

Designing of Virtual Environment for Analysing Drivers Behaviour

Akanksha Joshi¹, Dr. Shubhangi Giripunj²

¹Department of Computer Science & Engineering, G. H. Raisoni College of Engineering

²Professor, Department of Electronics Engineering, G. H. Raisoni College of Engineering

Abstract: *Virtual Environment is a term that mainly focuses on the designing of graphics which will be integrated with the hardware. This term can be defined as the environment which is designed with the help of software and which will be controlled with the help of scripting languages. The main use of the virtual environment is for examining the behavior of moving vehicles. VE was designed for ships, flights. This paper mainly focuses on designing a virtual environment for car driving simulator using Game Engine called Unity. This VE will be used for a different kind of experiment and analyze a different kind of driving pattern of the driver in different scenarios. With the help of Unity software the virtual reality can be designed. The scripting language is used to provide the control to this Virtual Environment. The engine behind this virtual environment will interact with the hardware and also the user. Different hardware component sends different signal or commands and according to this virtual environment is moved or affected. With the help, real time input from hardware simulator system will examine driver's behavior. Software simulator must be properly synchronized with hardware to generate a real-time result and real time effect.*

Keywords: Virtual Environment, Drivers Behavior, Game Engine, simulator, virtual driver, graphics

1. Introduction

The machine is made public as a bug or an ardent device that simulates some aspects of a real life situation and will be manipulated to seem at the outcomes of assorted assumptions or actions, whereas not exposing the experimenter to any danger or risk.

1.1. What is a virtual reality?

Virtual reality (VR) usually refers to laptop technologies that use the package to get realistic pictures, sounds associated alternative sensations that replicate a true atmosphere (or produce a fanciful setting), and simulate a user's physical presence during this atmosphere, by enabling the user to move with this house and any objects delineated. There in mistreatment specialized show screens or projectors and alternative devices.[1] VR has been outlined as "...a realistic and immersive simulation of a three-dimensional atmosphere, created mistreatment interactive package and hardware, associated toughened or controlled by movement of the body" or as an "immersive, interactive expertise generated by a computer". an individual mistreatment video game instrumentality is often ready to "look around" the fictitious world, move regarding in it and move with options or things that square measure delineated on a screen or in spectacles.[2] Virtual realities unnaturally produce sensory experiences, which may embody sight, touch, hearing, and, less normally, smell. Most 2016-era virtual realities square measure Displayed either on a laptop monitor, a projector screen, or with a video game receiver (also known as head-mounted show or HMD).[3] HMDs usually take the shape of head-mounted spectacles with a screen ahead of the eyes. Some simulations embody further sensory data and supply sound through speakers or headphones. Video game truly brings the user into the digital world by removing outside stimuli. during this method, the user is alone specializing in the digital content.

Virtual reality atmosphere is often captured mistreatment 360° stereoscopic spherical video and 360x360 surround sound from skilled VR video cameras. The users will emerge within the video game atmosphere mistreatment head-mounted displays. Some advanced perception systems within the 2010s currently embody tactile data, usually called force feedback in medical, video gambling and military coaching applications.[4] Some VR systems employed in video games will transmit vibrations and alternative sensations to the user via the sports controller. Video game conjointly refers to remote communication environments which give a virtual presence of users with through telepresence and tell existence or the utilization of a virtual object (VA), either through the utilization of ordinary input devices like a keyboard and mouse or through multimodal devices like a wired glove or omnidirectional treadmills. The immersive atmosphere are often like the \$64000 world so as to form a lifelike experience—for example, in simulations for pilot or combat coaching, that depict realistic pictures and sounds of the planet, wherever the traditional laws of physics apply (e.g., on the wing simulators), or it will dissent considerably from reality, like in VR video games that happen in fantasy settings, wherever gamers will use fictional magic and psychic phenomenon powers[5].

1.2. What's a Virtual Driver machine

A driving machine is employed as an associate auxiliary device within the coaching of driving skills. it's composed of a laptop that is usually known as a panel, a driving cabin wherever actual hardware setup is developed and a picture device. The machine is of the many sorts E-learning simulators, Marine machine, simulator etc. each machine has a completely different package and hardware half. For a Marine machine, the hardware is intended as a Ship and panels show the entire read of the ocean. Likewise, for the automotive machine, the hardware setup is the automotive and virtual atmosphere is of the road, traffic[6]. the machine is employed for the aim of testing or for coaching purpose.

