Submission Details: pos105s1

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Title (Maximum 10 words)

Title (Maximum 10 words): Congestion-Aware Routing for Multi-Class Mobility on Demand Service

Presenter Information

Presenter 1:

Name: Niharika Shrivastava
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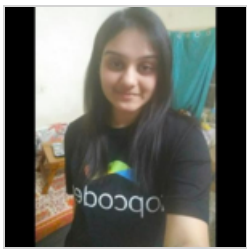
Biography:

Niharika is pursuing her Bachelor of Technology in Information Technology at the Indian Institute of Information Technology, Allahabad. Currently, she is a Research Assistant at the Singapore University of Technology and Design. She has been a finalist for the Red Hat Women in Open Source Academic Award, 2020. She was an Outreachy intern with the Fedora Project and a Product Developer with Gojek. She mentored students in Google Code-in for the Fedora Project, GirlScript Summer of Code and OpenCode. Her team won the Smart Indian Hackathon, 2019 for Dr Reddy's Labs.

Photograph:



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Will this person present the submission at the conference? Yes
Is this person a GHCI 20 Committee Member? No
Experience of the author/speaker proposed on the specific topic and why they should be considered. (100 words):

I am a core-contributor of the project. I have been working on it as a research assistant under the supervision of Prof. Malika Meghjani at Singapore University of Technology and Design since January 2020 for my final thesis (major project) at my home university, Indian Institute of Information Technology, Allahabad. I have developed all the tools and APIs to analysis relevant GIS information and incorporated novel path-planning algorithms.

The research work is a novel solution to urban mobility and real-time congestion management for autonomous vehicles thereby forming a "smart city grid" in Singapore. It aims to be cost-effective and scalable.

Does the speaker have prior speaking experience? Yes

Past speaking references with link to videos (100 words):

1.) Flock to Fedora, 2019: "Students in developing nations and FOSS contribution limitation " https://www.youtube.com/watch?v=T48sow7Ve4c&list=PL0x39xti0_64C75dRUuwlXlfYRgjgdEP4&index=68

2.) Flock to Fedora, 2019: "Fedora Summer Coding 2019 Project Showcase and Meetup" https://www.youtube.com/watch?v=hn2Cn6_vCxE&list=PL0x39xti0_64C75dRUuwlXlfYRgjgdEP4&index=50

3.) Fedora Women's Day Celebration, 2019: https://twitter.com/StarOrion25/status/1191660382634397696

4.) Open Source Summit, Europe by The Linux Foundation, 2019: Lightning Talk (no video recorded for lightning talks)

Additional Author/Speaker Information

Additional Author/Speaker 1:

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Company/Institution: Singapore University of Technology and Design
2nd Company/Institution:
City: Singapore
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Professional Title: Assistant Professor
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Biography:

Dr Malika Meghjani is an assistant professor at Singapore University of Technology and Design. She received her PhD degree in Computer Science from McGill University, Canada. As her debut in Singapore, she was awarded SMART Postdoctoral Fellowship for her research proposals on “Multi-Class Autonomous Mobility-on-Demand System” and “Context and Intention Aware Planning under Uncertainty for Self-Driving Cars”. A start-up proposal based on her work, titled, “Multi-Agent Rendezvous on Street Networks”, won her the NSERC Canadian Field Robotics Network, Strategic Network Enhancement Initiative Award. She is the first Google Anita Borg Scholar from McGill University, Canada.

Photograph:

Type: jpg
Size: 9KB
Uploaded: Jun 09
MD5: 33062c6f6057546fe28017ebce58eb48
Original Name: malika_meghjani.jpeg

Will this person present the submission at the conference? No

Is this person a GHCI 20 Committee Member? No

Experience of the author/speaker proposed on the specific topic and why they should be considered. (100 words):

The author has a wide range of experience in autonomous mobility-on-demand systems from robotics and fleet management perspectives. Her work on multi-class fleet sizing and mobility-on-demand, provided useful insights on joint optimization of the cost of the fleet and their expected service time. The proposed project in this submission is based on her aforementioned work and her award-wining paper on "Multi-

agent rendezvous on street network" for efficiently selecting optimal transit point between different modalities.

Summary/Abstract

Summary/Abstract (Maximum 150 words):

Recent developments in urban mobility have demonstrated the potential capacity of road networks to accommodate increasing traffic. First, we address congestion-aware routing for mobility-on-demand services that operate using a combination of a heterogeneous fleet. Every customer trip is distributed into multiple legs; walking /cycling for the first and last leg of the trip; cars for the middle leg. Second, we provide optimal transit points from one leg to another for this multi-class service. This framework is a social model as it fulfills all trip demands in a system-optimal way and in real-time.

We showcase the effectiveness of our framework by using Singapore's network data from OpenStreetMap coupled with its real-time traffic data. We achieve 0% congestion for 3 demand sizes: off-peak, moderately-peak, high-peak, along with a total cost reduction of 64.79% for multi-class service. There is a 70.1% query-save on finding the optimal transit points for the entire trip.

Track

Track: Posters

Keywords

Artificial Intelligence, Machine Learning & Data Science:

Multi-Agent Systems, Optimization Strategies

Emerging Technologies & Industry Trends:

Transport

Open Source (Back this year):

Contributor, Committer and Open Source Communities

Technology Driving Social Impact:

Mobility
Transport

Student Submission

Is this a student submission? Yes

Other Information

Has this topic been presented in any other forum? No
Does this submission contain use of open source tools and technology? Yes
What is unique about the submission and why it should be selected for GHCI? (100 words):

The submission proposes to integrate micro-mobility options such as walking/scooters in order to reduce congestion drastically. Its first-of-its-kind as it provides optimal transit points in a customer's trip so that the overall travel time if minimum. E.g, Will I reach my destination faster if I walked to the next nearest bus stop? Routing is done in real-time, results in 0% congestion, and is computationally-efficient than state-of-the-art. The project is built using only open-source tools: OpenStreetMap, GeoPandas, OSMnx, OSRM, Singapore LTA Datamall.

GHCI participants would benefit by knowing the advantages of intelligent urban mobility and get inspired in AI and Robotics.

2 Page Extended Abstract

2 Page Extended Abstract:

Type: pdf

Size: 139KB
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MD5: be941952a2588a05b293a0b38d5718d0
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Video Upload

Video Upload:

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