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TERMS OF REFERENCE

Team Project & Professionalism KV6002

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# **Project Vision**

Our project vision is to produce a VR System for an immersive forensic virtual reality experience to emulate crime scenes for forensic investigation. For this project we are working with external consultants from the forensics department of Northumbria of which are interested in a proof-of-concept for educational purposes. Therefore we intend to develop a 3D virtual reality crime scene environment where users can navigate and interact with the scene. The user will be uncovering a story developed by the group to examine the crime scene while using the Oculus VR headset to interact with various objects. A challenging aspect of this project is to create an accurate crime scene which feels natural for the user to navigate around while also being a notable educational tool. By using the Oculus VR headset coupled with Unity3D we can immerse the user using the latest advances in virtual reality technology. Using this latest technology we can introduce new ways of user interaction to move around and interact with objects such as bodies, weapons and other evidence related to a crime scene. We will be working and consulting with the Forensics Department of Northumbria University in this project. In this team project we have 5 members collaborating on assigned tasks. As a group we are ensuring that we can:

* Produce a system which can be used as an educational tool for the social sciences department using existing hardware provided by the university.
* Produce an application which must be running in real-time with acceptable performance.
* The group must ensure that all sub-systems must work together
* Ensure the user can move around the 3D environment using the Oculus Rift device.

As a group we aim to produce a working prototype application and if successful it may be used in the wider university context for teaching and educational purposes for the forensics departments within Northumbria University.

* Brief overview of what you are doing for your subsystem

**Group member, Luke Rose, will……**

Group member, Luke Rose, will attempt to create a simulated crime scene environment, through the game engine Unity. This crime scene environment will be created in conjunction with the storytelling subsystem, as this will allow the environment to incorporate elements vital to the story, creating a more cohesive overall product. To create an immersive feel to the environment, the scene will be populated with existing 3d assets from the community due to time constraints of the project. For example, assets can be sourced for free from (https://assetstore.unity.com). In addition, lighting will be just as vital as populating the scene with 3D objects, so multiple light sources will be set up around the scene to create light and shadows. Finally, if enough time is left towards the end of the project and all the requirements above are completed to a satisfactory standard, then, a second scene could potentially set up for future development and future story lines.

**Group member, Ana-Sabina Irimia, will……**

**Group member, Hassan Mohammad, will……**

**Group member, Zoe Irwin, will……**

**Group member, Efsthathios Efsthatiou, will……**

* Establish which group member is clearly responsible for which area
* **Address the sub-components with relevant research**
* **E.g. looking at literature for user interface systems in VR**

# **Team System Specification – Requirement Capture & Analysis**

For the requirements capture on this team project, we met with Dr. Alan Langford, a senior lecturer in forensics at Northumbria University. In this meeting we discussed an application idea in which some key elements were mentioned. Such elements include the idea of producing a 3D environment to simulate a realistic room. One requirement established in the meeting was to produce a system that could potentially provide educational benefits to the forensics department so that it may be used in the future with other staff and students. Dr. Alan Langford mentioned in this meeting that he currently has a few Oculus Rift devices for the development of a 3D application, therefore we expect to use this device for the development of our project as we intend to create an immersive virtual reality experience which is running in real-time. By using this device for our development we can create an application which also fulfils the team requirement of allowing the user to move around in a 3D environment to examine a hypothetical forensic crime scene. The discussion of the requirements with Dr. Alan also underlined how he was open to new ideas and as a result we decided to analyse existing products to get a framework for the project. The work of (Conway, et al., 2015) has provided our project with different elements for the requirements capture. For example, the paper discusses how they aim to create a virtual crime scene while preserving a realistic simulated experience. From this we intend to build a similar virtual reality application that immerses users into a 3D interactive environment that can be used as an educational tool for university students. From previous knowledge on the module Software Engineering (KF5012) each team member collectively recognised that we need to ensure that each of our assigned sub-systems must work together in cohesion to ensure the product works as intended and the project is completed on time. To achieve this cohesion between the sub-systems the group has agreed to adopt an agile approach to developing the application.

* **Include another source somewhere**
* **Include a reference to agile development**
* Aspects of this are likely to be non-functional for example choice of architecture, look and feel, security, etc.
* Sources of requirements should be clear and defined
* Outstanding and quality research practice (reference code of conduct)
* Fact Finding plan could be used/ Literature review
* ^^ The above can help with requirements capture

# **Specification of Main Functional Sub-Components**

# **Project Tasks and Deliverables**

* Requirements capture
* Analysis and design
* Systems build
* Approach to testing
* Configuration Management/Integration
* Main Deliverables are Project Application and Documentation
* Agile approach will be used, ensure that the product is always in a working state
* Resources include Oculus VR headset, Unity3D software package, Git & Github Repository, C#?????????????, In-House Coding Style Guide
* Black Box, White/Glass Box Testing
* End User Testing
* Risk Analysis
* Project Plan (Gantt Chart?)

