



## Executive Summary

### Optimization of Automated Demand Responsive Feeder Transit Operation

#### Innovation

A team of researchers at Morgan State University have leveraged their previous work with Degree of Circuity (*DOC*) and Maximum Degree of Circuity (Max *DOC*)-related algorithms and have further provided an optimal routing algorithm that minimizes total vehicles traveled and passenger travel costs at the same time using multiple modes of transportation. Their resulting transit network design effectively dictates operational efficiency, passenger travel time, passenger attraction, and generated revenues. The results showed that when unit operating costs decline, total operating costs and total costs decline. The optimization process tends to reduce passenger costs more while reducing total costs. Assuming that automation of the vehicles reduces the operating costs, it will reduce total operating costs, total costs and total passenger travel costs as well. This method can be extended beyond buses and trains to cover a broader transportation system and can also consider automated / driverless travel.

#### Market Need

Mobility-as-a-service companies as a whole, to include ridesharing, are valued around \$115 billion; Including deployment of driverless vehicles, that number is expected to be considerably higher. As gross sales grow to \$10 trillion in the early 2030s, 20% of that will go to platform providers; thus, incremental improvements in this field can contribute to any one company's growth.

#### Intellectual Property

The Office of Technology Transfer has filed a U.S. Provisional Patent Application (62/898,111).

#### Stage of Development

An initial disclosure was made to the Office of Technology Transfer, and an OTT Small Tech Transfer I-GAP Award was provided to advance the team's commercialization work.

#### Technology Transfer Opportunity

This technology can be useful to not only companies such as Uber and Lyft, but also to companies in the logistics/delivery space. Multiple modes for cargo transport can factor in rail, water, air, and trucks/cars – one or more companies in this part of the supply chain may be interested in implementing a solution to expedite deliveries. Suppliers may be able to use this as an important tool in addressing their cost and delivery structure. Consultants may also be interested in using this in advising transportation and supply chain companies. A startup could take advantage of the technology and use their advantage to attract drivers, advertising a lower cost structure to them as a result of optimizing transportation methods. This technology could also be implemented as an app that can be used by consumers to advise on the quickest vs. cheapest modes of transportation.

#### Inventor(s)

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#### Field(s) of Use

- Transportation
- Supply Chain

#### Key Words

- Transportation
- Optimal routing
- Cost

#### Advantages

- Lower cost structure
- Flexible
- Potential user app
- Save time
- Driverless vehicles

#### Status

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Patent Pending

#### Reference Number:

IPD # 76/2019

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