GEM Autonomous Vehicle from AutonomouStuff, F1TENTHs Environment System, and Autonomous Vehicle Demonstration.

**Teaching Assistant†** Aug. 2019 - May 2020
Administered classes for students enrolled in courses; CSCE 1010 - Discovering Computer Science, CSCE 4600 - Introduction to Operating Systems.

**Electrical Mechanic and Shop Hands** June 2014 - July 2019
Carrillo's Automotive, Midland, TX
Diagnostic inspection on electrical issues for vehicles e.g. electrical break tracing, resistance measurement reading, or computer troubleshooting.

## Awards

- *Honorable Mention for Exploration* in CPS-IoT Week - A. Liu, O. Xie, D. Carrillo, and Q. Yang, "*Phantom Traffic Jam Prevention Using Cooperative Car Following Model*," CPS Week 2022 Student Design on Competition Networked Computing on the Edge, Virtual Conference, May 2022
- *Honorable Mention for Presentation* in CPS-IoT Week - D. Carrillo, D. Qu, S. Dhakal, S. Tang, and Q. Yang, "*Raw Data Cooperative Perception on Autonomous Vehicles*," CPS-IoT Week 2021 Student Design Competition on Networked Computing on the Edge, Virtual Conference, May 2021

## Technical Skills

Program Language - C# | C++ | Python | MATLAB | LaTeX | HTML | CSS
Computer Tools - ROS | Git | Unity | PyCharm | Vim | VirtualBox
Language - Fluent English | Basic Spanish | Elementary Korean