Volume 6 Issue 3, March 2017

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

For the automotive driver, Road driving vision may be a primary method for trained persons to move with the virtual driving atmosphere, that is additionally a very important half within the style of a driving machine[7].

Virtual atmosphere provides the realistic feel to the humans that very useful for employment purpose or for the testing purpose. This provides the wise tool for analyzing the drivers and vehicles behavior. Advancement in laptop computer and graphics systems improved the computer game technology to simulate the driving behavior of the necessary vehicle.[8] Victimization advanced Virtual creation technology, driving simulation is not any longer dangerous for the human drivers. The virtual atmosphere got to represent the interaction between vehicle and its surroundings alongside roads, foliage, buildings and completely different vehicles. In step with the planning of driving machine and application areas, numerous factors got to be thought of in arising with a virtual driving atmospheres like simulation fidelity and realism, construction worth, and amount communication capability. With the help of this virtual atmosphere drivers driving skills is tested.

2. Related Work

Paper [11] describe a novel interactive coding system notably designed for making driving simulator's virtual hold technique is presented to construct a virtual town interactively and to drive the town real time. This method makes it achievable to come up with a virtual atmosphere like roads, buildings, traffic signs, trams, etc. presently soon for the virtual driving at intervals the interchangeable one another by a mode switch displayed on a Screen therefore a straightforward trial and error atmosphere is advantage On a current superior graphic computer. This sort of interactive system isn't entirely used for a driving machine however jointly for projected application fields like environmental assessment in designing and building planning or driver's psychological experiments, and town. The system consists of 3 functions: road generation, virtual city construction, and driving simulation. In paper [12] Virtual environments are a unit bumper in society nowadays, and area unit largely conferred to persons via games. These games are getting extremely immersive, and also the technology driving their development will transcend diversion and might even be used for coaching functions. this will be aforementioned of driving games; graphics and real-time physics modeling are refined to such some extent by these games that driving simulators may be accustomed model planet driving experiences at a low price. Driving simulators living vary from costly installations at analysis institutes to commercially offered computer code for private computers. There are driving simulators on the online, however, this area unit typically 2 dimensional and haven't any serious coaching or knowledge analysis element.

In paper [13] this system is employed to the look the machine supported 3 Dimensional (3D) virtual atmosphere to gather the information for driver's behavior. The target of this machine is to make virtual learning atmosphere supported planet scenery used for driver's education. The machine has the power to run on the non-public computers through web content and conjointly compatible for golem good phone

users. the information analysis is finished on the state of affairs conferred to the user like a tutorial, mixed visibility and poor visibility supported day to nighttime transition. The simulation result was tested for 9 males and eight females in total seventeen peoples and also the feedback was positive.

As another computer code machine program [14] this answer describes the methodology and technical problems with integration of a driving simulation and traffic flow simulation atmosphere in real time. The platform used for traffic simulation is AIMSUN and for driving machine Virtual atmosphere for Road Safety (VERA) is SCANeR. SCANeR 2.18 and AIMSUN platforms area unit employed in the mixing and check were disbursed on half-dozen.5 kilometre 2 lane French road with traffic flow of two hundred vehicles per hour and data was changed just for the vehicles at intervals a distance of 200 m from the interactive vehicle (150 m ahead and fifty m behind it). This framework was developed for overcoming the inconsistency of auto movements coming into and exiting from the environment of the interactive vehicle and also the reduced accuracy of the traffic machine in representing vehicle movements. This framework doesn't enable new driver models enforced within the traffic model to be tested within the driving machine atmosphere.

A. Driving Simulators Research: Driving simulators unit of measurement used at analysis bent for many functions. Vehicle manufacturers serve driving simulators. several colleges in addition operate simulators for analysis. in addition to sorting out driver work issues, driving simulators change researchers to see driver behavior beneath conditions throughout that it'd be non-legal and/or unethical to place drivers. Maybe, studies of driver distraction would be dangerous and unethical (because of the defect to urge consent from different drivers) to undertake and do on the road [15].

