Chapter One

Introduction

1.1 Introduction

Computer devices are considered revolutionary in the field of technology, which was and still is instrumental in the all of the modern areas. Based on the enormous capabilities of the computer it has multiplied its applications and uses and, easily to be demonstrated by recalling the following areas:

- Trading and economic fields especially for calculating budgets, profits and payments and receipts and salaries.
- Scientific and research fields : used in most scientific fields such as civil engineering, chemistry, computer science, mathematics, physics , etc. and is used to analyze data, sorting, comparing, and performing calculations.
- Civil Aviation: used to record information about the flights, as well as air operations like take-off and landing.
- Space Research and space-craft: the work is controlled by computer space-crafts; also computers are used to do Earth observation through satellites.
- Engineering and scientific areas: using a computer at the moment in the work of engineering designs and drawings such as: the design of buildings, cars, ships and other facilities.
- The field of industry and control devices: spreading the use of computers in automatic control, especially in the industrial process control.
- Medical fields: computers are used to conduct the necessary tests, and analyze the results of tests such as monitoring the work of the heart, blood vessels and brain. And is also used to monitor patients directly, during intensive care, and for the diagnosis of many complex processes of the human being, and in medical control devices.
- Educational fields: used widely in universities and other scientific institutes, in education, research and development, and Life-long-learning (L3).
- Military areas: private strategic nuclear weapons in the early alarms, as well as in the design of various weapons, and in the planning of military operations, such as simulations for military operations and training through Virtual Reality (VR) technologies.

1.2 Historical Introduction about the Beginning of the Military Use of the Computer

Obviously there have been parallel developments which resulted in a computer. In the United States of America the first computer was called ENIAC (Electronic Numerical Integrator and Calculator) - in Germany the civil engineer and computer pioneer Konrad Zuse built his Z1 computer. ENIAC was built in 1943 and was used during the Second World War with the aim of military use to perform crisis calculations and for the preparation of scheduling artillery ballistics. This first general purpose computer ENIAC could be completed after World War II, but did not serve the basic purpose, it was designed for originally. One of the main applications after being completed have been accomplishing a series of complex mathematical calculations that proved the possibility of building a hydrogen bomb.

From this brief historical introduction we see, that the main purpose of the invention of the ENIAC computer was for military use – it came later into other fields and areas. On the contrary the Z1 computer in Germany was built and used from the beginning serving for civil applications, such as to find solutions of large linear equation systems.

1.3 Problem Statement

In the military field, there are many ways to demonstrate military plans. In Sudan, most of the work at present is done manually, that is why it takes a lot of efforts and time, and it depends on the person(s) who drew those plans with affiliated maps and information actually available.

Supposed that the simulation designer has the wrong information or wrong maps. Such lacks no doubt have their effects on the plans and could lead to disastrous results.

On the other hand when we have new weapons, but not actually have it in our hand, we cannot know the shape, advantages, disadvantages or many other properties of this weapon, unless we have it physically.

1.4 Importance of the Project

The importance of this thesis project is to preserve the lives of soldiers during the tasks and to achieve the maximum results possible. Furthermore it should help leaders to deliver plans for the soldiers and their implementation as required and to identify and train them virtually on new weapons that cannot be obtained.

1.5 Related Work

In the following some references are reviewed to introduce into the topic of this thesis.

1. A bio-economic 'war game' model to simulate plant disease incursions and test response strategies at the landscape scale [1].
2. A Review of Simulators with Haptic Devices for Medical Training [2].
3. Contribution of Virtual Reality for Lines Production's Simulation in a Lean Manufacturing Environment [3].
4. Application of the Environmental Sensation Learning Vehicle Simulation Platform in Virtual Reality [4].
5. Comparison of Developmental Stages in Relation to Way Finding Behavior in an Immersive Virtual Reality Space [5].
6. 3D preservation of buildings – Reconstructing the past [6].

Pa #	Author	Publishing date	Tools
1	David C. Cook , Jean-Philippe Aurambout , Oscar N. Villalta , Shuang Liu , Jacqueline Edwards, Savi Maharaj	24 December 2015	Constructed in the agent-based modeling environment NetLogo
2	David Escobar-Castillejos, Julieta Noguez, Luis Neri, Alejandra Magana, Bedrich Benes	1 February 2016	Haptic devices are electro mechanical devices with handlers.
3	Mohamed-Amine Abidi, Barbara Lyonnet, Pierre Chevaillier, and Rosario Toscano	3 June 2016	Engine of simulation called SIMAN with ARENA
4	Kuei-Shu Hsu , Jinn-Feng Jiang, Hung-Yuan Wei and Tsung-Han Lee	26 January 2016	Streetscape as the main scenario , Sketchup software is used for modeling and mapping to draw an entire building model of a city and Unity 3d engine to make a virtual reality interface.
5	Hiroshi Watanabe, Tomohito Okumura,and Eiji Wakamiya	30 March 2016	immersive virtual reality (VR) device
6	Dieter Fritsch & Michael Klein	29 March 2017	terrestrial laser scanning, close-range photographs and aerial imagery