# **Legal, Social, Ethical and Professional dimensions**

* Fully Licensed and Legal Software (Agreed to End User License Agreements(EULA))
* Licensed Assets to use
* Cite references when used in documentation
* Our Project application should consider an age limit to consider social issues
* How will our project go about being used as an educational tool, will it be an effective educational tool???????????

* Blood and Gore is a reality of forensic crime scenes so we need to consider the ethical issues surrounding this such as disclaimers and age ratings
* Motion sickness from VR headset is a possibility and needs a disclaimer for users
* Plagiarism is another issue with citing work and using external assets for environment
* Ethical issues surrounding death and taking extra care with graphic scenes and descriptions found in forensic crime scenes
* No physical risks are found in our project
* Do not discriminate against types of people in both the development of the application and working as a team on the project ( annotations)
* Do not cause harm to others
* Back up the work and manage versions
* Maintain professional attitude with client
* High quality work and effective time spent on work
* Only use resources authorized to use either by group, university or supervisor e.t.c.
* Stay on top of laws and legislation relating to the work
* Maintain that work is well presented
* Honour agreements, contracts and responsibilities placed upon the group
* Maintain a consistent style across all documentation

**Ethical Issues**

Ethical issues regarding virtual reality is an ongoing issue in today’s society; the virtual scenes and environments individuals are presented with may contain graphic scenes of violence, combat and death. The Virtual Reality Society highlights their concerns between virtual reality and desensitisation. The idea that individuals become immune to acts of bad behaviour such as killing, and further failing to show emotion, in fact, some tend to appear more powerful and accomplished (Virtual Reality Society, 2017). In order to avoid this idea of desensitisation, our project idea is focused more on the educational side of forensic analysis, trying to minimise the visual graphics to less gore and more evidence related objects. It may be argued that this VR Forensic environment can cause distress and emotional damage due to the association of criminal activity. In order to prevent these issues, disclaimers will be implemented. By introducing a disclaimer related to age, being above 18+ this limits the access to younger children and by stating that the environment may provide scenes of distress, highlights to those that are sensitive to these areas can chose not to partake. Whilst discussing disclaimers it is important to note that our project will also cover the areas regarding motion sickness and pre-existing medial conditions to minimise the risks whilst participating with this application. Overall confirming to rule number one of the healthy and safety and welfare of the IEEE Code of Ethics (IEEE Advancing Technology for Humanity, 2019).

Another ethical issue that has to be addressed before the design and implementation of this project is user protection when the VR headset is on. A previous study by Adams, et al. (2018) raised concerns about individuals being oblivious to real-world physical hazardous objects. The idea that you are bumping into objects, not hearing alarm bells or significant events. He further reiterated the environment in which the VR headset is used has to be safe and specific. To mitigate this issue as part of our project we intend to use controllers along with the oculus rift, by doing so, this means no walking around the room or colliding with dangerous objects reducing the risk of both harm to others and the user themselves. Further with this point if we do decide to implement music it will be of low volume enough to be involved with the VR environment yet still hear surrounding real world commotions.

**Professional Issues**

As developers of this Forensic crime scene investigation virtual reality it is down to us to develop an application that meets the client’s requirements; it is therefore important to follow strict deadlines, honour agreements, contracts, and fulfil our code of conduct responsibilities. In order to ensure a high degree of professionalism, resulting in a successful end product. In addition, as a group we should take responsibility of the technology authorized by the university, along with how we use it and the potential consequences that become of it. Fundamentally, it is important to consider the ethical areas of concern in this documentation to prevent violation of ethical principles. As previously discussed, adequate information regarding the effects of VR to its potential users should be discussed this is further addressed by (Wiederhold & Wiederhold, 2005) as they highlight the important of informed consent as well as the ethics of experimentation with humans.

Now, in terms of the application itself it should be well presented, easy to navigate, thoroughly tested and importantly the users should feel immersed in their surroundings. On the other hand, the documentation provided should be consistent in terms of style and layout and the referencing used must be from reputable resources avoiding plagiarism which will have been covered in the legal issues.

Other professional issues that must be addressed regarding the application is that as developers we must stay inline with the laws and legislations of the BCS (British Computing Society, 2015). For example, they state in their code of conduct you must uphold the reputation of professionalism and good standards as well as make your application inclusive. In order to do avoid discrimination when developing our application for those with difficulty hearing and learning we will provide annotations on the screen to advise and tell the story as users participate with the environment.

Lastly an act of professionalism we must obtain is version control and back ups. No system will be successful without organized folders and files. In order to address this issue as a team have decided to use GitHub to manage version control. Although this is also a form of back up, it is still required we store an alternate form of back up on external storage for example a USB or HardDrive and in doing so it should be regularly to avoid data loss (Hanselman, 2012).

# **Costing**

* Cost of working on the project for each team member
* Cost of equipment e.g. Oculus VR headset, Desktop PC’s e.t.c

# **Subsystem Specification**

# References

Conway, A., James, J. I. & Gladyshev, P., 2015. *Development and Initial User Evaluation of A Virtual Crime Scene Simulator Including Digital Evidence,* Seoul: Springer.