

Computer Based Educational Environment Simulation for Digital Circuit and Computer Networks

Shirshak Gurung , Raunak Ghimire , Anil Guragai , Sang Doma Tamang , Dipeka Sharma , Sumit Rai

Abstract

In this modern era, we are surrounded with technology which has aided us to perform many activities whether simple or complicated. Similarly, in the field of teaching learning, technology has major roles including learning methods through simulation. Simulation means an imitation of any process or action. As this project is multimedia based, development of this project is done with software like Unity 3D and Blender. This project has the concept of Virtual Learning Environment (VLE) which is automated with programming language like C#(Sharp). A virtual learning environment (VLE) is a set of teaching and learning tools designed to enhance a student's learning. Ideas was developed mainly focusing on lab experiments done in college.

Keywords: Unity 3D, Blender, Visual Studio, C#, Simulation

1. Introduction

Technology has surrounded our environment in probably all the steps. It has made life simpler and easier, in every field. Technology can simplify many works of businesses, medical works, research, education etc. In the field of education, even the simple gadget like calculator is a boon of technology. Computer Based Educational Environment Simulation deals with a virtual environment that is provided with a platform where learner can practice and learn their lab experiments related to digital circuit and computer networks. This project is developed basically with two software tools, unity and visual studio. With the support of Unity, 3D environment is built within simulation software and working is developed using visual studio. Although there is basic hardware equipment for this project, there is a more need of multimedia software.

1.1 Unity 3D

Unity is a cross-platform real-time engine developed by Unity Technologies, first announced and released in June 2005 at Apple Inc.'s.

Unity3D is a prevailing cross-platform 3D engine and a accessible development environment. Unity would notice anybody who wants to easily create 3D simulation and applications for mobile, desktop, the web, and consoles.

1.2 Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs, as well as websites, apps, we services and mobile apps.

1.3 Visual Studio Code

Visual Studio Code is a source-code editor developed by Microsoft for Windows, Linux and macOS. It contains maintenance for debugging, embedded Git control, syntax highlighting, intelligent code completion, snippets, and code refactoring.

2. Data Collection and Assets Designing

A catch-all term stating to all tools needed to productively ample a project. In terms of web design and simulation development, "assets" typically refer to the text content, graphics, photographs, videos, audio files, and databases. Asset designing is aided through 3D designing software Blender which include surface, walls , tools , camera position.

2.1 Visual Graphic Design

Graphic design is the procedure of visual communication and problem-solving through the use of composition, photography and illustration. The field is reflected form of a subset of visual communication and communication design.

2.2 Blender Foundation

The Blender Foundation is a public organization in control for the development of Blender, an open source 3D content-creation program. It provisions the completeness of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation. Meanwhile the inaugural of the source, Blender has knowledgeable important refactoring of the first codebase and main add-ons to its feature set.

2.3 C#(sharp) Programming Language.

C# is a general-purpose, multi-paradigm programming language including strong typing, lexically scoped, imperative, declarative, functional, generic, object-oriented, and component-oriented programming disciplines.

3. Literature Survey

[1] Computer Simulation Complex for Training Operators Of Handling Processes ,Rustam Fayzrakhmanov, Ivan Polevshchikov, Aydar Khabibulin Department for Information Technologies and Computer-Based System, Perm National Research Politechnical University, Perm, Russia. Proc. of the 5th International Conference on Applied Innovations in IT, (ICAIIIT), March 2017

This paper is dedicated to the development of the architecture of computer training simulation complexes. (TSCs) aimed at training operators of managing machineries , models and operation algorithms of their workings. This introduce a unique training complex, Ganz TSC, for portal crane operators, developed according to the models and methods proposed. It demonstrates its effectiveness in the training process. In specific, their case study demonstrates that operators qualified with the usage of Ganz TSC transfer cargoes 27% earlier on usual, conserving the obligatory class of work.

[2] Primary School STEM Education: Using 3D Computer-based Virtual Reality and Experimental Laboratory Simulation in a Physics Case Study Diana Bogusevski, Marilena Bratu, Ioana Ghergulescu, Cristina Hava Muntean and Gabriel-Miro Muntean Dublin City University, Ireland; University of Bucharest, Romania; Adaptemy, Ireland National College of Ireland, Ireland, April 2018

An educational application, Water Cycle in Nature, that focuses on physics phenomena such as vaporization and

condensation, was employed in a small-scale pilot carried out in a primary school in Ireland, a portion of the European Horizon 2020 NEWTON project. 3D immersive computer-based virtual reality and experimental laboratory simulation are share of the particular application. 58 primary school students got involved in this model. The aim of the learning presented in this paper was to evaluate the learner involvement and usability of the Water Cycle in Nature application. The results analysis shows that most children found the application useful and enjoyable in learning the presented topics.

[3] Simulation of an Organization of Spatial Intelligent Agents in the Visual C#.NET Framework. Reza Nourjou and Michinori Hatayama International Journal of Computer Theory and Engineering, Vol. 6, No. 5, October 2017

This paper examines the simulation of a public of spatial intelligent agents, an significant subject for the operation and assessment of dispersed algorithms.

The investigation query is how to simulate this organization using Visual C#.NET.

[4] Understanding emergency care delivery through computer simulation modelling. Lauren F. Laker, PhD, Elham Torabi, PhD, Daniel J. France, PhD, MPH, Craig M. Froehle, PhD, Eric J. Goldlust, MD, PhD, Nathan R. Hoot, MD, PhD, Parastu Kasaie, PhD, Michael S. Lyons, MD, MPH, Laura H. Barg-Walkow, PhD, Michael J. Ward, MD, PhD, MBA and Robert L. Wears, MD, PhD ACADEMIC EMERGENCY MEDICINE • February 2018, Vol. 25, No. 2

Academic Emergency Medicine assembled a agreement session titled, “Catalyzing System Change through Health Care Simulation: Systems, Competency, and Outcomes.” This article, a creation of the getaway conference on “understanding complex interactions through systems modeling,” discovers the part that computer simulation modeling can and must show in research and development of emergency care delivery systems.

