ÇANKAYA UNIVERSITY

Software Design Document

MEGA REJİ

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06.05.2018

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1. INTRODUCTION

1.1 Purpose

The purpose of this Software Design Document is providing the details of project titled as “Mega Reji: A Gamified Mobile Application Framework for Film Production System”.

The target audience is members of film production team. Mega Reji application provides a coordinated work environment for film production team members with a gamified system.

The purpose of Mega Reji project is creating an environment in order to make easier synchronization and communication between film production team members. In film prduction process, sometimes conflict can occur in team members in terms of decision making phase. Therefore, Mega Reji assures that all members from each department of film production company will get rid of possible problems while pre- production, production and post production phases. Mega Reji has three main modes: Pre-Production, Production and Post Production. Participants login to the system according to their roles in film production team, and then use the system according to constraints which are determined by admin. Pre-Production mode consists of Producer Group, Director Group and Scenarist Group. In this mode, Scenarist Group writes the script by using Mega Reji application, offers actor for appropriate role, and offer a place to shouting. Producer Group approves the information which comes from Scenarist Group and then Director Group makes a plan according to information which is approved by Producer Group and send notification to all team members about plan. Production mode consists of Stage Group, Producer Group, Director Group, Production Group and Art, Display, Sound, and Light Groups. In Production Mode, Art, Light, Display and Sound Groups create request reports according to their needs, Producer and Production Groups view reports relevant to location and requests, and then Stage Group sends notification about schedule to film production team members according to created plan by Director Group. Lastly, Post Production mode consists of only Post Production Group. In this mode, Post Production Group creates report about how is going on post production phase.

Mega Reji project is designed

1.2 Scope

This document contains a complete description of the design of Mega Reji for Film production system.

The JSP extension is Java Server Pages. JSP technology allows you to easily create web content, both static and dynamic pieces. It allows HTML and server-based Java programs to work together.

Android is an operating system developed by Google and used by millions of people. Android operating systems are available on mobile phones and tablets. Linux operating system kernel is used. It builds the Android base structure. Apk supports the extension. Android-based phones are useful devices in many ways. Especially being a Java supporter is becoming one of the most noticeable features of phone and tablet users. Every Android-based phone and tablet allows many applications to run and use very easily.

The Android operating system consists of five parts.

The kernel: is the Linux kernel. It includes security, memory management, process management, network stacks, and driver models.

Android Runtime: Virtual machine.

Libraries: Includes database libraries, web browser libraries, graphics and interface libraries.

Application Framework: It is the part that provides a broad platform for application developers.

Applications: Includes applications developed directly in the Java programming language.

