The SIU CAVE
Project Definition Document

Document Version: 1.0
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### VERSION HISTORY

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### APPROVALS

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<td>(sign here Dr. Mousas)</td>
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**SIU CAVE – Project Definition Document**

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1. **PURPOSE**
   Cave Automatic Virtual Environment (CAVE) is a virtual reality environment created by the illusion of immersion by projecting stereo images on the walls and floor of a cubical room. The walls and floors of CAVE project images. Interaction takes place using a variety of input devices, for example, a joystick, motion sensors or, a haptics device, i.e. data glove. This enables the person to interact with objects in the virtual world.

2. **PROBLEM/OPPORTUNITY**
   CAVE systems are inherently expensive to purchase through companies, even though they are not modular to user needs. This project was developed in order to create our own SIU-CAVE system that is inexpensive, modular, and fits our department’s exact needs.

3. **PROJECT GOAL**
   - Projection of Stereo images on the walls and floor of a room-sized cube.
   - Head tracking system continuously adjusts the stereo projection to current position of the leading viewer
   - Interaction with the virtual world by the means of various input devices such as motion sensors, joystick or, a haptics device i.e data glove

4. **PROJECT OBJECTIVES**
   - Configure a software that captures motion input and provides visual and sound effects in sync with the hardware of the CAVE.
   - Develop an application that can demo the CAVE virtual reality.
   - Design a Web portal with information and details about SIU-CAVE.

5. **PROJECT SCOPE**
   - Research and acquire the needed hardware/software for the CAVE system
   - Create a working CAVE system with the said hardware/software
   - Implement test applications for the CAVE system
   - Create a web portal for the project in order to show its features

6. **KEY STAKEHOLDERS:**
   Team Supervisor: Dr. Christos Mousas
   Team Members: Utsav Dhungel, Josh Maier, Brady Sprinkle
7. **Outcomes/Success Criteria**

Proper research needs to be done regarding the hardware requirements and suitable software that compliments the hardware for SIU-CAVE. The success is dependent on the application that can demo the features and functionality of the SIU-CAVE.

8. **Assumptions and Constraints**

8.1 **Assumptions**
- Budget of around ~$20k
- Time of completion needs to be May 2018
- Utilizing an office space in EGRA

8.2 **Constraints**
- Budget
  - Type of hardware/software we can acquire
  - May affect performance, type of application that can be developed
- Room size in relation to hardware
  - Projector space, number of screens
  - Space for user movement

9. **Risks**

- Building CAVE can be expensive.
- Hardware and software compatibility issues.
- Head tracking system and motion capturing to adjust the stereo projection can be complicated and difficult to configure.
- Capturing movements and motion input needs to be accurate enough for the CAVE devices to function correctly.

10. **Functional Requirements**

- Develop appropriate wrapper software compatible with the hardware devices.
- Software that captures motion input and provides visual and sound effects in sync with the motion.
- Develop an application that can demo the CAVE virtual reality.
- Design a Web portal with information and details about SIU-CAVE.

11. **Non-Functional Requirements**

- Research about suitable Hardware and Software required to build CAVE with respect to the budget and resources available.
• Identify suitable type and capacity of Projector.
• Level of computational capacity and GPU power required.
• Type of motion capturing device to be used.
• Spatial Localization and sound effects

12. **USE CASES**

- **Entertainment Purposes:**
  - Virtual Reality Gaming Experience.
  - 3-D Movie projection.
- **Medicinal Application:**
  - Practice and perform surgery on remote patients.
  - Teach new skills in a safe, controlled environment.
- **Manufacturing**
  - Engineering Companies use CAVE for product enhancement.
  - Prototypes of parts can be created and tested, interfaces can be developed, and factory layouts can be simulated.
- **Education and Training:**
  - Used for driving, flight, ship, tank simulation.
  - Enables people to interact and train in a real world environment without spending millions on the physical devices.

Date: December 14th, 2017
Approved by: ____________________________
Approver Signature: ____________________________
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