
# Ride Sharing in Mobility on Demand Systems:

## Opportunities, Challenges and Future

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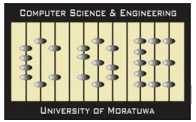
University of Moratuwa
Data Science, Engineering & Analytics Research Hub

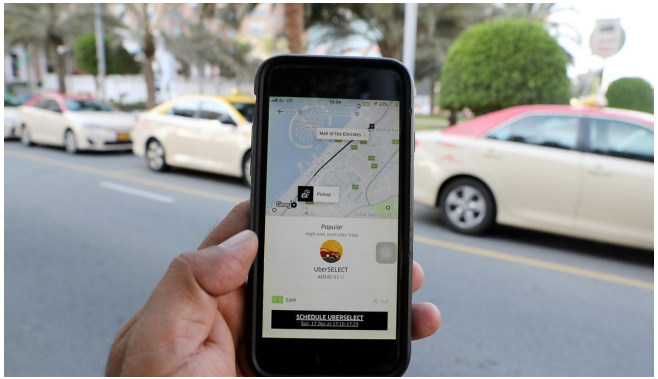


*“Ride-sharing services have enormous potential for positive societal impact with respect to congestion, pollution, and energy consumption”*

Professor Daniela Rus
Director of MIT’s Computer Science and Artificial Intelligence Laboratory (CSAIL).

