

# Investigation into Traffic Performance under MFD-based Perimeter Control

## Master's Thesis of Kifayat Shah

### Mentoring:

Natalie Steinmetz, MSc  
Yamam Alayasereih, MSc

### Introduction

- **Perimeter Control:** Restricting the Vehicle inflow into a specified area of a network called a Protected Network to avoid over-saturation
- **MFD-based Perimeter Control:** Gating Traffic inflow using the MFD-derived network states
- The traditional solution of **increasing infrastructure faces challenges** due to spatial constraints and induced demand (Zahavi Principle).
- Need strategies to **use the existing infrastructure efficiently**

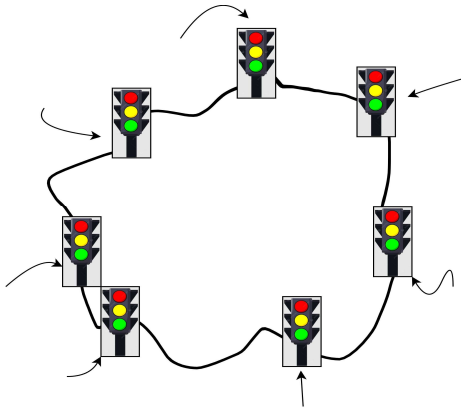


Figure: Perimeter Control through Signals

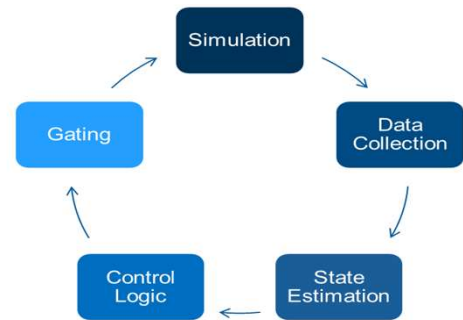
### Literature Review

- Existence of MFD was first proposed in 2008 through a field experiment in Yokohama, Japan
- The concept of restricting inflows to Protected Network was initially presented in 2012
- Feedback-based perimeter control and Model Predictive Control are among the initial MFD-based perimeter control strategies
- Existing network-level control strategies either fail in saturated traffic conditions or not implementable due to computation complexity

### Methodology

MFD Development	Control Strategy Design	Implementation	Evaluation
<ul style="list-style-type: none"> <li>• Use PN Lane-based data</li> <li>• Edie,s</li> <li>• Definition of developing MFD</li> </ul>	<ul style="list-style-type: none"> <li>• Feedback-Based Soft and Hard Gating</li> <li>• Using Bang-Bang Controller</li> </ul>	<ul style="list-style-type: none"> <li>• Any Suitable Software Tool can be used</li> <li>• Simulation of Urban Mobility (SUMO) in this thesis</li> </ul>	<ul style="list-style-type: none"> <li>• Using relevant KPIs</li> <li>• Average Speed and Time delay in our case study</li> </ul>

### Feedback Mechanism



### Results

