

Abstract

Development of new technologies is based mainly on analysis, improvement of existing tools and finding innovative solutions. Unfortunately, due to financial constraints, as well as the risk of negative effects, it is not recommended to implement the idea without preparation. In order to significantly reduce the risks using tools offered by simulation environments should be considered. The computer forgives mistakes made at the design stage. It can also investigate the matter with a great precision and answer most of questions. In addition it has the possibility of optimizing processes so as to obtain the final effect maximized.

The thesis is dedicated to the development of the inverted pendulum transporter. The project is based on a well-known problem of a two-dimensional system consisting of an inverted pendulum mounted on a movable platform. In addition, the transporter is equipped with a drive motor controlled by voltage. The main task of the system is to keep the pendulum in an unstable equilibrium and respond to interferences from the environment. In this project the system is transferred into a three-dimensional world in which two independent systems, associated with the horizontal directions of the principal axes, are integrated into a unit. As a result, the movement trajectory can be applied to the system and the pendulum should be transported according to the given trajectory. An additional element of the project is dealing with the wind force. The transporter have to respond on the interference so as to minimize the risk of losing control of the pendulum.

The prepared solution has not reflected in the technique yet, however it perfectly finds itself in the world of simulation. The project allows for in-depth analysis of system's dynamics, as well as it can be used in computer games as a virtual vehicle with a non-trivial control.

The aim of the thesis is to build a simulator for the given problem. Moreover, it gives the possibility of in-depth analysis of a simulation process to develop the optimal solution. This document is a summary of the whole work. It illustrates the system model and the software architecture. In addition, it presents the results of the tests and the conclusions drawn from them.