DEVELOPMENT OF COMPUTER GAME OF THE SHOOTER GENRE BASED ON UNREAL ENGINE 4

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Relevance. It's no secret that video games have firmly taken their position in the modern entertainment industry. There are attempts to distinguish computer games as a separate area of art, along with theater and cinema. It was the game development process that gave impetus to the development of robotics, architecture, modeling of physical processes, navigation systems and other industries. Now this business can be not only interesting, but also profitable, because there are plenty of examples in history.

The first primitive computer and video games were developed in the 1950s and 1960s. They worked on platforms such as oscilloscopes, university mainframes, and EDSAC computers. Nowadays, games are created practically on any device, and development companies have more than $ 1 billion in profits from creating video games.

The object of the research project is the development of a bulk virtual reality with the processing of a game mechanic, and the subject of research - conceptual, polygonal, functional and computer simulation.

The purpose of the study - the development of computer games in the genre shooter Unreal Engine 4 based on mathematical methods.

Despite the versatility of development, the main manipulations associated with the collection of material into a single structure, will be executed with the engine Unreal Engine 4, which allows the ability to write code in C ++, or its analogue - Blueprints, which describes the logic programs and created some scene materials. As a result, this system not only gives the skills in programming, but also the understanding that logic needs to be built competently, optimized and thought out. It also develops logic in the field of modeling and processes.

Realization of the main task requires the use of methods and models of programming and mathematics. Of these, one can distinguish:
- behavior tree;
- state machine;
- Vornoi diagram;
- inheritance;
- interpolation

Applicable methods. The scene actors are animated using a state machine model, smoothing movements and motion are achieved by interpolation, and the module responsible for intelligent decision making is implemented through the behavior tree.

Results. The result of the project is a game containing a detailed environment consisting of medium and low poly textured models of the

environment, a flexible controller of the user's character, the artificial intelligence of the enemy's character and other NPCs. Various game mechanics have been worked out: bullet ballistics, movement system, combat system without weapons, stealth mode, cover system, movement with hook-cat, object destruction and parkour.

Pic. 1. Game demonstration

Findings The use of mathematical and quantitative methods to substantiate decisions in any sphere of human activity is subject to discipline called the "research of operations". This work is a vivid example, because in order to achieve the goal, namely the creation of a three-dimensional virtual reality, a series of actions in the field of mathematical modeling was carried out, in the construction of heuristic methods and models in the search for optimal solutions. In this work, the reasons for the optimality of the choice of a particular model were given. To a greater degree, the optimality depends on the volume of the written code (the less code, the better), because we are basically doing programming. However, this is not the main criterion of quality. If we take, for example, the above-described structural model, then its advantage over other models was that adding elements to the system does not need to spend additional resources: to enter new variables or create new classes, and also heavily loads the virtual reality reproduction device. In order to minimize the load on the device in the work, it was decided to draw graphically only those objects that are in the field of view of the cameras fixed by the character and use low-polygonal modeling of objects.

Losses in the graphic of virtual reality lead to losses in realism, which is a serious problem for immersion in the atmosphere. This is the main disadvantage of the work performed. From the advantages of work I would like to emphasize that since the purpose of the study was to demonstrate the use of a mathematical apparatus in the development of the virtual world, the goal was fulfilled, and the completion of defects is not a difficult problem.