

Road Traffic Information and Monitoring System

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Received 26 February 2013; Accepted 3 April 2014

(Technical note)

Abstract

The construction of new infrastructures has been more and more difficult to be implemented as space diminishes, the costs of building and maintenance increase, constraints related to high traffic develop, environment protection rules become strict as well as other requirements come into operation. This paper discusses issues related to mobility and safety concerning road traffic in our country now, issues that had to be dealt with earlier in other countries. The paper presents an application based on WEB technologies developed by the authors. The implementation of this application enables the author to find useful data with respect to the traffic in a certain geographical area at a given moment of the day. This kind of information can be used by the drivers in choosing a given or optimal route for the required period of time. The paper also addresses the road managers who could better manage the resources available for the information and monitoring of the road traffic. Statistical data concerning the most crowded areas in given time intervals can be provided, and the control and remote monitoring of the equipment necessary for the beneficiary can be improved.

Rezumat

Construcția de infrastucturi noi a devenit tot mai greu de realizat datorită lipsei de spațiu, a costurilor ridicate atât pentru realizarea cât și pentru întreținerea lor, a constrângerilor impuse de trafic, protecției mediului etc. Lucrarea de față vine în întâmpinarea problemelor de mobilitate și siguranță cu care se confruntă traficul rutier de la noi din țară, neajunsuri cu care țările mai dezvoltate au luat cunoștință înaintea noastră. În lucrare se prezintă, în linii mari, o aplicație bazată pe tehnologiile WEB concepută de autori. Prin implementarea acesteia utilizatorul poate obține informații utile despre trafic dintr-o anumită zonă geografică dată și într-un anumit moment al zilei. Astfel de informații pot fi folosite de către conducătorii auto în alegerea unui traseu dat sau cel optim, într-o anumită perioadă de timp. Se adresează și administratorului de drumuri, în grija căruia se află drumul, cu scopul de ai gestiona/administra resursele existente pe partea de informare, monitorizare a traficului rutier. Poate furniza date statistice cu privire la zonele cele mai aglomerate, pe anumite perioade de timp, dar în același timp poate să vină în sprijinul beneficiarului cu posibilitatea de a controla și programa de la distanță aceste echipamente.

Keywords: road traffic, congestion, real time, traffic monitoring

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1. Introduction

The growth of the vehicle fleet witnessed during the recent years as well as other economic and social factors led to the occurrence of mobility and safety problems for the road traffic. The need of solving these drawbacks has also led to more research in this field. The developments in the domain of information technology have contributed to the development of ITS (Intelligent Transport Systems). The ITS basic principle is relatively simple: it consists in adopting the real time traffic to the existing conditions. In order to make the principle active, two conditions need to be fulfilled: to have accurate information on the road network and to be able to rapidly react to the modifications occurring in traffic and to enable the driver to also react fast and optimally to the changes.

The term of Intelligent Transport Systems is a generic term used in the integrated software applications in the communications, control and data processing for the various transportation systems, as mentioned in the PIARC's ITS Manual, edition 2004 [1].

The notion of Intelligent Transport Systems was first used at the end of the 1990s and concerned several research programmes running in the 1980s, such as: PROMETHEUS or DRIVE in Europe, PATH or IVCS in the USA, AMTICS and RACS in Japan [2].

Together with the technological development in the field of information technology the possibility to have more control of the behaviour in traffic increases. The information can be provided to the traffic participants in a shorter time, almost instantly and more accurately. However, the less disciplined traffic participants can also be detected and identified by means of surveillance systems. This is, therefore, a chance to increase traffic discipline, to improve behaviour on the road, to improve road cooperation and to have participants more careful to orders and recommendations though the latter may not necessarily refer to personal benefits for them [3].

The system we propose in the present paper, **Road Traffic Information and Monitoring (IMTR)**, for motorways, European and national roads, is dedicated to finding and applying solutions to issues concerning traffic, its safety, the reduction of costs to minimum, the mitigation of traffic pollution, by means of up-to-date systems that guide and adjust traffic flows using real time information about the traffic. The paper will mainly focus upon the benefits of this system and will give less data on its design and achievement.