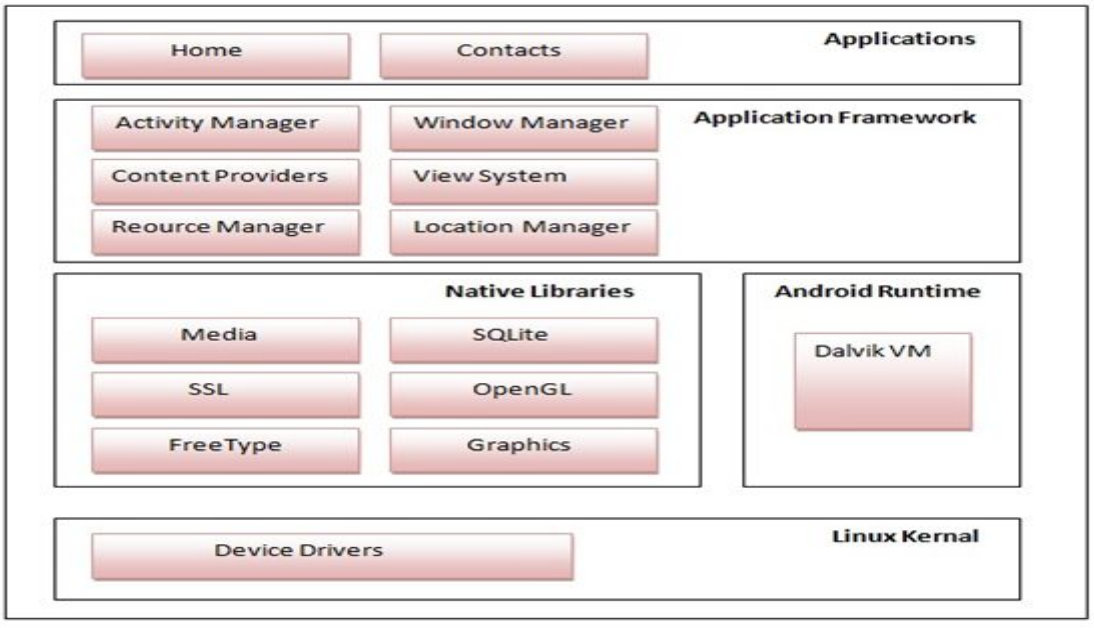


Figure android architecture[1]

Scripting part of the project is occurred using java in mobile application which is developed for Android and web application. Java is open source code, object oriented,platform-independent, high- performance, multi-functional, high-level, an interpreted language. We chose the Java programming language because of rich resources and libraries.

1.3 Glossary

Term	Definition
BLOCK DIAGRAM	The type of schema which the components in the system are displayed in blocks.
HEAD MOUNTED DISPLAY (HMD)	It is a display device which is worn to the head.
HTC VIVE	It is virtual reality system with head-mounted virtual reality glasses which has gaze driven technology and provides haptic feedback through controllers.
NPC (Non-player Character)	Characters in the simulation who cannot be controlled by the participant [6].
PARTICIPANT	The user who interacts with the simulation environment. Generally Medical Aid Man, Privates Sergeants, Militant Lifesaver, Commissioned Officer in Turkish Armed Forces.
SDD	Software Design Document.
UML DIAGRAM	It is a modelling language which is used in Software Engineering.