This article deliberates zones vital to the practice of computer simulation modeling in emergency care research. The four central methods to computer simulation modeling are labelled (Monte Carlo simulation, system dynamics modeling, discrete-event simulation, and agent-based simulation), sideways with difficulties agreeable to their use and pertinent instances to emergency care. Also conversed is an outline to accessible software modeling platform and how to discover their use for study, along with a study program for computer simulation modeling. Through this article, our objective is to improve acceptance of computer simulation, a set of procedures that embrace inordinate potential in addressing emergency care organization and enterprise challenges.

[5] A Unity 3D-based Interactive Three-Dimensional Virtual Practice Platform For Chemical Engineering, Shu-Guang Ouyang ,Gang Wang, Jun-Yan Yao, Guang-Heng-Wei Zhu, Zhao-Yue Liu, Chi Feng, Computer Applications In Engineering Education 26 (1), 91-100, 2018

This paper presents an communicating Unity3D-based three dimensional virtual preparation platform used for chemical

engineering ,which is envisioned to provision the chemical engineering scholars in their manufacture training .The actual Chemical plant units are re-formed in the virtual environment of the scheme. The system offers users with two kinds of walkthrough modes, demo of the construction and process principle of some main equipment as well as the functioning purposes of location up some main pumps and valves so as to reinforce the learners sympathetic pf the chemical process and train their operative aptitude. In addition, its virtual dealing of emergency can aid consciousness of the learners and nurture their skill to retort to unforeseen emergency.

4. Methodology

As this is a multimedia based project,some multimedia software's like 3D max ,unity 3D are used for designing and development of this project.Fig(8.1) shows the proposed methodology of the project.

Step1: Collect all the data of laboratory syllabus,tools,kits and their workings.

Step2: For designing and development of this project we need Engine(Unity 3D).

Step3:We have to design surface,tools,kits,LAN's using Blender

Step4: we have to develop the button configuration,movement of the object and saving and loading function using Visual Studio.

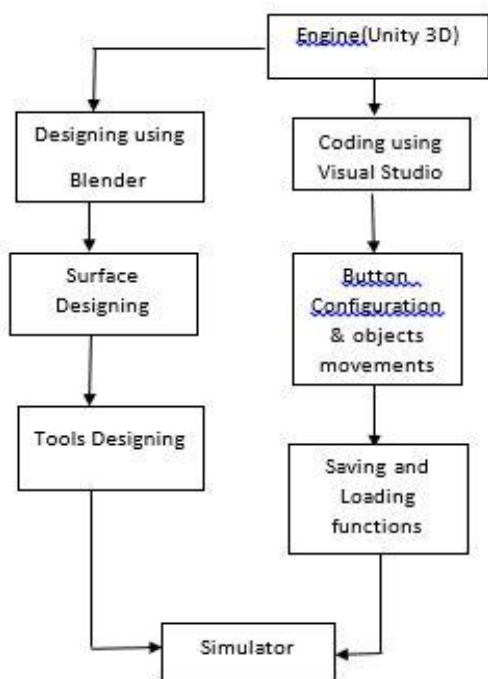


Fig 1: Proposed Methodology

Conclusion

Development of this project can establish a method for easy learning and virtual environment for students which also enhance interest in learning. As there is less information about these simulators on different institutions, it will also become a new trend and a profitable outcome from customer's view.

References

- [1] Computer Simulation Complex for Training Operators Of Handling ,Rustam Fayzrakhmanov, Ivan Polevshchikov, Aydar Khabibulin Department for Information Technologies and Computer-Based System, Perm National Research Politechnical University, Perm, Russia. Proc. of the 5th International Conference on Applied Innovations in IT, (ICAIT), March 2017
- [2] Primary School STEM Education: Using 3D Computer-based Virtual Reality and Experimental Laboratory Simulation in a Physics Case Study Diana Bogusevschi, Marilena Bratu, Ioana Ghergulescu, Cristina Hava Muntean and Gabriel-Miro Muntean Dublin City University, Ireland; University of Bucharest, Romania; Adaptemy, Ireland National College of Ireland, Ireland, April 2018.
- [3] Simulation of an Organization of Spatial Intelligent Agents in the Visual C#.NET Framework. Reza Nourjou and Michinori Hatayama International Journal of Computer Theory and Engineering, Vol. 6, No. 5, October 2017.
- [4] Understanding emergency care delivery through computer simulation modelling. Lauren F. Laker, PhD, Elham Torabi, PhD, Daniel J. France, PhD, MPH, Craig M. Froehle, PhD, Eric J. Goldlust, MD, PhD, Nathan R. Hoot, MD, PhD, Parastu Kasaie, PhD, Michael S. Lyons, MD, MPH, Laura H. Barg-Walkow, PhD, Michael J. Ward, MD, PhD, MBA and Robert L. Wears, MD, PhD ACADEMIC EMERGENCY MEDICINE • February 2018, Vol. 25, No. 2
- [5] A Unity 3D-based Interactive Three-Dimensional Virtual Practice Platform For Chemical Engineering, Shu-Guang Ouyang ,Gang Wang, Jun-Yan Yao, Guang-Heng-Wei Zhu, Zhao-Yue Liu, Chi Feng, Computer Applications In Engineering Education 26 (1), 91-100, 2018