B. Varieties of Driving Simulators: There exists a form of varieties analysis driving simulators, with an oversized vary of capabilities. the foremost advanced, similar to the National Advanced Driving machine, have a full-sized vehicle body, with six-axis movement and visual displays that are touched with the actual spherical. On the other end of the varied unit of measurement, simple desktop simulators love the house Driving machine that unit of measurement usually enforce using a laptop computer monitor to indicate visual and there area unit devices that are employed to pass the signal i.e wheels and panels. The simulators with less value unit of measurement used readily among the analysis of basic and cone-shaped certain scientific queries. Recent analysis has discovered that if the important virtual setting is employed within the analysis it provides an additional result and provides prompt results of driving take a look at that's substantially completely different from virtual setting [9].

C. The validity of Driving Simulator: There is associate degree problem in generating whether or not that isn't real and therefore the results obtained from the machine that lives applicable to driving. Given the defect to repeat some machine studies on the passed this will be likely to remain an issue for a couple of times. Some analysis live the pattern of vehicles to regenerate machine analysis on a take a glance at

the track, facultative plenty of direct comparison between the machine study and so the planet. As computers have grown up faster and simulation could be a heap of widespread among the automotive trade, business vehicle math's models that area unit valid by manufacturers unit of measurement use in simulators. Driving simulators could also be used for the work of heavier-than-air craft, Train, Tramway and different vehicles drivers. The simulation coding system area unit typically seen as a serious game, some corporations create themselves additional sustain to deliver the additional realistic driving machine [6].

3. Proposed Work

This work includes verifying completely different techniques and software package for planning the read of traffic. For planning the natural condition like rainy completely different software package ought to be verified. With the assistance of visual information generates driving scene victimizationPC. The EON studio is that the main software package within which all traffic scenes is made. With the assistance of Photoshop, the natural condition is shown on pictures. Once providing the animation to the present Photoshop image it'll employ in the software package. the event method includes commercialism 3D objects, sometimes originating from varied modeling tools like 3D Studio. The import procedure for all foreign formats is dead in 2 steps once the foreign 3ds file is opened in EON Studio metal. First, the EON convertor masses and converts the 3ds file to an inside information illustration. Afterward, associate EON hierarchy is made from the information are created.

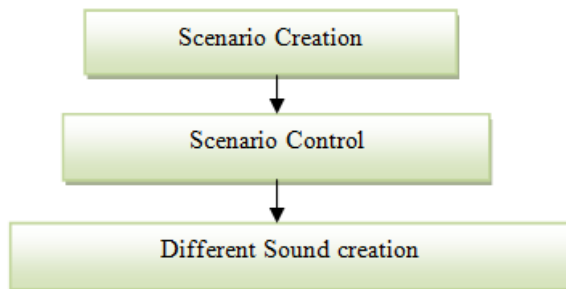


Figure 1: Flow of Methodology to be employed

To create a video game we've to use Game engines. Their area unit various game engine out there to develop the automotive driving atmosphere. Game maker, Unity, liquidizer etc. area unit a number of the sports engines that is usually used for developing this type of atmosphere. The most question arise once this is often what's game engine and however essentially this game engine works. Game Engine area unit rely upon three things i.e. Graphics, Audio, and Logic. Game Engine has 5 parts, 1st is Game program which incorporates all the logic for games, an Engine that is employed to get 3D graphics pictures, ensuring is sound engine that provides totally different sounds, essentially it works with the assistance of formula which can be work with totally different sounds,[16] A physics engine which might work with completely different physicals movement and also the computing which might facilitate in coming up with different modules that may work with the various of virtual atmosphere.