1.4 Overview of Document

1.5 Motivation

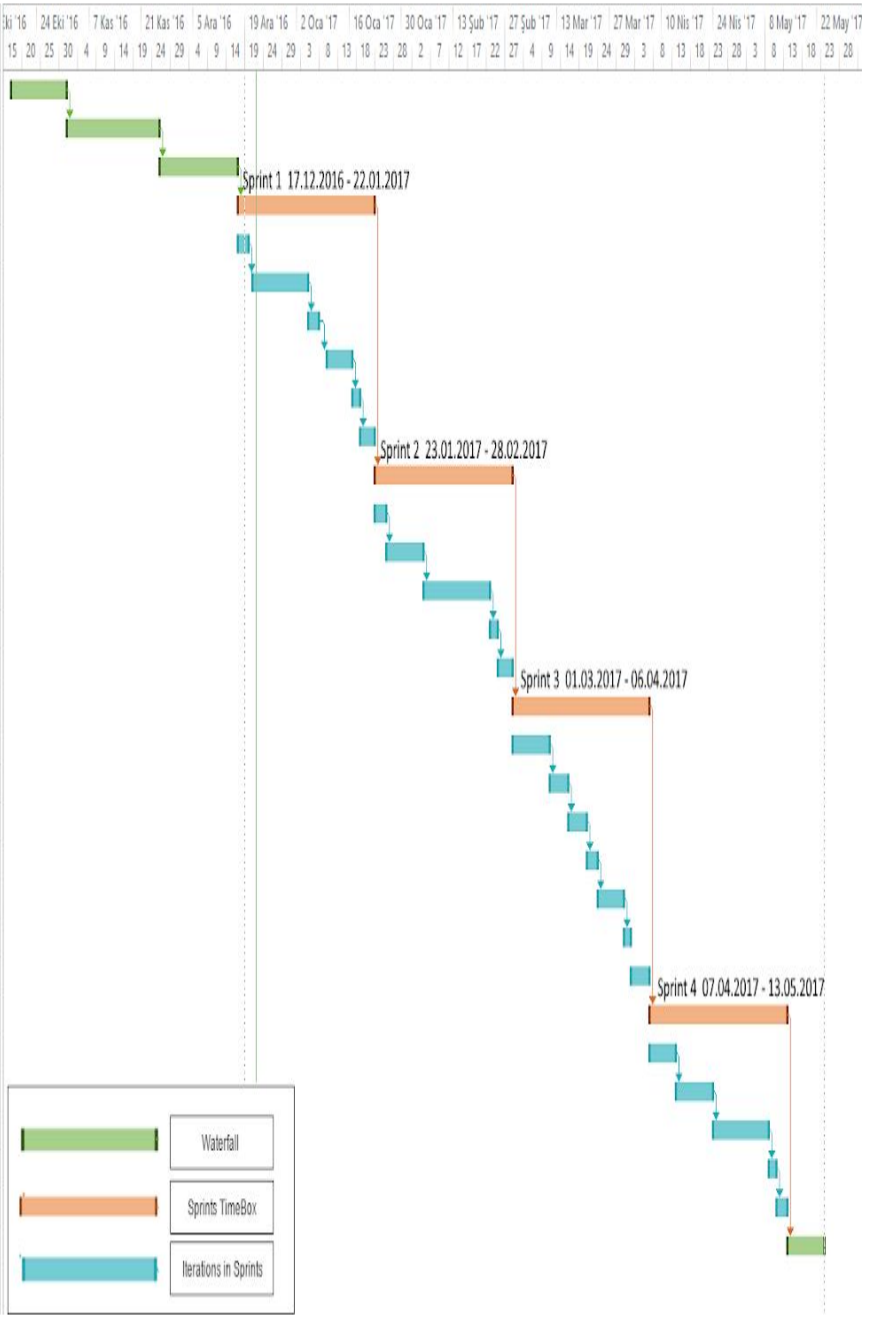
We are a group of senior students in computer engineering department who are interested in gamification and mobile platform. As a group, we have taken the course of java programming for a better understanding object oriented programming. We aimed to combine the fields of education, web programming, mobile programming and gamification in this project. When we are researching about gamification, we find out this technology is so popular but nobody knows it is a gamification.it affect on secretly people's behaviour. Our aim is combining gamification element with web and mobile platform.

2. ARCHITECTURE DESIGN

2.1 Simulation Design Approach

GANTT GRAFİĞİ

	Görev Modu	Görev Adı	Süre	Başlangıç	Bitiş
1		Literature Review	15 gün	Pzt 17.10.16	Pzt 31.10.16
2		SRS Documentation	25 gün	Sal 1.11.16	Cum 25.11.16
3		SDD Documentation	21 gün	Cmt 26.11.16	Cum 16.12.16
4		Sprint 1	37 gün	Cmt 17.12.16	Paz 22.1.17
5		Designing Treatment	3 gün	Cmt 17.12.16	Pzt 19.12.16
6		Modelling	15 gün	Çar 21.12.16	Çar 4.1.17
7		Scenario Designing(Preparing Dialog)	3 gün	Per 5.1.17	Cmt 7.1.17
8		Scripting (NPC - Victim)	7 gün	Sal 10.1.17	Pzt 16.1.17
9		Testing & Release	2 gün	Sal 17.1.17	Çar 18.1.17
10		Agile Process Technical Dept	4 gün	Per 19.1.17	Paz 22.1.17
11		Sprint 2	37 gün	Pzt 23.1.17	Sal 28.2.17
12		Desinging BatteleField	3 gün	Pzt 23.1.17	Çar 25.1.17
13		Modelling	10 gün	Per 26.1.17	Cmt 4.2.17
14		Scenario Generator & Coding	13 gün	Paz 5.2.17	Çar 22.2.17
15		Testing & Release	2 gün	Per 23.2.17	Cum 24.2.17
16		Agile Process Technical Dept	4 gün	Cmt 25.2.17	Sal 28.2.17
17		Sprint 3	37 gün	Çar 1.3.17	Per 6.4.17
18		GUI Design	10 gün	Çar 1.3.17	Cum 10.3.17
19		Modelling	5 gün	Cmt 11.3.17	Çar 15.3.17
20		Video & Sound Editing	5 gün	Per 16.3.17	Pzt 20.3.17
21		Preparing Quizes	3 gün	Sal 21.3.17	Per 23.3.17
22		Coding	7 gün	Cum 24.3.17	Per 30.3.17
23		Testing & Release	2 gün	Cum 31.3.17	Cmt 1.4.17
24		Agile Process Technical Dept	5 gün	Paz 2.4.17	Per 6.4.17
25		Sprint 4	37 gün	Cum 7.4.17	Cmt 13.5.17
26		Database Design & Implementation	7 gün	Cum 7.4.17	Per 13.4.17
27		Modelling NPC & Vehicles	10 gün	Cum 14.4.17	Paz 23.4.17
28		Integrating HTC Vive & Coding	15 gün	Pzt 24.4.17	Pzt 8.5.17
29		Testing & Release	2 gün	Sal 9.5.17	Çar 10.5.17
30		Agile Process Technical Dept	3 gün	Per 11.5.17	Cmt 13.5.17
31		Usability Testing, Last Release	10 gün	Paz 14.5.17	Sal 23.5.17