# Mobility on Demand (MOD) Services

## On Demand Taxi Services



## Floating Systems


## Station Based Services

lyft

UBER

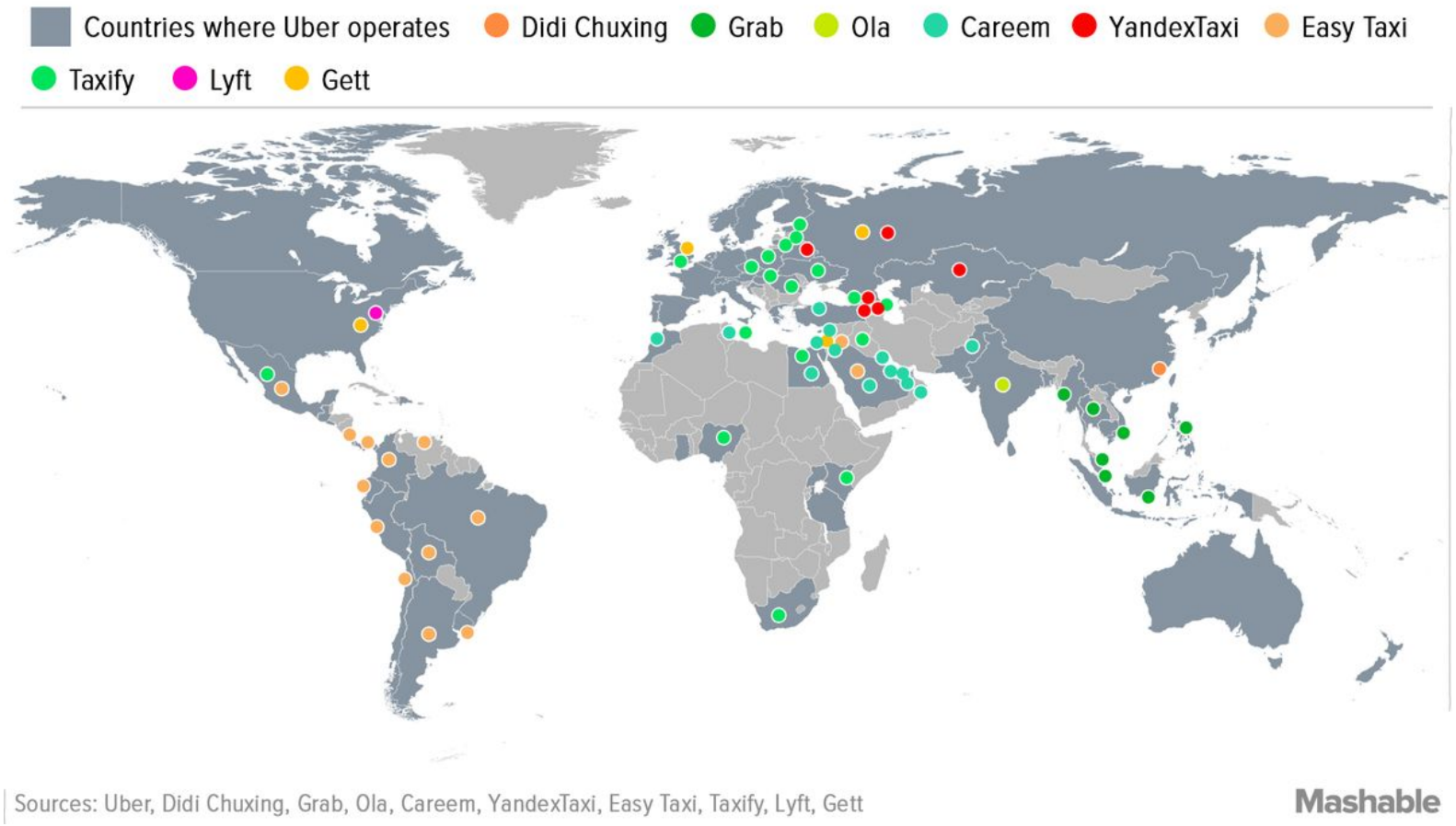
PickMe

OLA

CAR 2GO

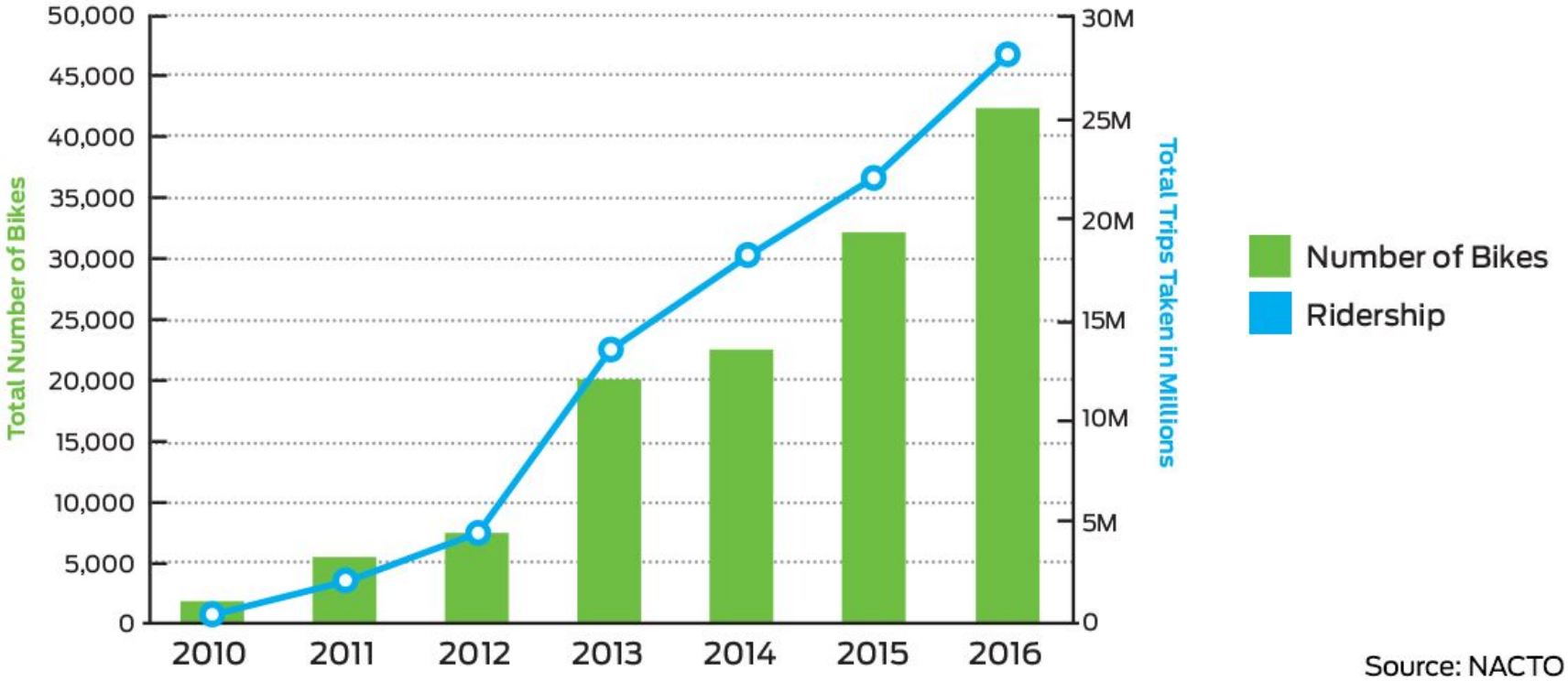
LimeBike
Your ride anytime

la bicy




Source : https://dazeinfo.com/2018/05/29/global-ride-hailing-market-schemed-upheaval/

# Bike Share Growth in the US




Source: NACTO

National Association of City Transportation Officials : https://nacto.org/bike-share-statistics-2016/

# Ride Sharing - Impact on Traffic, Money and Environment

- Researchers from MIT had developed an algorithm in comparison to the nearly **14,000** taxis that currently operate in New York City [1],
