

ABSTRACT

The thesis is presented in 84 pages. It contains 2 appendixes and bibliography of 41 references. 42 figures and 20 tables are given in the thesis.

Topic relevance. To date, in the world there is a significant increase in interest in the creation of artificial intelligence. Already planned and already partially introduced systems that control the car without the participation of the driver. The main element of these systems is the analysis of the road environment, which is mainly carried out using a pair of stereo cameras. To study the positions of objects, their parameters are used methods of photogrammetry, namely stereophotogrammeter. With it, you can estimate the distance to the objects of the environment, to find out the coordinates of the object in three-dimensional space. Just knowing the distance to the objects surrounding the car, you can correctly decide on the further movement of the car, correctly manage the vehicle, the ability to predict the further movement of objects and adjust their own trajectory of motion.

Thesis connection to scientific programs, plans, and topics. The thesis was prepared according to the scientific research plan of the Mathematical Methods of System Analysis Department of the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute.”

Research goal and objectives. The goal of this thesis is to develop a method for evaluation the position of objects of the road with photogrammetry methods.

To accomplish this goal, the following objectives were reached:

- analyze photogrammetry method;
- analyze main problems of the processing of photographs for disparity calculation;
- develop a method for depth calculation of the road environment;

– develop a system for depth map generation of the road environment utilizing stereo pairs.

Object of research is road environment.

Subject of research is photogrammetric method.

Methods of research. To solve the task, the following methods were used: methods for stereophotogrammetry (for developing a model for mapping distances); methods of optimization (to provide the necessary accuracy of the chosen model); methods of algorithm theory and programming (for software implementation of developed algorithms); methods of probability theory and mathematical statistics (for evaluation of the quality of the proposed model).

Scientific contribution consists of the following: the model of the road environment, which, in contrast to the existing, more accurately calculates the distance to surrounding objects.

Practical value of obtained results. The proposed method can be used as a driver assistant or for self-driving cars. The developed method and software allow you to quickly and precisely receive a depth map of the road environment.

Publications. The results of the dissertation are presented in the international scientific journal.

PHOTOGRAMMETRY, DEPTH MAP, DISPARITY, CONVOLUTION NEURAL NETWORK, CORRELATION LAYER, ENCODER-DECODER