

The SIU CAVE

Project Definition Document

Document Version: **1.0**

AUTHORS

This document was prepared by:

Utsav Dhungel, Team Member
SIUC
1200 E Grand Ave
Office phone: 303-9169
utsav@siu.edu

Josh Maier, Team Leader
SIUC
Roundabout A
Office Phone: xxx-xxxx
jmaier33@gmail.com

Brady Sprinkle, Team Member
SIUC
1195 E. Walnut St. APT. J-4
Office Phone: 217-883-7972
bsprinkle@siu.edu

VERSION HISTORY

<Insert version completion date>	<Insert version number>	<Briefly describe work completed to create the version>	<Name author or reviser>
Dec. 14th, 2017	1.0	Initial draft	Brady Sprinkle, Utsav Dhungel

APPROVALS

<Insert approval date>	<Insert version approved>	<Provide name and title of approver>	
Dec. 14th, 2017	1.0	(sign here Dr. Mousas)	

TABLE OF CONTENTS

- 1. Error! Bookmark not defined.4
- 2. Error! Bookmark not defined.4
- 3. Error! Bookmark not defined.4
- 4. Error! Bookmark not defined.4
- 5. Error! Bookmark not defined.4
- 6. Error! Bookmark not defined.4
- 7. Error! Bookmark not defined.5
- 8. Error! Bookmark not defined.5
 - 8.1 Error! Bookmark not defined.
 - 8.2 Error! Bookmark not defined.
- 9. Error! Bookmark not defined.5
- 10. Error! Bookmark not defined.5
- 11. Error! Bookmark not defined.6
- 12. Error! Bookmark not defined.6

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: _____

Mentor Name: Dr. Christos Mousas

Mentor Signature: 