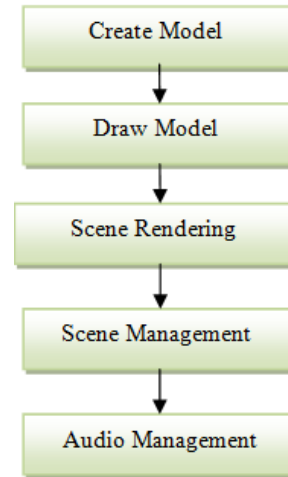


Figure 2: Working with scenario management

In early stages, the sport like Mario is developed that is considers as a terribly basic game. however, it takes a lot of memory that isn't helpful. While the technology augmented space the new game engines arewon't developed the new virtual setting. Unity Is one amongst the foremost used game engines kind all the sports engines provided. Unity provides wealthy and complex tools to develop the various reasonably virtual setting. the most side of Unity is it developed a game for each platform. For the various package, the unity games will simply run. C# and javascriptare the languages used for the programming. Unity provides commonplace assets packages which have totally different tools that are promptly out there to style the virtual setting[17]. The package contains, 2D, Effect, setting, Fonts, Characters, Visual result, Prototyping, Vehicles. This virtual setting is interfaced with the hardware part and it'll show the movement of hardware part. The hardware part includes Brake (keyboard keys/ Joystick), Accelerate (keyboard keys/Joystick), Steering (Joystick), Gear (Joystick), Horn (Button), Indicators (Button).

4. Results & Conclusion

All the results of driving can shows on screen with the various modules. theautomobile is move from one track which has totally different conditions and different turning of roads and far additional. to point out the proper operating of break horn indicators town traffic is additionally shown which can facilitate to provide the actual feel of driving as shown in figure 3.

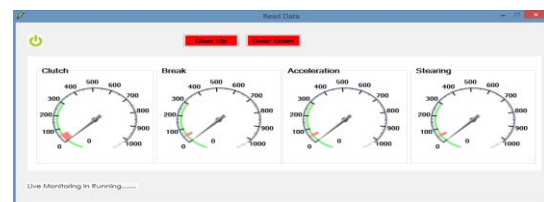


Figure 3: Movement of Brake, Clutch, Acceleration and Steering

The simulation computer code is predicated on following on things that include:

- a) **Physical Movement of the automobile:** This includes the driving pattern of vehicles as of real vehicles. It

includes the stopping distance of automobile from consequent automobile, the angles at that the automobile turns and stops. The driving pattern whereas totally different conditions.

- b) **Vehicle Dynamics:** Gear ranges of the vehicle utilized in the machine computer code is correspondent with a true automobile. The break and suspension values it includes however breaking is finished. The dashing values, fuel values in several setting is taken into account.
- c) **Traffic:** It includes several parameters, significant traffic, low traffic, medium traffics, traffic sign utilized in the Republic of India are there in computer code. Signals show totally different color (RED, GREEN, YELLOW) when preset intervals. completely different roads are shown and driving on different roads with different speed is analyzed. 1. No traffic 2. lightweight traffic 3. traditional traffic 4. Sound Alerts.
- d) **Measure and analysis criteria:** When this computer code runs one profile screen will seem within which each driver need to enter the name and when coming into the name consequent screen are going to be virtual setting. when pressing begin the automobile starts moving and totally different scenes can appear on the screen. The analysis of drivers are supported following criteria:
- e) **Accidents 2.** The speed of automobile type totally different lanes 3. The speed of an automobile in several roads (Urban, Highway) 4. Angles of Turning automobile (while taking the U-Turns or left and right turns) 5. Gear ranges of the vehicle 6. unforeseen breaking 7. victimization the horn on the far side its purpose 8. whether or not Indicator is on whereas turning or not. 9. Violation of Traffic Rule.
- f) **Reporting:** After finishing the actual track the automobile can mechanically stop and also it'll move toward the consequent screen. On consequent screen, the one report is generated. All the info which can collect from this profile is going to seem theirs with the name or numbers which can embrace whereas the first screen.
- g) **System:** It is the management unit that permits the remote management of the system. This system performs following operations: 1. beginning New situation 2. browse the info 3. Ending the situation 4. Analyzed the info 5. Generate Instant Report.