2. Presentation of the information and monitoring system

The present software application is dedicated to the common road user, i.e. the driver as well as to the road manager who is in charge of road maintenance in good conditions. It makes use of real time and stored traffic related data, and displays the situation of the traffic in a certain section of the road providing opportunities to choose optimal routes. The national road and motorway network manager also receives information in real time from the equipment operating in the network and can program part of the instruments.

The software has two distinct parts: the user graphical interface (GUI) and the database (DB). The graphical interface is developed in Romanian and is user friendly and quite easy to handle. The application can access already existing databases, on condition that there is a subscription paid to a mobile telecommunications operator, or it can collect in real time, data from the instruments mounted along a route or in an area. In this way, the application can:

- collect traffic and weather related information motorways, national and European roads passing through Romania from the instruments mounted along the roads;

- download weather related data for the selected roads from "weather.com" and traffic incidents from "infotrafic.ro", until it will form its own database;
- the relevant information and key parameters are sent from the HTML (HyperText Mark-up Language) source files for weather and traffic to the DB;
- for traffic data collection,
 - if singular, a new link to DB is needed;
 - in two copies, old input data are updated with the new information.
- Collection of weather related data.

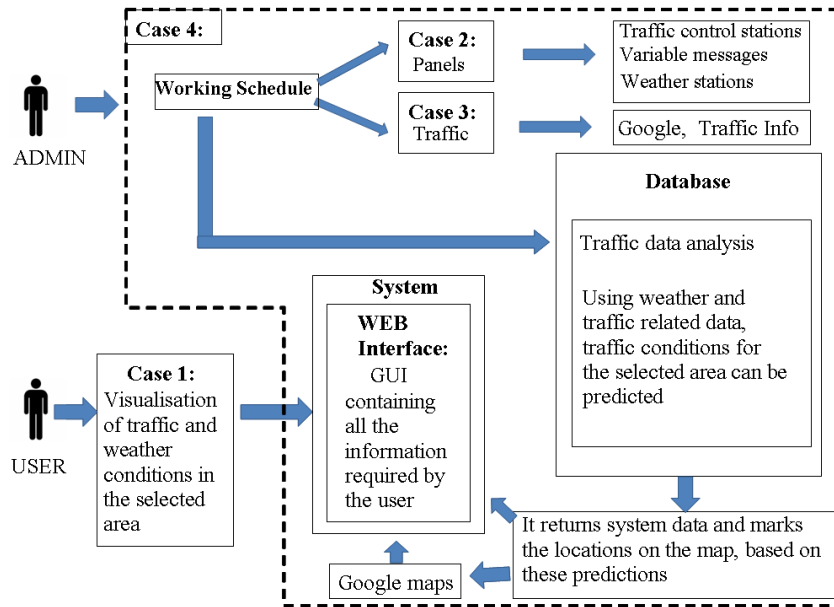


Figure 1. System diagram.