2.1.1 Class Diagram

2.2 Architecture Design of Simulation

2.2.1 Profile Management

Summary: This system is used by participant and admin. Participant can login, register, and update personal information and exit from the system. In addition to this, admin can delete an account, approve participant accounts and add a new admin.

Actor: Participant, admin

Precondition: User must run the program.

Basic Sequence:

1. User must register if s/he doesn't have an account.
2. User shall login to the system by entering his/her username and password.
3. User can update his/her personal information by selecting update button from user menu.
4. Admin can delete a user account by selecting delete button from admin menu.
5. Admin can approve a user account which is registered recently by selecting approve from admin menu.
6. Admin can add a new admin by selecting add new admin button from admin menu.
7. User can exit from the system by selecting exit button.

Exception: Database connection can be failed.

Post Conditions: None

Priority: Low

2.2.2 Options Menu

Summary: Participant can pause and continue the simulation, change volume settings, display instructions and exit from the system.

Actor: Participant

Precondition: Participant must be logged in and selected options button.

Basic Sequence:

1. Participant can pause the simulation by selecting options button.
2. Participant can continue the simulation by selecting continue button from options menu.
3. Participant can change volume of the simulation by selecting change volume settings from options menu.
4. Participant can display instructions by selecting display objectives button from option menu.
5. Participant can exit from the system by selection exit button.

Exception: None

Post Conditions: None

Priority: Medium

2.2.3 Training Mode

Summary: This system is used by both participant and admin. Participant can select a first-aid technique, display score, display options, take quiz, answer questions, attend practice technique, hold and drop objects. Admin can add, delete and update questions of the quizzes in this system.

Actor: Participant, admin

Precondition: User must be logged in, chose a first-aid technique.

Basic Sequence:

1. Participant can select a first-aid technique from the list of techniques.
2. After selecting a technique an educational video regarding selected technique shall be displayed to the participant.
3. Quiz panel which includes questions about selected technique shall be displayed to the participant.
4. If the result of the quiz is satisfactory, a training environment shall be created for the user.
5. Participant can hold and drop object in training environment.
6. Participant can display options by selecting options button.
7. Admin can add, delete and update questions regarding selected technique.
8. Participant and admin can display score regarding selected technique.

Exception: Database connection can be failed.

Post Conditions: Changes made by admin will be saved within related table. Final score of

the participant shall be updated within related table.

Priority: High

2.2.4 Battlefield Mode

Summary: This system is used by participant and admin. Different from the training mode, this mode includes war ambiance, includes medical intervention techniques and injury scenario.

Actor: Participant, admin

Precondition: User must be logged in to system and selected battlefield mode.

