

Evaluation report

Safety by Radar

City of Aarhus

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Short description

Cyclists going downhill sometimes have a speed where they have problems deciding whether to continue or brake when signals turn to yellow. In this pilot sensors will be placed at traffic lights that are able to register cyclists who are approaching the traffic lights. These traffic lights lay downhill so cyclists approach them with high speed. The sensors can regulate the traffic lights in such a way that they increase the timing of the green lights. In this way cyclists can reach the other side of the intersection safely and it is avoided that they must slow down suddenly in case the lights jump on red.

Type of ITS

Interactive

Timeline

The 29th September 2020 the sensor has been installed at one intersection. Data on the appreciation by cyclist has been collected the 6th of October between 3 p.m. and 5 p.m.

Hypothesis

The use of sensors at downhill intersection will make cycling safer and/or more comfortable and will as such contribute to an uptake in cycling and a reduction in motorised traffic and CO₂ emissions.

Data sources

- Interviews with cyclists on their appreciation (post-intervention)
- Experiences of project managers

Analysis

Report of the pilot

To evaluate the experience of cyclists about the safety by radar pilot, a short questionnaire was developed to interview cyclists that had crossed the intersection on which the sensors were installed.

The following observations on the cyclists, traffic, and other things, has been noted:

- The bike route towards the city goes downhill, therefore cyclists have a higher speed than normal.
- Before reaching the traffic light, many of the cyclists had been stopped at another traffic light, crossing the Ring Road. Therefore many of them reach this junction in groups and with green light.
- It's not possible to stop cyclists in high speed for the interviews – therefore the responders in this survey are those awaiting the green light.

- Most cyclists don't have to stop at the traffic signal – they reach the green light.

One of the purposes of this pilot is to give cyclists longer green time and give them fewer stops – therefore it might be considered all in all as positive that it was difficult to stop cyclists for interviews.

On the 6th of October 2022, for two hours (from 15:00h to 17:00h), - on a dry and clear day with sun and – data were collected from 26 cyclists. Not all responders answered all the questions.

92% of the respondents cycled often at the place of the intersection. 31% had already noticed that they met a green light more often and for a longer period. 72% felt safer when they didn't have to stop at the traffic light, however, some of them didn't interpret the situation at first in terms of safety but indicated that 'it felt more comfortable'. 52% indicated it as more comfortable and one respondent referred to it as 'it gives a better flow'. 23% indicated that they would cycle more 'if they didn't have to stop at traffic lights', however many respondents noted they wouldn't cycle more, as they were already cycling every day, but appreciated the fact that 'it gave them a better flow though the city'. One respondent suggested that 'it would make more sense with a wave of green light on the Ring Road'.

Based on this sample we may conclude that the pilot's goals of increasing safety and comfort are met, at least in the experience of the cyclist. No hard data on accidents or near accidents was available for analysis. The experience of the other traffic participants could not be evaluated.

Impact

The 'safety by radar' pilot aimed at increasing the safety and the comfort of cyclists when approaching downhill crossroads. The survey showed that it increased both, at least as it was experienced by cyclists. Based on the BITS-survey that 36.3% of the Aarhus inhabitants are (very) unhappy with the safety of the bicycle paths in Aarhus and 29.3% are (very) unhappy with the safety of the bicycle crossing roads. 56% of the respondents consider 'sensors that can detect approaching cyclists and make traffic light green faster' a form of technology that would encourage them to cycle more'. While this last item is not formulated in the exact sense as the goals of the pilot, it has a very high compatibility as it points to a higher 'flow in traffic' and comfortability experienced by the respondents in the survey amongst cyclist (see above).

In Aarhus there the motivation to cycle (a lot) more is high: 47.3% of the respondents indicated that they would like to cycle (a lot) more 'to go shopping or to travel to leisure activities, day care centre or to see family or friends', 58.7% that they would like to cycle (a lot) more 'to commute to school or work' and 59% that they would like to cycle (a lot) more 'as a sport or leisure activity in itself'.

If we select the Aarhus respondents who would like to cycle (a lot) more on at least one of the activities mentioned above and consider 'sensors that can detect approaching cyclists and make traffic light green faster', 34% of them indicated they were (very) unhappy with the safety of the bicycle paths, 28.2% with the safety of the safety of the bicycle crossings and 56.4% consider 'sensors that can detect approaching cyclists and make traffic light green faster' a form of technology that would encourage them to cycle more'.

If we consider that last item, then 48.3% of the respondents would be motivated to cycle more if changes at the lightening system would be implemented in the city of Aarhus at a whole. The data gathered in

function of the specific trial showed a willingness to increase cycling of 6% (amongst people in which cycling is often already an important way of transport, amongst people who are motivated to cycle but see safety or comfort as a barrier, that number may be higher).

This calculation, however, is theoretical: it implies that sensors, like the ones implemented in the pilot would be installed at all crossings in Aarhus (included the ones at traffic lights that are not downhill, for which this pilot was meant) and that citizens experience a higher sense of safety and/or comfort while cycling due to the system. While probably not realistic in the short term, the pilot indicates that increasing cyclist's flow in traffic and increased safety could increase cycling uptake.

The pilot, if more broadly implemented, has at least the potential to decrease CO₂ emissions. We could, however, not estimate the size of that potential, as there was no reliable way to estimate changes in transport mode due to increased cycling as a result of this pilot.

Experiences project managers

The project managers made following remarks and suggestions:

- Safety by radar is a pilot that is relatively easy to implement as it is a rather 'technical solution', that doesn't require more fundamental reconstruction works at intersections. It will therefore not impact cyclists negatively during a period because of obstruction and or delays because building and construction on site. Cyclists will not necessarily notice changes made at the intersection immediately, however they will in time probably experience increased comfort and hopefully experience increased safety. The pilot indicates that cyclists experience a better flow in traffic as it minimizes the number of stops, they must make on their trips.
- In terms of evaluation, it can be said – the pilot works too well, because most of the cyclists reach the traffic light and have a green light, and don't have to stop for red lights (what decreased our potential to survey them). Otherwise there hasn't been any problem with this pilot.
- The goal with this pilot was to improve safety for cyclists in the traffic lights. We are not able yet to objectify the 'safety effect' of it yet, as it is too soon to evaluate objective statistics on accidents or near accidents. Over the coming years we will observe the statistics on accidents to see if there will be fewer accidents at the traffic lights at the site where the pilot has been implemented.
- At sites were high speed cyclists and/or cyclists try to speed up to get through green light, the Safety by Radar system shows to be a potential solution as it extends the green light and minimizes the risk of conflict between a turning car and a high-speed cyclist. However, we want to be careful with strongly recommending the system to interested authorities, as we have not been able to evaluate the impact regarding the number of accidents in the pilot area.

Conclusions

The 'safety by radar' pilot aimed at increasing safety and comfort for cyclists (specifically for cyclist at speed levels above higher than average) by installing sensors at a crossing road that detect incoming cyclists and that can increase cyclists' priority (extension of cyclists' time to cross the intersection by extending 'green light'). Based on the survey of cyclists at the specific intersection, we may conclude that this intervention increased cyclists' experience of comfort and safety (although comfort was not always recognized as safety). For further evaluation, objective statistics on accidents, conflicts and near conflicts will be needed. However, the BITS survey indicates that there is a high willingness to cycle more amongst citizens of Aarhus, and that increased safety would contribute to transform intentions into behavior and that systems that increase the flow of cyclists in traffic (city-wide) could increase uptake of cycling and has the potential of reducing CO₂ emissions (although insufficient data were available to measure the impact on this goal).