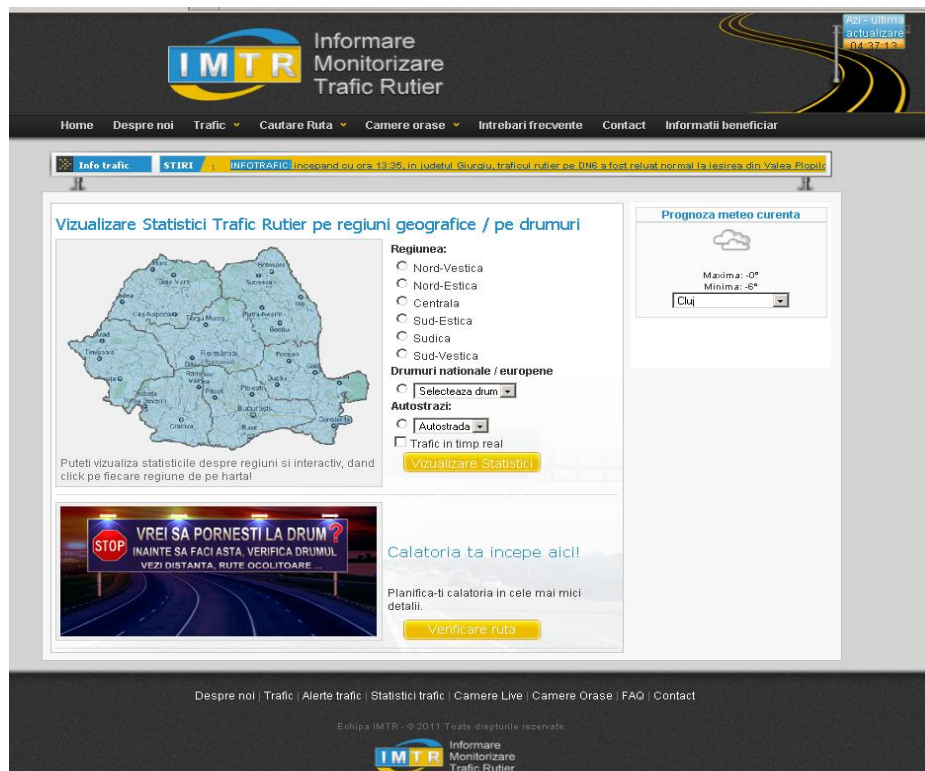


Figure 2. IMTR main page.

The IMTR main page shows the general image of the software (see also Figure 2).

The paper will present further on only some of the most valuable facilities given by the application. As mentioned earlier, the application can be approached in two ways, one by the user accessing the page and one by the road network manager. The information for the road manager has a private content. In Figure 3, one can see the way in which the information for the traffic can be found in real time, for a section of the road. The information is received by selecting the radio key "Drumuri nationale/europene", selecting then the road of interest intersecting the vertical menu and making a click on "Vizualizare statistici" so that on a Google map, data is given for the selected road. The information is under the form of icons, to which texts concerning the incident is detailed if the icon is clicked on.



Figure 4. Recent traffic events.

Figure 4 presents on key "Traffic", the option "Alerte trafic" the most recent events/news that can disturb the road traffic in certain sections of the roads. The data can also be found in the yellow field in permanent motion. A click on the main message opens a new window which displays the full message.



Figure 4. Recent traffic events.

The private part of the software application is safe and can be accessed from the key "Informatii beneficiar", using simply the username and password, as shown in Figure 5.



Figure 5. Private data access.

The private part of the software enables an improved management of the resources regarding the information and monitoring of the road traffic and the remote control of the equipment used, too. Thus, Figure 6 shows the manner in which the beneficiary can have access to the information received from various instruments in the field, such as radars and traffic control and analysis stations. The information is attached to the key "Control Traffic" in "Vizualizare Control trafic" and can be found after selecting date, and kilometre at which the equipment is situated. The user, for example, can see whether the vehicle passing through the portion of the road exceeded or not the maximum axle load allowed.