  - **3,000** 4-person cars could serve 98% of taxi demand with an average wait-time of only 2.7 minutes.

OR

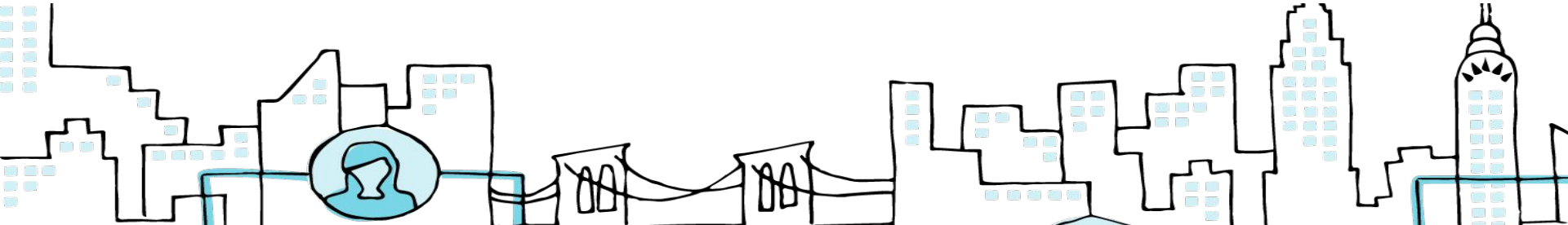
  - demand would be covered by just **2,000** 10-person vehicles.

[1] Javier Alonso-Mora, Samitha Samaranayake, Alex Wallar, Emilio Frazzoli, and Daniela Rus, On-demand high-capacity ride-sharing via dynamic trip-vehicle assignment, *Proceedings of the National Academy of the Sciences.*

# Research Problem

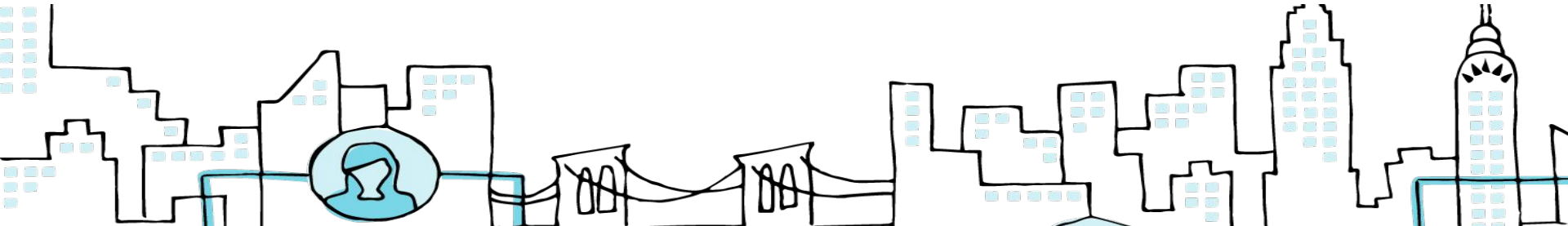
- Large scale ride sharing in more popularized cities* require meticulously designed mathematical models and algorithms in order to match riders and vehicle fleet in real time.