Pa #	Open issues
1	Without IAS management controls, it is estimated that weeds, plant pathogens, vertebrate and invertebrate pests have the potential to inflict pre-harvest yield losses ranging from 44–54 % in wheat, 64–80 % in rice, 58–75 % in maize, 73–80% in potatoes and 49–69 % in soybeans (Oerke 2006). Even with controls, losses average 28 % in wheat, 37 % in rice, 31 % in maize, 40 % in potatoes and 26 % in soybeans
2	Surgical procedures have a high degree of difficulty and complexity. Therefore it is necessary to provide students or practitioners a proper and extensive learning process before they can perform surgeries correctly. The learning curve in the medical process is a concept focused on two aspects: optimization of operating time and reduction of patients bleeding. This study found that patients who have been treated by doctors with surgical experience, that have performed between 750 and 10,250 procedures, tend to have fewer health problems than patients who were treated by doctors with less experience
3	It is hard for the various stakeholders to understand or handle complex data resulting from the flow simulation
4	Furthermore, it is necessary to support novice drivers in practicing their skills

1.6 Hypotheses

Using Autodesk Maya, Autodesk 3ds Max, Unity 3D engine, C# programming language tools will enable the military services to make a good planning strategy.

1.7 Research Objectives

- Illustrate weapons by 3d visualization and 3d models.
- Use most recent technology in 3d and 2d simulations.
- Make planning more flexible and easy for novice users.
- Provide flexible and friendly user interfaces for all kind and level of user.
- Provide visual (2d and 3d) plans.
- Use updated maps from the web.
- Provide 3d visualization strategies to see weapons, if we cannot have it physically at the moment.

1.8 Research Scope

This research covers the military sphere and applies the concept of virtual reality for military services. Moreover it deals with the application of the main functions of search and rescue, and would like to contribute to the advancement and continuous developments of the military domain.

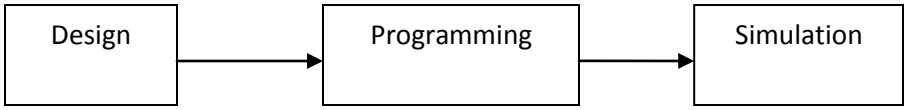
1.9 Methodology

1.9.1 Experimental methodology

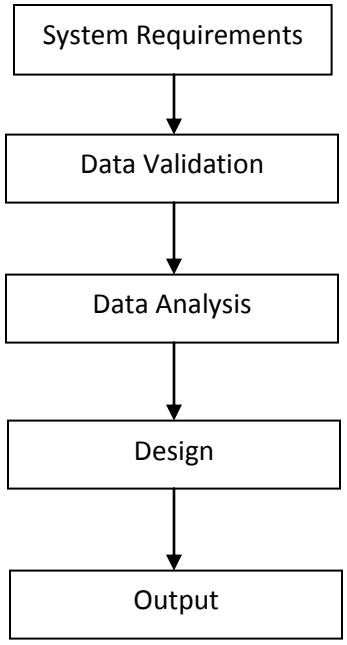
This depends on noticing the facts and developing hypothesis. Thus, some tests are performed to check the hypothesis, and then access the laws that govern general and special relations.

To achieve the goals of this research we apply the following steps:

1. Use Autodesk Maya, Autodesk 3d Max to design the model and the environment of the virtual reality.
2. Use the Unity 3D engine to simulate the environment.
3. Use C# programming language to program all methods and to design the interface of the applications.



Flow chart of the system faces:



1.10 Expected Contributions

In terms of the scientific outcome it is expected for this thesis to accomplish a real addition in the field of computer science, and improve our military planning and military education and move forward to use simulation technologies in the military field.

1.11 Research Layout

Chapter	Description
Chapter one	Presents a general introduction to computers usage in various fields. Moreover, it browses the history of older mainframes.
Chapter two	Performs a background look on the project, describes the current problem and the ways to solve it, and presents the used methodologies.
Chapter three	Explains the analysis of the system using the appropriate tools that co-operate with the system construction.
Chapter four	Talks about system graphical user interfaces, and system construction according to the analysis performed earlier.
Chapter five	Testing section, involves demonstrating checksums that displays the project's achievements.
Chapter six	Conclusions, given by an abstracted summary of the final aim of the research.
References section, citing the data resources for this research.	

1.12 Research Time Table

ID	Task Name	Duration	Start	Finish
1	Data collection	2wks	Wed5/10/16	Wed19/10/16
2	Theoretical Background	2wks	Thu20/10/16	Thu3/11/16
3	Analysis	2wks	Fri4/11/16	Fri18/11/16
4	Design	2wks	Sat19/11/16	Sat3/12/16
5	Implementation	3wks	Sun4/12/16	Sun25/12/16
6	Maintenance	1wks	Mon26/12/16	Mon2/1/17
7	Write the thesis	3mons	Wed5/10/16	Mon2/1/17