Basic Sequence:

1. Participant can select an injury scenario from list of injuries.
2. After selecting an injury scenario, Participant shall select a medical intervention technique.
3. An environment is created depending on the selection of participant.
4. Participant can move around the environment with keyboard's w-a-s-d buttons and HTC Vive Controllers.
5. Participant can hold and drop objects which are in this environment.
6. Participant can fire a gun with mouse's right click or HTC Vive controller.
7. Participant can display Progress Bar by selecting progress bar button.
8. Participant can view items in his/her inventory by selecting inventory button.
9. Participant can display objectives panel by selecting objectives button.
10. Participant can display options by selecting options button.
11. Admin and participant can display score regarding selected medical intervention techniques and injury scenario.

Exception: Database connection can be failed.

Post Conditions: Final score of the participant shall be updated within related table.

Priority: High

2.3 **Activity Diagram**

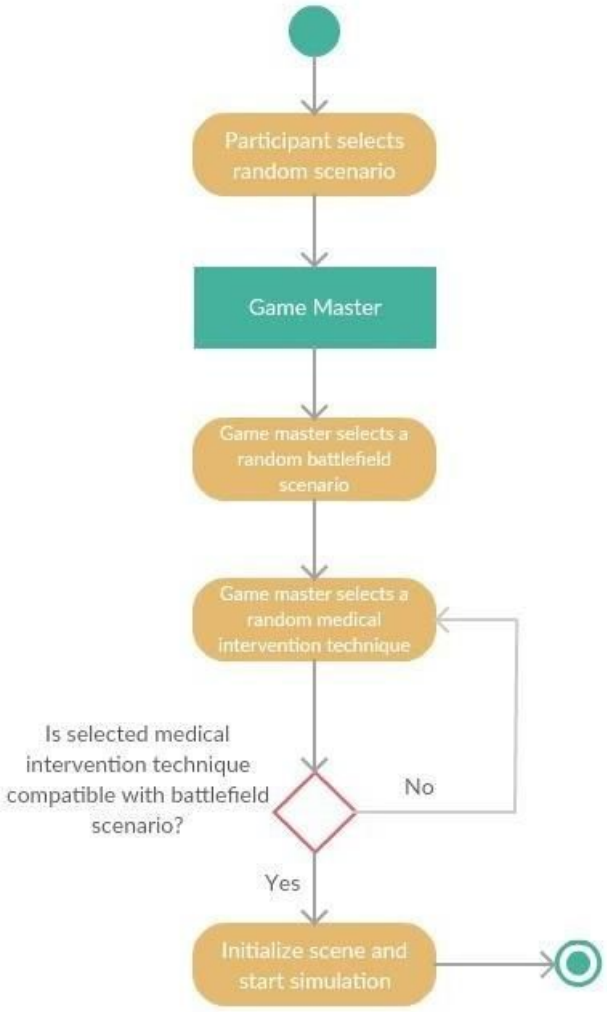


Figure 5 Activity Diagram of Scenario Generator

Figure 5 shows how the scenario generation works as an activity diagram. When the participant selects random generation choice, Game Master object will run random scenario generation function. First of all, in this function, a battlefield scenario shall be selected randomly according to the algorithm. After that, a medical intervention technique shall be selected. Then the compatibility between these scenarios shall be checked. If the medical intervention technique and battlefield scenario is compatible, the scene shall be initialized according to these scenarios and the simulation shall be started. If they are not compatible, then another medical intervention technique shall be selected randomly again.

