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RESEARCH ON MANAGING OF URBAN TRANSPORTATION FLOWS BASED ON UAV PLATFORMS

ABSTRACT

This work analyzes a possibility of use of unmanned aerial vehicles in managing of urban transportation. Here are presented some basics used to prepare project proposal for research project under bilateral agreement between Serbia and China.

INTRODUCTION

Intelligent Transport Systems utilize information and control technology to assist drivers, dispatchers and other operators in their operations for providing fast, efficient, safe and environmentally friendly transport. The fact that the European Parliament adopted Directive 2010/40/EU of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems is an evidence of the significance of the issue. The directive points out that the increase in the volume of road transport is the primary cause of increasing congestion of road infrastructure and rising energy consumption, as well as a source of environmental and social problems. The response to those challenges is in "innovation, which will have a major role to play in finding appropriate solutions".

A prerequisite for introducing of an intelligent system is the availability of precise data about the traffic and road conditions. With the rapid development of urban transport traffic conditions are becoming more complex and access to cheap information with wide coverage will be more and more needed.

The current systems rely mainly on ground-based spot devices and mobile devices. Spot devices usually have a fixed location and collected data reflect the traffic conditions only at specific locations, and high limitations are common.

Therefore, Unmanned Aerial Vehicles (known with their easy maneuvering, great flexibility and relatively low costs of operation) can be considered as a great aerial sensor for traffic data collecting. They can provide bird's eye view over a route or a large area, and provide observation of traffic flow formation and dissipation.

OBJECTIVES OF THE RESEARCH

The objectives of the research efforts are: to create methodology how to use UAV to register city traffic; to assess how moving objects over transportation corridors can be extracted and how their velocity can be estimated; to find optimal way to connect collected photos and videos with geographic positions of recorded vehicles; to prepare conditions to start work on creating a model of intelligent city transport system;

RESEARCH PROBLEM ACTUALITY

Crowds in city traffic are an everyday occurrence and a big problem especially in big cities. The average speed of vehicles is very low, ranging from 2.7 km/h in Manhattan downtown to 35 km/h in Dublin. For example, the average vehicle speed in

Beijing and in New York is 12 km/h, in London 19 km/h, and in Berlin 24.2 km/h. If we bear in mind that these are medium speeds of the vehicle during the day, and that the speeds in the rush hours, or in the case of an accident on the street, are much lower, it is clear how important better regulation of traffic in cities is. Any vehicles stopping means additional emission and additional environmental pollution.

Due to the lack of appropriate equipment for the registering of number of the vehicle in motion on the streets, in the practice were occasionally performed counting of vehicles at certain intervals, or stationary video surveillance equipment was used. The use of radio-controlled unmanned aircrafts and multi-copters brought new possibilities for traffic monitoring. Multi-copters are inexpensive multi-rotor platforms, but they have major limitations in terms of the amount of equipment they can carry and their control range. Unmanned aircrafts are able to carry more equipment, move on higher altitudes, and can cover larger areas.

The theme is very topical. In recent years, many specialized scientific conferences (ICUAS) on the use of unmanned aircrafts for the purpose of collecting data on traffic in cities are held. In the section Bibliography, some of the works in this field has been pointed out.

EXPECTED RESULTS

They can be summarized as follows:

a. Getting results about the opportunity and expedience of applying the UAV technology to promote intelligent transport system efficiency and reliability;

b. Research of the reliability of the main components applied in the considered model of the intelligent transport system, and the possibility of application of this system in the two countries.

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