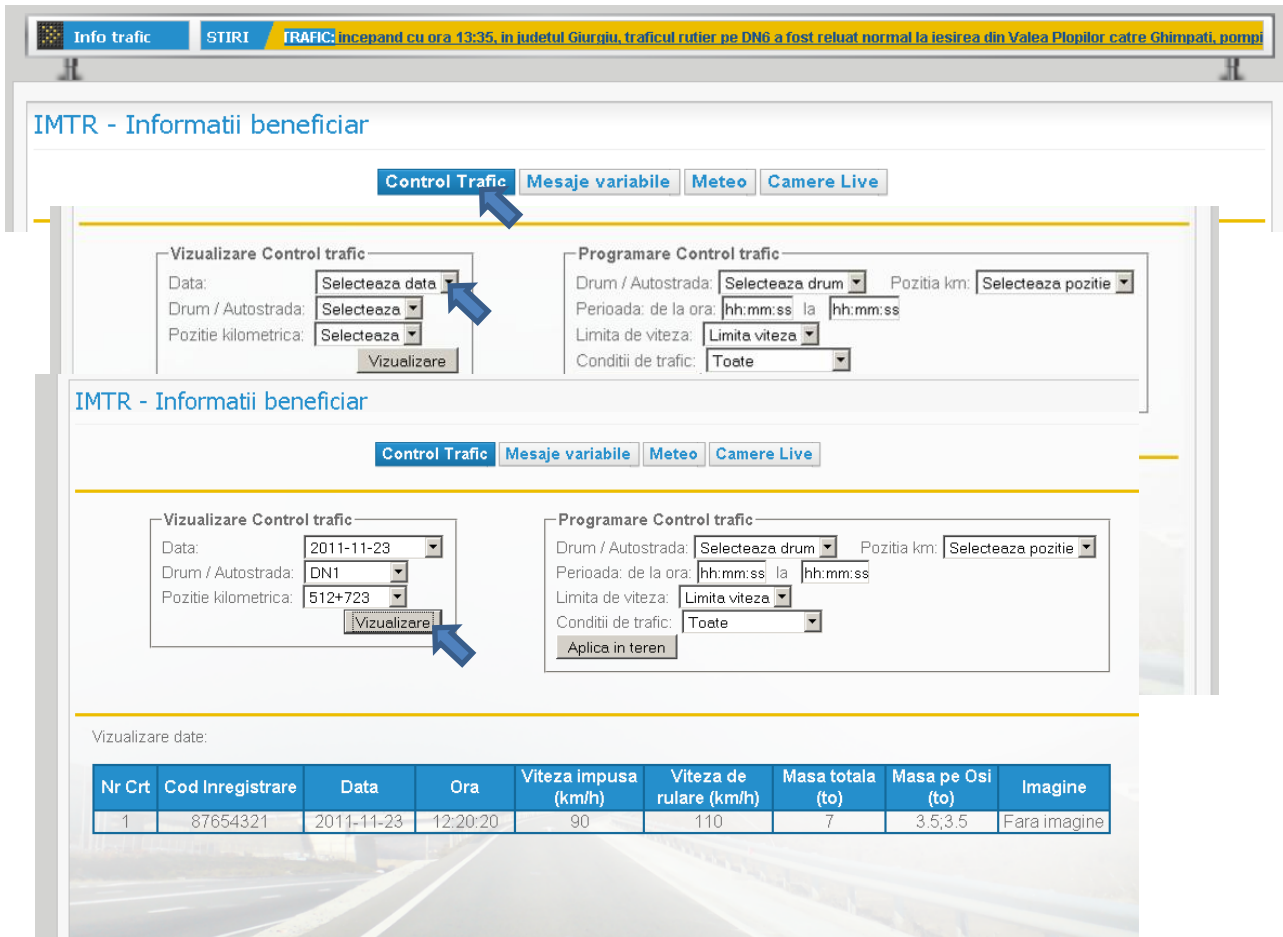


Figure 6. Visualisation of traffic control data.



Figure 7. Traffic control – speed limit programming.

In the same window, Figure 7, under "Control Traffic" is also included the "Programare Control traffic", a section that enables the beneficiary to establish a speed limit in a certain portion of the road, with the time interval for the constraint fixed considering weather conditions too, and the information can be later seen in an individual window coming after making a click on "Aplica in teren".