3. USE CASE REALIZATIONS

Simulacrum Project

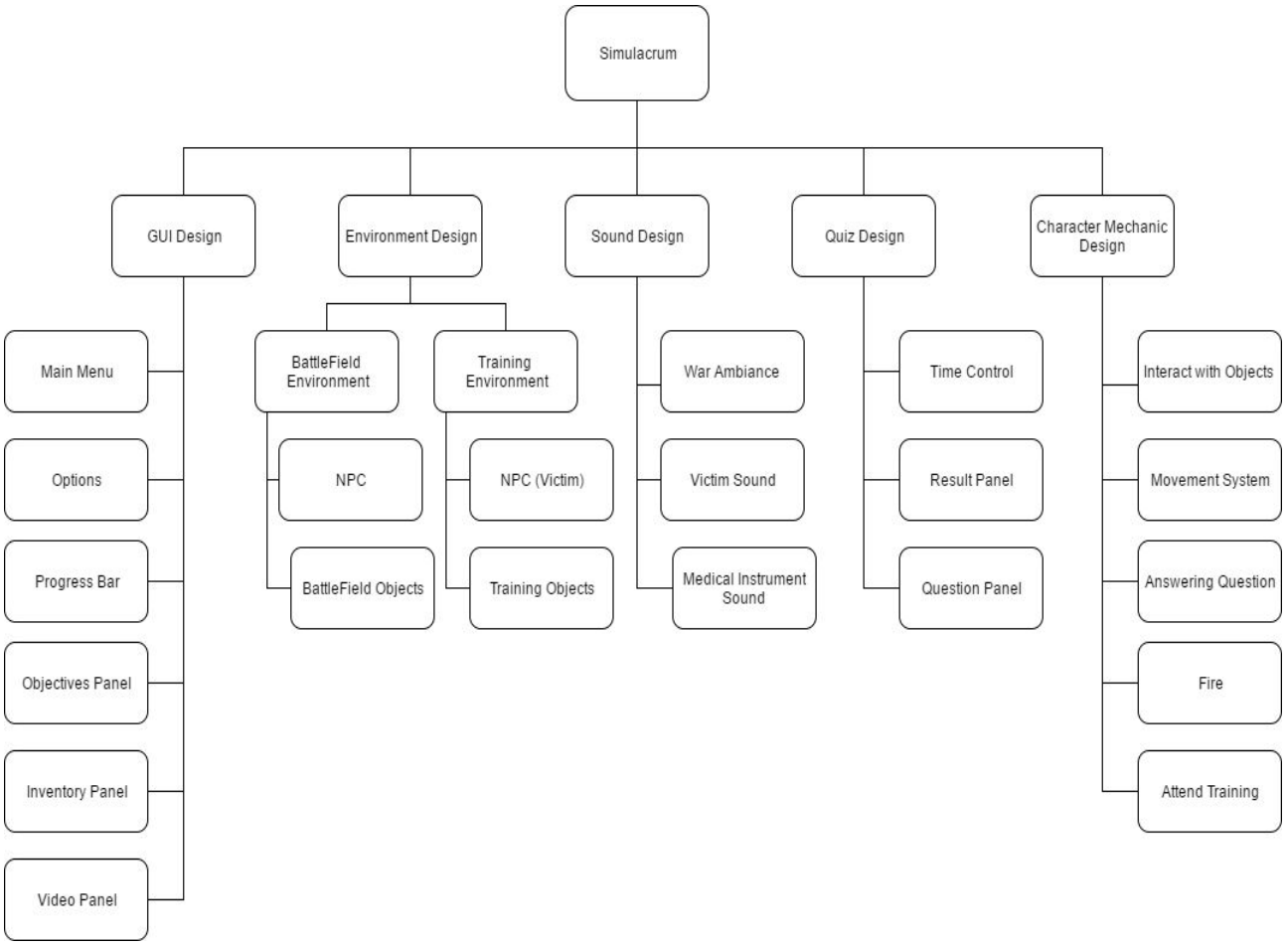


Figure 6 Project Components of Simulacrum

3.1 Brief Description of Figure 6

Components of the Simulacrum Project are shown in the *Figure 6*. All designed systems of the simulation are displayed in the block diagram in the figure. There are five main components of the system which have their own sub-systems.

