SMART SIGN CONNECTIVITY FOR BETTER ROAD SAFETY

TEAM ID : PNT2022TMID42266

TEAM LEADER : MUKIL ARASI S (710019106030)

TEAM MEMBERS : NAVEEN KUMAR T (710019106302)

JAYAPRAKASH S (710019106018)

BALAA RUPENI S (710019106007)

DEPARTMENT : ELECTRONICS AND COMMUNICATION ENGINEERING

COLLEGE NAME : ANNA UNIVERSITY REGIONAL CAMPUS

COIMBATORE.

LITERATURE SURVEY

A literature survey or a literature review is that section which shows the various analyses and research made in the field of your interest and the results already published, taking into account the various parameters of the project and the extent of the project.

The following papers are studied in the following survey:

[1]Andrzej Czyżewski; A. Sroczyński; T. Śmiałkowski; Piotr Hoffmann

The objective of this paper is to present a practical project of intelligent road signs, under which a series of new products for the regulation of traffic is being created. The engineering part of the project, described in this paper, was preceded by a series of experimental studies, the results of which were described in another paper accepted for publication at the MTS-ITS conference

2019, entitled "Comparative study on the effectiveness of various types road traffic detectors". A new kind of intelligent road signs which will enable the prevention of the most common collisions on highways, resulting from the rapid stacking of vehicles resulting most often from accidental heavy braking. A range of products is being developed, including intelligent road signs: standing, hanging and mobile ones, displaying dynamically updated driving the speed limit, determined automatically, through an embedded electronic module, enabling multimodal measurement of traffic conditions. Solving a number of research and construction problems, such as: effective and independent of weather conditions traffic monitoring based on simultaneous analysis of several types of data representation, development of a method of calculating gradients and histograms of vehicle speed for various types of road situations or traffic topologies. Moreover, creating a platform for self-organizing reliable wireless connections among road signs equipped with innovative displays and power supplies and carrying out prototype tests are carried out. As a result, advanced conceptually products for increasing road safety for which there is a market demand are being prepared for future implementation.

[2] J. Kotus, A. Czyżewski, Counting and tracking vehicles using acoustic vector sensors, 176th Meeting of the Acoustical Society of America and 2018 Acoustics Week in Canada, Victoria, Canada,

A method is presented for counting vehicles and for determining their movement direction by means of acoustic vector sensor application. The assumptions of the method employing spatial distribution of sound intensity determined with the help of an integrated 3D intensity probe are discussed. The intensity probe developed by the authors was used for the experiments. The mode

of operation of the algorithm is presented in conjunction with noise characteristics produced by moving vehicles. The optimization of the algorithm is based on measurements of intensity of sound emitted by the vehicle under controlled conditions. A test setup was built for this purpose with the use of measuring devices installed along a road with varying traffic flow. Reference data on the number of vehicles and traffic directions were prepared employing a recorded video and a reference traffic analyzer operating in lidar technology. It is shown that the developed acoustic method may contribute to an increase of effectiveness of commonly used vehicle counting systems employing inductive loops or Doppler radars. [Project financed by the by the Polish National Centre for Research and Development (NCBR) from the European Regional Development Fund under the Operational Programme Innovative Economy No. POIR.04.01.04-00-0089/16 “INZNAK—Intelligent road signs...”.]

[3] K. Marciniuk, M. Blaszke, B. Kostek, Acoustic Road Monitoring, 12th International Road Safety Conference GAMBIT 2018 Road Innovations for Safety National and regional perspective, Gdańsk,,

The subject of this research is showing the performance of an automatic acoustic road monitoring system proposed by the authors. The main goal of the study is describing road traffic by means of an acoustic representation and testing effectiveness of traffic flow sensors. Evaluation metrics of the road conditions such as velocity of the traffic flow, its structure and weather condition are presented along with acoustic descriptors derived from the audio signal analysis. Accuracy of emergency vehicles pass by detection based on acoustic monitoring is also briefly described.

[4] van Flandern, T. C.; Pulkkinen, K. F. Low-precision formulas for planetary positions, Astrophysical Journal Supplement Series, vol. 41

Numerous modern applications have created a demand for low-precision (1 arc min) formulas for the positions of the sun, moon, and planets. With the power of a computerized formula manipulator which can handle algebraic and trigonometric expressions, the development of simple expressions for coordinates and elements from the existing analytic theories is now feasible. The paper presents the results of such developments in a form suitable for use with hand calculators, minicomputers, or microprocessors. The outputs are always in the form of series. The series are also available on punched cards or in the form of FORTRAN subroutines. The full-precision (1 arc sec or better) formulas with unlimited time validity are being developed. Several tables are included.

[5] Muhammed O. Sayin; Chung-Wei Lin; Eunsuk Kang; Shinichi Shiraishi; Tamer Başar

A game theoretical adversarial intervention detection mechanism for reliable smart road signs. A future trend in intelligent transportation systems is "smart road signs" that incorporate smart codes (e.g., visible at infrared) on their surface to provide more detailed information to smart vehicles. Such smart codes make road sign classification problem aligned with communication settings more than conventional classification. This enables us to integrate well-established results in communication theory, e.g., error-correction methods, into road sign classification problem. Recently, vision-based road sign classification algorithms

have been shown to be vulnerable against (even) small scale adversarial interventions that are imperceptible for humans. On the other hand, smart codes constructed via error-correction methods can lead to robustness against small scale intelligent or random perturbations on them. In the recognition of smart road signs, however, humans are out of the loop since they cannot see or interpret them. Therefore, there is no equivalent concept of imperceptible perturbations in order to achieve a comparable performance with humans. Robustness against small scale perturbations would not be sufficient since the attacker can attack more aggressively without such a constraint. Under a game theoretical solution concept, we seek to ensure certain measure of guarantees against even the worst case (intelligent) attackers that can perturb the signal even at large scale. We provide a randomized detection strategy based on the distance between the decoder output and the received input, i.e., error rate. Finally, we examine the performance of the proposed scheme over various scenarios.