

Master Thesis
Subsystem for Crowd Simulation in a Confined Space

ABSTRACT

Master thesis: 71 p., 16 pictures, 1 application, 18 links.

Topicality. In modern society, the problem of the displacement of large masses of people in the premises is very relevant. Modeling and predicting their behavior in these conditions is a very important task in the context of designing buildings and organizing mass events in terms of safety and comfort. The analytical solution of this problem is difficult not only because of the complexity of mathematical models, but because of the large number of unknown parameters (mood, temperament, psychic stability of each person) and external forces.

Computer simulation of crowd in a limited space is the most effective way to analyze people's behavior.

However, due to the peculiarities of the implementation of the agent approach, task of calibrating the parameters of the mathematical model, which is responsible for the behavior of agents, arises.

Relationship of work with scientific programs, plans, themes. The work was carried out at the Department of Automated Information Processing Systems and the Office of the National Technical University of Ukraine "Kyiv Polytechnic Institute of Igor Sikorsky " within the theme " Creation of simulation means for discrete-event systems". State registration number 0117U000923.

The purpose of the study is to calibrate the mathematical model of the simulation of the behavior of the crowd.

To achieve the goal, you must accomplish the following tasks:

- review the existing methods of crowd dynamic modeling;
- carry out a comparative analysis of various methods and approaches of modeling of the crowd;
- develop an effective mathematical model of parameters calibration of the crowd modeling subsystem;

- collect information about emergency events involved the movement of a large number of people;
- perform the analysis of the obtained results.

Object of research - behavior of a large number of people in a confined space.

Subject of research - the parameters of the mathematical model of the modeling process of a large number of people.

The research methods used in this paper are based on the methods of the mechanical approach of crowd dynamic modeling.

The scientific novelty of the obtained results is to develop a method for calibrating the mathematical model of the behavior of a large number of people in a confined space for more precise modeling and creation of a software product that will be based on the aforementioned mathematical model.

Publications. Materials of the work will be published in the international scientific journal "Actual problems of automation and information technologies" №2018 / 12 and were presented at the VIII conference "Scientific Ukraine: problems of the present and future of the future" and "Informatics and computer technology-IOT-2018". Also, the thesis of this work was submitted to the conference "Mathematical and Simulation Modeling Systems" in 2017.

MODEL, CROWD, PHYSICAL MODEL, CROWD DYNAMICS, FIRE SAFETY, INVERSE MODELING, CALIBRATION OF THE MATHEMATICAL MODEL, INFORMATION SYSTEMS.