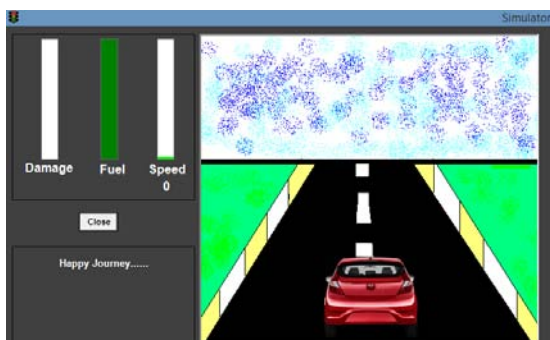


Figure 4: Scenario of Virtual Environment

This machine package is meant to assist in analyzing the driver's behavior whereas driving the automobile in several states of affairs. It'll be used for any road moving vehicles. This package provides a report on totally different parameters like a lot of what quantity distance is roofed with what speed and the way much fuel is employed. it'll additionally

facilitate choose whether or not the drivers is prepared to drive the automobile on urban roads or not or it'll facilitate whereas giving the license for four wheelers drivers. This atmosphere can facilitate to determine in what patterns drivers is prepared to drive.

References

- [1] Y. Peng, F. Wang, Y. Yang, and P. Zhang, "Design and Implementation of Virtual Driving System Fusing Driver's Cognitive and Operating Characteristics *," pp. 1826–1829, 2014.
- [2] U. Manawadu, M. Ishikawa, M. Kamezaki, and S. Sugano, "Analysis of Individual Driving Experience in Autonomous and Human-Driven Vehicles Using a Driving Simulator," 2015.
- [3] M. Agil, M. Balbed, N. Ibrahim, and A. M. Yusof, "Implementation of Virtual Environment using VIRTOOLS," pp. 101–106, 2008.
- [4] I. Ismail, M. S. Sunar, H. W. Qian, and M. A. M. Arsad, "3D Character Motion Deformation Technique for Motion Style Alteration," no. Icidm, 2015.
- [5] J. M. Leitbo, A. A. Sousa, F. N. Ferreira, and D. E. E. Isep, "Graphical Control of Autonomous, Virtual Vehicles."
- [6] S. M. S. Jop van den Hoogen, "LESSONS ON THE DESIGN OF GAMING SIMULATIONS FOR CONVERGENCE AND DIVERGENCE IN VOLATILE INNOVATION ENVIRONMENTS," pp. 1044–1055, 2015.
- [7] Y. Wu, X. Yao, and J. He, "An innovation of the Game script engine development based on J2ME Multimedia mobile device," pp. 193–195, 2011.
- [8] N. Fouladinejad and N. Fouladinejad, "Modeling Virtual Driving Environment for a Driving Simulator," no. Vdm, pp. 27–32, 2011.
- [9] X. Liu, C. Xie, Y. Jin, and Y. Yin, "Construct Low-Cost Multi-Projector Tiled Display System for Marine Simulator," pp. 2–7, 2006.
- [10] L. Chen, "Research and Realization of Building the Three-dimensional Runway of Unity3D Game Based on PSO Algorithm," no. Iccsnt, pp. 452–456, 2015.
- [11] Xiao Shuxian, Zhang Linxuan, "Simulating Driving Feel for Virtual Driving Simulator based on Semi-physical Simulation," Proceedings of the 34th Chinese Control Conference, July 28–30, 2015, Hangzhou, China.
- [12] Kareem Abdelgawad, Mohamed Abdelkarim, Bassem Hassan, Michael Grafe and Iris Gräßler, "A Modular Architecture of a PC-based Driving Simulator for Advanced Driver Assistance Systems Development," 15th International Workshop on Research and Education in Mechatronics (REM), Elgouna, Egypt, September 9–11, 2014.
- [13] Kevin Kandhai, Michael Smith, Andrea Kannech, "Immersive driving Simulator for Drivers Education and Analysis," The 16th International Conference on Computer Games, 2011.
- [14] Vincenzo Punzo and Biagio Ciuffo, "Integration of Driving and Traffic Simulation: Issues and First Solutions," IEEE Transactions on Intelligent Transportation Systems, Vol. 12, No. 2, June 2011.

- [15] C. A. O. Changbin and W. Junhua, —Driving Simulator Validation for Research on Driving Behavior at Entrance of Urban Underground Road,” pp. 147–150, 2015.
- [16] C. Yang, C.-L.Huang, and K. Hsu, —Unity 3D production and environmental perception vehicle simulation platform,” pp. 452–455, 2016.
- [17] Z. He, —Research and Application of Path-finding Algorithm Based on Unity 3D,” pp. 1–4, 2016.