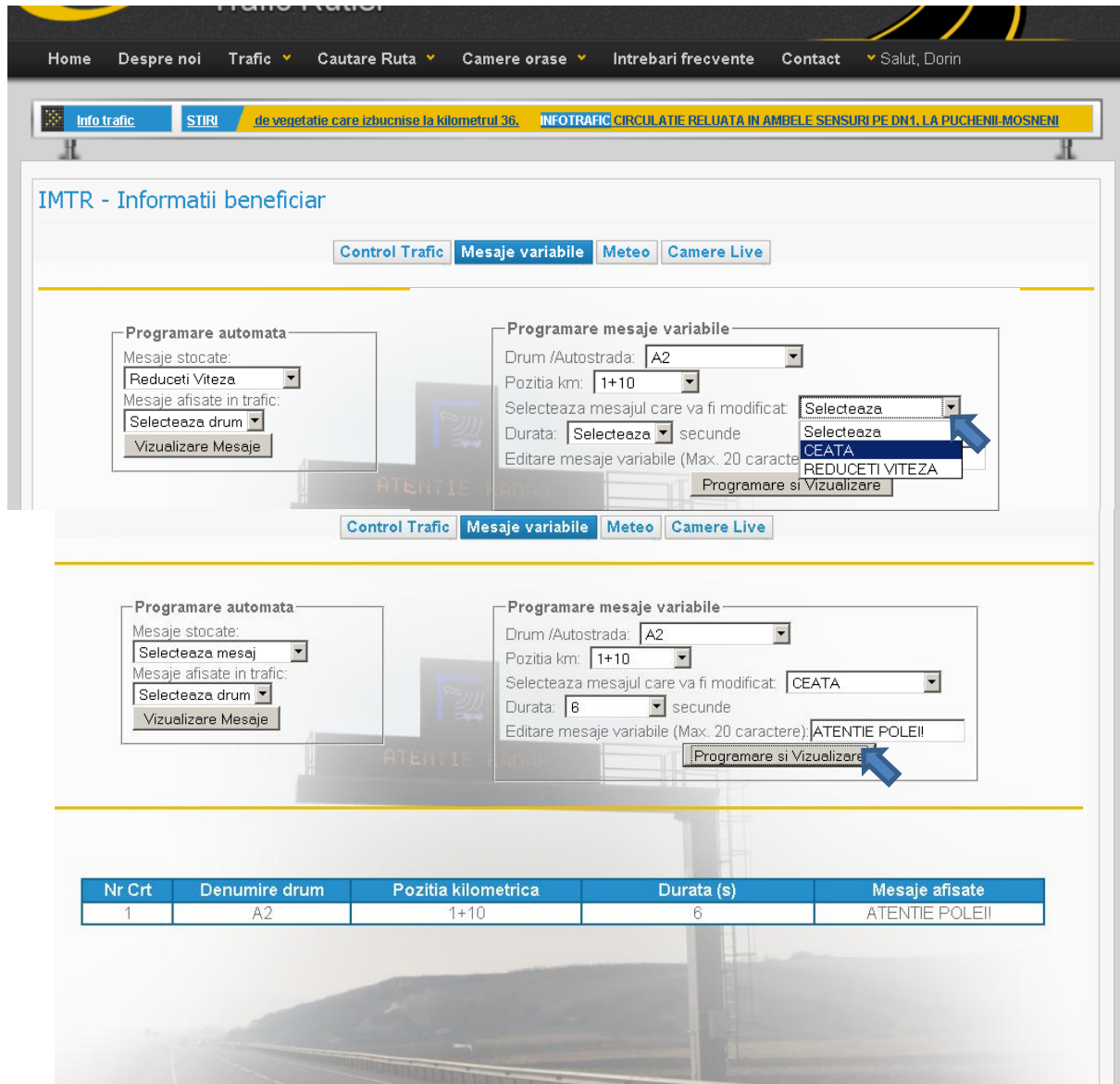


Figure 8. Visualisation and programming of variable messages.

The presentation in this paper does not include all the details, and all the data, though it underlines some of the facilities it can offer.

The database is conceived and designed so as to be readily adaptable to the new equipment acquired as well as to an increased number of requirements. The software is based upon modern information collection, processing and distribution methods and technologies.

For the data collection, monitoring and information equipment to be efficient, it is necessary to be implemented in a larger number of road networks, a number that has to increase as compared to the present situation (For instance, at present, an area manager has less than 20 portals and consoles, half of them are only message displays and they cover over 2,500 km of rods).

3. Conclusions

IMTR software can provide real time information about the automated location of the vehicle in time and space. It also includes techniques to identify the vehicle and to visualise it also giving data on its speed and axle load.

With this software, a remote control for equipment running in the area can also be provided, a limited speed for a portion of the road being made available as well as a change/addition of variable messages in a certain display interval being possible.

Following the implementation of the proposed software, named IMTR, the main requirements of the users can be put into practice: real time information, increased traffic safety, improved comfort, better quality of services, energy saving, environment protection, all according to the policies in the European Union.

4. References

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