Goudappel

MOBILITY MOVES US

VACANCY: 'Improving Gouden Groen'

ABOUT GOUDAPPEL

At Goudappel and Dat.mobility we are experts in the field of mobility. We connect our expertise on integrated solutions for the journey of today and the world of tomorrow. We contribute to accessibility, quality of life, safety, sustainability and economic vitality in the Netherlands and abroad.

Within our organization, we think highly of students and attach great value to interns and graduates. New ideas arise and innovative research is carried out by the new generation of mobility experts. This keeps our organization fresh and ensures that knowledge can be shared. In addition, your internship or graduation theses can be an interesting start to your career. You might be our future colleague!

INTRODUCTION

A few years ago Goudappel developed a new principle for traffic signal control. This principle tries to improve throughput of traffic at signalized intersections, and aims at reducing overall delay. The principle is called 'Gouden Regelen' and it includes five modules. Among these modules are:

- Gouden Groen;
- Gouden Wissel.

With Gouden Wissel we let go of the fixed order in which signal groups are given green. Instead, we define stages, which consist of a collection of signal groups that can be given green at the same time, and continuously determine what stage should be given green to minimise overall delay. As a result, the order in which signal groups receive green is dynamic. The Gouden Wissel module results in earlier and more frequent green realisations for signal groups with high traffic flows.

The Gouden Groen module calculates maximum green times on the basis of current traffic flows, instead of using predefined sets of maximum green times. With the Gouden Groen module we aim to increase utilization of given green time. The Gouden Groen module calculates maximum green times via two methods:

- We use the stop line loop detector to count the number of vehicles that have passed the stop line in the past few minutes. We translate this into a traffic flow. When a vehicle requests green of a signal group, we add vehicles to the estimated queue of that signal group on the basis of the traffic flow and the current red time;
- We use the stop line and distant loop detectors to count the number of vehicles that are currently in the queue. When the distant loop detector becomes occupied, we add one vehicle to the queue, and when the stop line loop detector becomes unoccupied, we subtract one vehicle from the queue. If the number of vehicles in the queue reaches a predefined maximum, we assume that the queue has grown upstream of the distant loop detector, and we continue adding vehicles to the queue while the traffic light is red on the basis of the estimated traffic flow.

PROBLEM DESCRIPTION

When we apply the Gouden Groen module, we face various challenges when it comes to correctly estimating the number of vehicles in a queue. The goal of the research would be to optimize queue length estimation, hence improve the working of the Gouden Groen module. Research questions could be:

- When counting vehicles with the stop line and distant loop detector, how can we better incorporate lorries? Lorries take up a large amount of space, and to avoid missing out on vehicles upstream of the distant loop detector, the predefined maximum number of vehicles that can be in a queue cannot be set to a high value. We consider replacing the predefined value by an algorithm that determines the maximum number of vehicles in a queue dynamically, but we have not been able to create this algorithm yet. An algorithm could take advantage of the information in the table below.

	Short occupation time of distant loop detector	**Long occupation time of distant loop detector**

Short queue length *(= few vehicles counted)*	Likely a passenger car	Likely a lorry
Long queue length *(= many vehicles counted)*	Likely a passenger car	Could be both a passenger car and a lorry

- How can we, especially when a distant loop detector is missing, better take into account the arrival of a platoon of vehicles at a signal group? These kind of situations often occur after a bridge opening, or level crossing closure. In these situations the difficulty is that the estimated traffic flow is low (no, or only few, vehicles have passed the stop line in the past minutes), which means that adding vehicles to the queue on the basis of the traffic flow leads to underestimation of the actual queue length;
- How can we better estimate queue length when signal groups have no distant loop detector?
- How can we better estimate queue length when two separate signal groups have one conjoint distant loop detector?

SIGN UP AND ENJOY OUR BENEFITS

- An exciting and up to date internship/graduation assignment
- Mentoring by an expert in the field
- Being full part of the team
- Educational period
- Flexible working hours
- Possibility to develop your own initiatives and ideas
- Graduation fee of € 300,- gross (based on full-time)
- 20 vacation hours per month (based on full-time)

INFORMATION

When interested in this internship assignment please contact:

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More information about Goudappel can be found via www.goudappel.nl.