**AIMRL FYP Documentation**

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11. **Project Title:**

Virtual Reality Powered Car Driving Serious Game

Members details with Final DSM Score (your first DSM till 30-May-2017)

|  |  |  |
| --- | --- | --- |
| Roll No | Name | DSM Score (%) |
| BSEF13A014 | Moin Rajput | 72.95 |
| BSEF13A022 | Ahsan Masood | 59.42 |
| BSEF13A030 | Muhammad Moeen | 56.52 |
| BSEF13A032 | Danish Hashmi | 73.91 |
| BSEF13A055 | Muhammad Umair Rauf | 65.22 |

|  |  |
| --- | --- |
| **Category** | **Yes/No** |
| Web Project? | **No** |
| Mobile App? | **No** |
| Research Project? | **Yes (Research and Development)** |

1. **Find us online:**

FB Group Link: <https://www.facebook.com/groups/vrpdt/>

Who is Admin of Group: Mian Muhammad Mubasher

Code Repository Link: https://github.com/muhammadumair-rauf/VRDT-2016-17

1. **Introduction:**

This project is the third extension of previous two projects named as **“Virtual Reality Powered Driving Tutor”** and **“Virtual Reality Powered Realistic Driving Tutor”**.

* 1. **Virtual Reality Powered Driving Tutor (First Version):**

This project was based on the simulation of a 3D modeled car which was powered with virtual reality technology. This project was completed by the students of PUCIT from **Fall 2011**.

* 1. **Virtual Reality Powered Realistic Driving Tutor (Second version):**

In this extended version, realistic road network was introduced which would enable to create virtual environment of any city. This project was based on the modeling of a 3D road network which is powered with virtual reality technology. Simulation of 3D driving environment is created using Oculus. AI was used to simulate the surrounding traffic and pedestrian and the car for human interaction used Logitech apparatus to take input. This project was completed by the students of PUCIT from **Fall 2012**.

* 1. **Research on the project:**

Standard formats to represent cartographic road network data have been explored and identified from research literature. It has been found that an open XML format exists to represent cartographic road network data namely OpenDRIVE which is being used by many vehicular traffic flow simulators such as MovSim. MovSim is a highly cited open source vehicular traffic flow simulator, but its visualizer is 2D. To develop a 3D human-in-the-loop simulator or a serious game it requires to model the virtual environment – the virtual road network using of-the-shelf game engine e.g. Unity3D. Another tool TDE has been introduced to construct a road structure by just doing drag and drop road components.

* 1. **Virtual Reality Powered Car Driving Serious Game (Current Version):**

In this project, we mainly covered three parts

* Extension in TDE
  + There are many bugs in the previous version of TDE so we fixed these bugs and performed testing on the TDE.
  + Included more functions in TDE like short keys etc.
* Research
* Assisted in research paper on TDE.
* Researched on driving models.
* Researched on this project that how can we create a 3D road structure on a runtime and artificial intelligence traffic.
* Wrote research paper to compete in simultech conference 2017.
* Development
  + We create a 3D road network at runtime. We gave the file in openDrive format to our unity program that will create its #D road structure and we can drive a car on the road with provided virtually 3D environment.

1. **Technologies Used**

* **Operating System**
  + Windows 8.1 64 bit
* **Tools**
  + Eclipse Neon
  + Movsim
  + Unity Editors
  + OBS
  + Camtesia
  + MATLAB 2016
  + Notepad++
  + Visual Studio
  + Mono Developer
* **Languages**
* Unity 3D
* C# and JS Scripting
* JAVA
* Related JAVA APIs

1. **Requirements:**

|  |  |
| --- | --- |
| Sr# | Implemented Tasks |
| 1 | Create Virtual 3D Road Network at runtime. |
| 2 | Fix Bugs in TDE. |
| 3 | Add new functions in TDE. |
| 4 | Researched on traffic models. |
| 5 | Assisted in research paper. |
| 6 | Wrote research paper for simultech conference. |
| 7 | Proposed solution for traffic model. |

|  |  |
| --- | --- |
| Sr# | Pending Tasks |
| 1 | To include Artificial Intelligence Traffic in our project. |
| 2 | To Include more scenarios in this project. |

1. **Architecture Diagram:**



1. **Dependencies**

* Movsim
* Windows8.1 64 bit
* Logitech g27
* Oculus runtime sdk
* Oculus rift dk2
* openDrive Format

1. **How to Setup Project Environment:**

* Go to “How To Setup Environment” folder in Video folder here you can find video name Setup Project.mp4. By following this video, you can set up the project easily.
* For any problem kindly see all other videos and read documentation.

1. **Limitations of project**

* Compatible with only openDrive 1.3
* Movsim parser unable to parse few components of xml.
* Non-availability of authentic Microscopic components currently.
* OVR compatibility with different versions of windows.
* Not enough opendrive scenarios sample to proceed with gradient property.
* Compatibility issue of TDE to newer version of movsim.

1. **Learning from the project:**

In life, you learn about things with day to day experience, which have positive and negative impacts as well. There are some points which we learn from our project are as follow.

**Positive impacts:**

* Empowers how to work on a continues project and strategies the working.
* Empowers how to search for the related sources available and how to make full utilization.
* Learned tactics to tackle and understand large code base.
* Experience of Virtual Reality
* More knowledge of automobile, traffic rules and regulations. There effects on the daily user and their actions on the society
* It helps us to experience How to write research paper and gather material for that.
* A step towards professionalism (SCRUM), which empowers us how to work in a professional environment, thankful to Sir Bilal and others as well.
* We learned how to preserve a code base and learned how to keep the code base and other developers updated by the help of GitHub.
* Unity always prevails, to achieve something you need work together as a team in spite of personal differences.

**Negative Impacts:**

* Hardware issues observed, as wires and other components of DK2 Oculus are not available.
* Hardware issues regarding basic system components like hard disk creating issues and input devices.
* Unity versions are not compatible with each other, which causes compatibility issues with prefabs and models.
* More research oriented and less development based which make is a bit dry and boring.
* Facing issues regarding job demands, not meeting the requirements as there is more demand for web development and mobile development.