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# Problems with keeping the safety distance between vehicles on the roads

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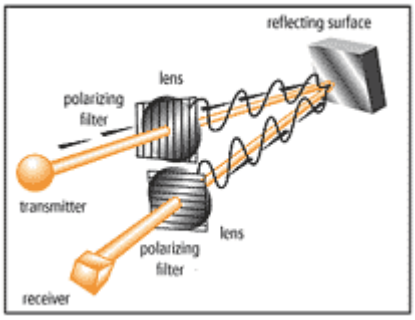
The keeping the safety distance between vehicles on the roads has recently been one of the hot topics of discussions and reports in Czech media and out of it. The main reason was the prepared change of the code n. 274/2008Sb Section 19.1. It says that: “Driver going behind the other vehicle has to keep such a safety distance that he could avoid the accident in case the other driver in front of him suddenly slowdowns.” It has been suggested that ignoring this rule should be fined by two penalty points and the financial sanction. The question is: How the police will check the drivers? How will the particular police crews measure that safety distance on the roads? The matter of principle is the speed of cars. The safety distance depends on it. There is a solution by means of ”2 seconds rules“ in many countries of EU, but how to prove breaking this rule?

One of the aims of this project (Diploma thesis), but not the main one, is the simple contemplation on realization of distance measurement between the vehicles within considering their speed. Then I would like to realize it in a real traffic on the road. I would like to realize it by means of the lowest costs. The construction of a simple portable device which is able to measure distances and speeds for a long time is one of the options. My simplified version of the device could work for a couple of hours. And it should be an inspiration for police departments in the Czech Republic. (There are some devices on motorways which can detect vehicles but they are only static). Borrowing of a similar device for onetime measurement in order to get data for the main target of this project is another option. It will be described in one of next parts.

Here is the example of the principal of one of the solution to measure distances and speeds for a long time. The measurement can be realise by means of retroreflective sensors**.** For a retroreflective application, the transmitter and receiver are incorporated into a single housing. A reflector is mounted opposite to the sensor and returns transmitted light back to the receiver. Compared to a thru-beam application, retroreflective sensors are used for medium range (up to 16m) or average excess gain applications. The effective beam describes the area that must be completely interrupted in order to reliably sense a target and it increases as the distance between the sensor and reflector increases. When the target is directly in front of the reflector, it must be at least as large as the reflector. Smaller objects can be detected if

they are located closer to the sensor and they are at least as large as the optics. So It won´t be comluicated with cars.




The measurement has to be realized on some specific sections of roads because of keeping the low costs. The choice of this section will be very important and difficult. The success of measurement is conditioned by the device functionality and sufficient traffic intensity. The place of measurement should be the section of high speed road or motorway, where the car density is at measurable level. I think that some very suitable sections are on the motorways near Prague or Brno. The motorways have two or more lanes and flow in every direction. This is the reason why the measurement has to be realized in the vertical position. It could not be realized in the horizontal position as the device would detect vehicles in both lanes. It is unadvisable! If we realize the measurement in the vertical positions, we must find a suitable bridge or foot bridge above the motorway. We will fix the device on such a bridge construction and will aim it directly down to traffic lane, where the reflector will be fixed. This is the only way how to detect only one traffic flow of cars. The device output should be ”ones and zeros“ with the time parametr. We can process these data in the PC´s programme as Matlab or similar.

We know the time distance between the cars now. It could be enough, but for better results we would like to know the speed of every car. So we need another, second sensor that will be fixed on other side of the bridge. It will also detect the time distances between cars.

We can easily find out their speed, because we know the distance between the sensors and can easily count their speed (see the picture bellow).

We let the whole contruction of device to somebody or some company that deal with this problems. This is not target of this project.

It will be statisticaly processed after the successful measurement. The results will contain basic statistic characteristics and their graphics issues in graphs and potencional dependents between them. Practically, it means to find out if the drivers obey the law and keep the safety distance.

There is a statistical fact that most accidents are caused by drivers who do not keep the safety distance. 27 659 road accidents happened in the Czech Republic in 2007. Breaking the safety distance has the second position in the roads accidents' chart, it is close to the distraction while driving. So the Traffic department (BESIP) has started the campaign „2 second rules". There are some new TV spots on TV channels, there are several billboards next to the roads, and there are posters on toillets in all petrol pumps' restaurants. Transportation experts concured that vehicles should keep the distance corresponding to two second drive by setting the speed – it is 28m for 50 km/h speed, 50m for 90km/h and 72m for 130km/h speed. Many drivers really do not know this 2 second rule, or they do not know how to set the right distance.

The most important part of this project is the proposal and construction of the vertical and horizontal traffic sings which spur the drivers to keep the safety distance. Drivers might correct and set this safety distance with help of these traffic signs. I found the inspiration on the British motorways where the drivers can set the right safety distance because of these signs. The similar device (signs) could be officially on the Czech roads, especially on some very dangerous sections, couldn´t be? The British traffic signs have two main parts, three vertical signs and several horizontal signs in the middle of each lane. It is on the section of

roads more then 500m long. The first of vertical signs (the picture bellow) tells the drivers to check their distance. The drivers will see the second sign several seconds later. It says how to set the right distance (the second picture bellow).



Drivers set the safety distance according to horizontal signs on the lanes. They must always see two chevrons between the vehicle in front of them and themselves. The distance between two chevrons is the safety distance for the maximum speed permitted by the law. The count of chevrons is so great that drivers have enough time for setting the distance. The last, third, vertical sign only tells the drivers to keep this safety distance. Its position is on the section where are no more chevrons.


This idea has also some difficulties. The distance between chevrons is fixed for one particular speed. If there is high density of vehicles on the lanes, the flow will go slower and signs will not work. The speed between left and right lane is different. The flow on the right line is slower because of lorries.

The main aim of this project is a proposal and construction of component which is similar to British traffic signs and which would adapt to Czech conditions. The construction would be low cost. Vertical signs would be print on the large label stick on the plastic board and the chevrons should be only temporary paintings on the road. The subsequent research of

effectuality of these traffic signs influence would be realized by means of another measurement on the motorway and another statistic processing. The statistic results would be compared with the results from the last measurement. It is the conclusion of the whole project. The last difficulty is to obtain an approval and permission from the city council.

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This project is processed as a current diploma thesis at Faculty of Transportation Sciences Mr. Tomas Micunek management – Department of Forensic Experts of Transportation Sciences


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