Overview of data accuracy evaluations for STMS vehicle detectors

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Abstract

The STMS vehicle detectors were introduced on traffic data collection market in 2010. The possibility of more extensive and accurate traffic data collection combined with lower installation and maintenance cost quickly gained the attention of traffic authorities. To verify that the detectors produce comparable or better data accuracy than existing systems on the market, traffic authorities and research organizations have conducted several evaluations. This document gives an overview of the latest major third party evaluation and its results.

The test was performed by the Nordic traffic authorities strategic research cooperation (NordFOU) on the E06 road in Klett, Norway. The three STMS vehicle detectors used in the test had an average detection accuracy of 99%, a classification accuracy of 95% (five class scheme), an average speed error of less than 1% and an average length error of -2.1cm.

1 Introduction

Since the introduction on the market in 2010, the possibility of more extensive and accurate traffic data collection combined with lower installation and maintenance cost quickly gained the attention of traffic authorities. To verify that the detectors produce comparable or better data accuracy than existing systems on the market, traffic authorities and research organizations have conducted several evaluations. This documents gives an overview of the latest major third party evaluation and its results.

In a continuous effort to further improve the accuracy of the detectors and to supply potential users with objective third party evaluations, Sensebit participate in tests conducted by traffic authorities and research institutions in different countries on a regular basis. As tests are completed, this document will be updated with new results, please make sure you have the latest version by contacting Sensebit.

1.1 About the STMS vehicle detectors

The STMS vehicle detectors utilize magnetometer technology to register high-resolution magnetic profiles of vehicles. They are installed in the road and allow users to conduct all traffic data collection remotely.

By analyzing the magnetic profiles, the vehicle detectors deliver the following parameters on a per vehicle basis:

- Timestamp with millisecond resolution
- Velocity between -200km/h and +200km/h with 0.1km/h resolution
- Vehicle classification (up to 15 classes)
- Length of vehicle, including possible trailer, with 0.1m resolution

All STMS vehicle detectors are built on the same technology platform and therefore deliver the same data accuracy for all parameters. Although all products have been evaluated in the tests described below, no explicit distinction is made between the different versions in this document.

2 Test results

The latest test of STMS data accuracy was conducted by the Nordic traffic authorities strategic research cooperation (NordFOU) between 27th and 28th of November 2012 on the E06 road at Klett, about 15 km south of Trondheim. The primary aim was to test various traffic measuring equipment to determine how accurately it classifies vehicles according to a range of vehicle classifications. A range of measuring equipment and reference equipment was used, including magnetometer based detectors, radar, pneumatic tubes, inductive loops and ANPR cameras. Three STMS vehicle detectors were used in the test, one in the southwest direction and two in northeast. [1]

2.1 Ability to measure traffic volume

In total, 3 451 vehicles drove in the southwest direction during the test. The STMS vehicle detector installed reported 3 418 (99%) vehicles. [1]

During the same period, 3 314 vehicles drove in the northeast direction. The two STMS vehicle detectors installed reported 3 276 (99%) and 3 277 (99%) vehicles. [1]

The variation in registrations between the two STMS vehicle detectors installed in the same direction was 1/3277 (0,03%). [1]

2.2 Ability to classify vehicles

Of the 3 451 vehicles driving in the southwest direction, 3 268 (95%) were correctly classified by the STMS vehicle detector in a five class system (*Light motor vehicle, Light motor vehicle with carry, Heavy motor vehicle, Heavy motor vehicle with carry, Other motor vehicles*). [1]

Of the 3 314 vehicles travelling in the opposite direction, 3 173 (96%) and 3 162 (95%) were correctly classified by the two STMS vehicle detectors in the same five class system. [1]

2.3 Accuracy of speed estimations

For all vehicles registered by the STMS vehicle detectors in the evaluation, the average speed error is below 1%. The absolute speed errors of the three detectors were -0,84km/h, 0,41km/h and 0,68km/h. [1]

The 85th percentile for speed errors for all three detectors is below +-4km/h. [1]

2.4 Accuracy of length estimations

The average length error of for the STMS vehicle detectors in the evaluation was -2.1cm. For all vehicles registered, 92% of them had a length estimation with an error smaller than 50cm. [1]

3 References

[1] NordFOU, *Analysis of measured data for the calculation of accuracy in vehicle classification and measurements of speed, axle spacing and vehicle length*, 2012.