* Cities with sophisticated spatiotemporally distributed mobility demands

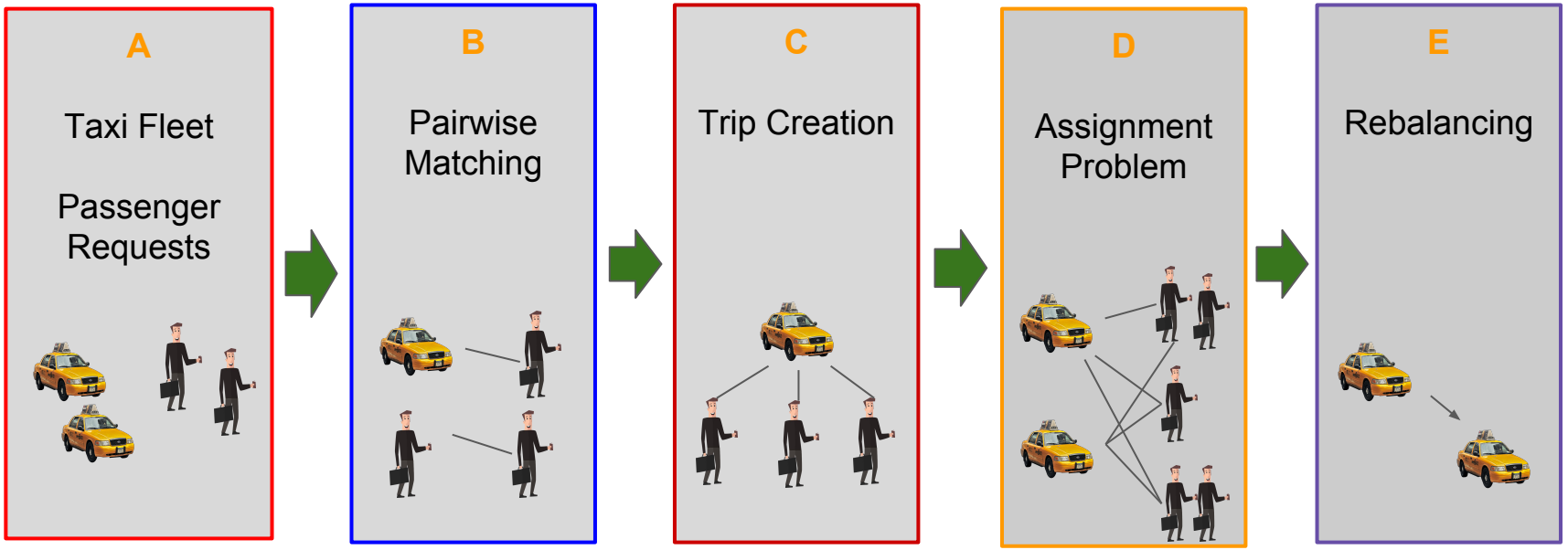


# Research Objectives

- Develop algorithms for ride sharing while focusing,
  - Scalability
  - Robustness to disruptions
  - Efficiency in real time
  - Passenger satisfaction
  - Sustainability



# Helio - Hailing Optimization - Model Overview



# Findings : Feasibility in Ride Sharing in Sri Lanka

**Data Set :** PickMe

## Experiment - 01

- Region : Colombo District
- Number of taxis : 1000
- Maximum waiting time per passenger : 5 minutes
- Maximum travel delay per passenger : 10 minutes
- Service Rate : 30-40%

## Experiment - 02

- Region : Colombo District
- Number of taxis : 1000
- Maximum waiting time per passenger : 10 minutes
- Maximum travel delay per passenger : 20 minutes
- Service Rate : 85-90%

Helio

*Hailing Optimizations*

*"Many people in urban environments are rethinking the need for personal vehicle ownership. Combine this with the data that we can collect in real time from smart phones and internet-enabled devices and you have a real opportunity to create some great solutions"*

Professor Samitha Samaranayake
Mobility, Algorithms and Society Lab
Cornell University, USA

# THANKS!!

**Any questions?**

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