3.1.1 GUI Design

GUI design is responsible for interaction between the actors and the system. There are six sub-systems in this design which are Main Menu, Options, Progress Bar, Objective Panel, Inventory Panel and Video Panel. Main Menu is a start page, participant can register, login, display the information about how to use the system, and logout from the system. There are two different ways to access the options menu. First of all, if HTC Vive is connected to the system, participant shall access options menu by activating the panel on the tip of the index

finger of

left hand with using right hand. Secondly, if HTC Vive is not connected to the system, options menu can be accessed by clicking esc button from keyboard. Participant can reach the progress bar from both simulation modes. Progress bar indicates the achievement of the participant. Objective panel can be reached from both simulation modes by clicking "O" from keyboard or can be accessed by activating the panel on the tip of the middle finger of the left hand with using right hand. Objective panel displays current objectives. Inventory panel can be accessed from both simulations. This panel is located on top of the screen. Inventory panel indicates participant's inventory that contains medical instruments. Video panel is shown from both of simulation modes. It will give information about first-aid and medical intervention techniques.

3.1.2 Environment Design

Environment Design is responsible for managing environment which the user interacts with objects. There are two types of environment in the system which are battle field and training environment. Training environment is more focused on education whereas battle field includes objects which are related to battle. Both of the environments includes NPC objects such as victims, soldiers, tanks, etc. to increase the level of immersion of the simulation.

3.1.3 Sound Editing

Sound design module is responsible for all audios which are used in simulation in order to increase the realism of the simulation especially for battle field mode. This system includes War Ambiance, Victim Sound and Medical Instrument Sounds.

3.1.4 Quiz Design

This sub-system manages all the question that are asked to the participant. This sub system includes Time Control, Result Panel and Question Panel.

3.1.5 Characteristic Mechanic Design

This design module is used for determining the participant's abilities. Participant can interact with objects using HTC Vive, move around the environment, answer questions in the quizzes, fire guns and attend trainings.

4. ENVIRONMENT

4.1 Modelling Environment

In this project, 3D image-based modeling technique is used to create virtual environment in Simulacrum. Objects in real life are modelled virtually using modeling tools such as Blender and these models are transferred into Unity3D project. Unity3D is capable of recognizing 3D object with extensions of FBX, OBJ, etc. [8].

In our simulation, we have two different environments which include 3D models. First environment is training scene which includes 3D models of NPC (victim) and medical instruments. In *Figure 7*, a victim who is injured in training environment can be seen. In this moment, it is expected from the participant to examine the wounds of the victim and start treating that wound correctly using items in the inventory panel. Inventory panel contains all the items in the possession of the participant and these items are displayed in grid view on the left side of the panel. If the participant would like to use an item from the inventory, s/he will click on the button of that item and that item will be displayed on the right side of the panel. It can be observed that the wounded victim is treated in the image on the right side by selecting an item from the inventory and using it upon the victim.

Figure 7 Wounded Person in Training Environment

Second environment is a battlefield. Apart from including NPC and medical instrument models, this environment also includes a terrain, tree, grass, armored vehicle, house and fighter jet models.

Figure 8 First Scene of Battlefield Environment

As it can be observed in *Figure 8* the participant shall start in a battle field along with his/her military unit. Initial objective of the participant is to neutralize every terrorist and secure the village in the *Figure 8*. Until any of the fellow soldiers are wounded, the participant shall act as a proper soldier as s/he is expected to fight with the terrorists using his/her gun.

Figure 9 A Fellow Soldier Getting Shot Scene of Battlefield Environment

In *Figure 9*, it can be observed that it is the moment of a fellow soldier is getting shot by a random enemy. In a certain part of the scenario, this event is planned to occur. To allow participant to practice medical intervention techniques, this event will always occur in some part of the simulation. In this case, it is expected from the participant to stop fighting and start performing necessary medical intervention technique immediately.

Figure 10 Wounded Soldier Scene of Battlefield Environment

In *Figure 10*, as it is expected from the participant, s/he gets closer to the wounded soldier in order to perform medical intervention technique. In order to perform this technique, participant must get to the indicator which will appear next to the wounded soldier. After reaching to this indicator, functionalities such as fighting and moving of the participant shall not be used in this part. Instead, medic bag which belongs to the participant shall appear and it will be expected from the participant to perform necessary medical intervention technique by selecting required items from this bag.

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