Improving Freight Transport Mobility and Efficiency via Synchronization

Technology Transfer Activities

by

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December 2024

Center for Connected Multimodal Mobility (C2M2)

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Technology Transfer Activities

1 Outputs

The project's output includes one peer-reviewed journal manuscript, one Ph.D. dissertation, and codes that implement the dynamic decentralized carrier collaboration.

1.1 Output #1

Ahmed, F, N. Huynh, W.G. Ferrell, V. Badyal, and B. Padmanabhan. Vehicle Re-routing under Disruption in Cross-Dock Network with Time Constraints. Expert Systems with Applications, 2024, Vol. 237, Part B, 121517. https://doi.org/10.1016/j.eswa.2023.121517

1.1 Output #2

Ahmed, Fahim. Design and Analysis of Freight Movement in a Logistic Network. Ph.D. Dissertation, 2025. University of South Carolina.

1.1 Output #3

Codes for solving the integrated vehicle routing and scheduling problem with cross-dock will be submitted as a project deliverable and will be available on the center's website.

2 Outcomes

The primary outcome of this research is a framework for a reactive recovery system that integrates the routing of vehicles and scheduling in response to the breakdown of a pickup vehicle to mitigate the negative impact of such disruptions. This framework can be used by logistics companies to improve information exchange between drivers, the dispatcher, and the cross-dock (CD) operator to synchronize vehicle arrivals at the CD to lower the makespan and total delay in the event of a disruption.

2.1 Outcome #1

Development of two mathematical programming models for the integrated vehicle routing and scheduling problem (one model for normal conditions and one model for disruption conditions) and solution methods that implement the framework.

3 Impacts

The developed framework has the potential to lower the makespan at the cross-dock, delay at the supplier locations, and delay at the customer locations.

3.1 Impact #1

The developed framework can be used by companies that manage their logistics involving a cross-dock to mitigate the impact of disruption due to vehicle breakdown on service quality and CD operations.