Application of fuel oil tank filling simulation and fire prevention with 3D animation in PT LIMAS REKAYASA(LIMAS)

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ABSTRACT

PT LIMAS REKAYASA is located at JL. Gandaria Raya, Block GG4 No. 1 Sukatani, Tapos, Depok, West Java 16454 is engaged in services, to always provide optimal results. The professional in question is an employee who actively develops his or her potential to have religious spiritual power, self-knowledge, personality, intelligence, noble character, as well as the skills he or she needs, society, nation and state.

Applications The simulation of fuel oil tank filling and fire prevention with 3D animation is one of the multimedia learning media technology to assist the trianer in the process of delivering working procedures and training and assisting new employee to understand and understand the working procedure, by giving medium of learning tool, and using Computer Aided Instruction (CAI) method which consists of tutorial, drill and practice, simulation. The development of this application must go through the stages in accordance with the chosen development method that is the development of multimedia applications Luther-Sutopo, in this application there are several functional candidates namely simulation, evaluation, value and fire prevention, while for trainers there are 3 menus.

Based on the results obtained from the research conducted it can be concluded that this application has been able to help trainers in explaining the process of delivery and training that is difficult to understand by prospective new employees, this application can help prospective new employees in understanding the material delivered by trainers.

Keywords: Simulation of Oil Fuel Tank, Fire Prevention, Interactive Multimedia, Computer Aided Instruction, Multimedia Luther-Sutopo.

1. INTRODUCTION

PT LIMAS REKAYASA was established since 2007, located at Jln. Gandaria Raya Block GG 4 No.1 Depok, West Java. PT LIMAS REKAYASA is engaged in various construction business such as Building Design in Commercial and Social Field, Architect and Interior Design and Installation, Construction Management Services (Construction Management Services) , Feasibility Study, Power Plant and Industrial Plant Design, Mechanical, Electrical, and Piping Design, Road and Bridge Design (Road and Bridge Design) Facility and Maintenance Services, Quantity Surveying Services (Quantity Surveying Services).

Based on the interview with Mr. AR. Yudha Siddhi as one of the licensing section in PT LIMAS REKAYASA, that they have professional trainers who hire new staff and determine whether or not the candidate qualified by giving training and self development to get the result of analysis which will be used as a measure of ability performance of prospective employees. In addition, the trainers are also tasked to provide an explanation of the work procedure planning to prospective employees.

However, sometimes professional trainers at PT LIMAS REKAYASA have difficulties where it is seen from many new employee candidates who have difficulties in understanding the training process, the difficulty is seen from the number of new employees who do not know what to do in conducting the training. This leads to the value of training obtained by new employees many under the criteria, from the data obtained it can be concluded that the overall

average value is 70 while the passing standard is 75. This value is still below the expected standard. This indicates that the still low understanding of new employees on the training process has been taught.

This makes the trainer difficult in choosing the right training that will be given to new prospective employees to be easily understood and in accordance with the needs of the company. In the case study presented by AR. Yudha Siddhi is expected by professional trainers to be more wise in providing training at PT SHELL INDONESIA gas station that will build gas station in jln.Wastukencana no 75 in order to provide training that can fulfill what is needed to expedite the training program. For now, the system of planning and submission of work procedures to prospective employees only through printed media, and oral submission directly in the field without interactive media, this resulted in low understanding of prospective new employees in the process of delivering professional trainers to the training.

Provided and the amount of time and budget, causing obstacles for prospective employees to understand, especially the crew of fuel trucks (tank drivers) in charge of delivering fuel tanks, how to work in and out of fuel tanks, how to refuel fuel tanks to storage areas, and candidates others. employees on how to refuel to consumers according to SOP, and how to handle fire action. This is a problem for PT LIMAS REKAYASA (LIMAS), especially professional trainers because it slows down the planned goals. Based on the problems that have been described above, it takes a more interactive media, making it easier for trainers to process work planning procedures in the field.

1.1 Research Methodology

Research methodology is a step process used to solve a logical problem, requires data to support the implementation of a study. Research methodology used in research in PT LIMAS REKAYASA (LIMAS) is using descriptive analysis method where the data to be used in this research are symptoms, events, events.

Descriptive analysis method is a method that describes facts and information in the current situation or event in a systematic, factual, and accurate.

1.1.1 Data Collection Stage

Data collection methods are obtained directly from the research object. Stages of data collection used are:

A. Literature Study

This research is conducted by studying, researching and reviewing various library literature derived from books, texts, and readings that have something to do with the research topic.

B. Field Studies

This research is done by visiting the place to be studied and data collection is done directly. include:

1. Interview
Interview is one way of data collection by way of question and answer directly with related institutions of research.
2. Observation
Observation is data collection by doing direct observation with related institutions of research.
3. Library Studies
The study of literature is done by studying various literatures, such as books, articles and resources relating to the material to be discussed.

1.1.2 STAGE DEVELOPMENT OF THE SOFTWARE

The method used for this step is the Multimedia Application Development Method from Luther-sutopo [1] as shown in Figure 1 which includes:

1. Concepts

Concept stage is a stage to determine the purpose and who the user program (identification audience). In addition, he determines the type of application (presentation, interactive, etc.) and application objectives (entertainment, training, learning, etc.).

2. Design

Design (design) is the stage to create a specification about the program architecture, style, appearance and material needs / materials for the program.

3. Material Collecting

This stage is where the collection of materials that fit the needs done. This stage can be done in parallel with the Assembly stage. In some cases, the Material Collecting stage and Assembly stage will be worked out in a linear fashion not parallel.

4. Assembly

The Assembly stage is the stage where all multimedia objects or materials are created. Making this application is based on the design stage.

5. Testing

The Testing stage is done after completion of the assembly stage by running the application / program and see if there is any error or not. This stage is also referred to as the alpha test stage (alpha test) in which the test is performed by the manufacturer or the manufacturer's own environment.

6. Distribution

This stage where the application is stored in a storage medium. At this stage is not enough to accommodate the application, then the compression of the application.

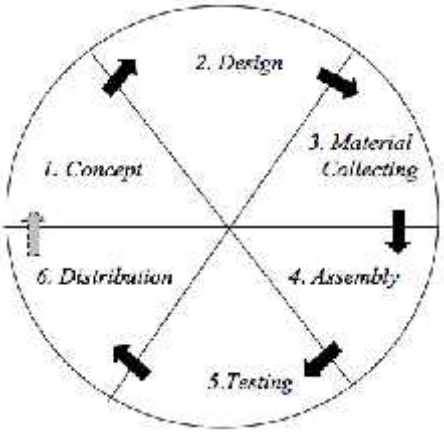


Figure 1. Luther-Sutopo Software Method

1.2 Learning Media

Schramm explained that instructional media is "messenger technology that can be utilized for learning purposes". According to Briggs suggests that instructional media is "the physical means to deliver content or learning materials such as books, films, videos, slides, and so on" [2].

Rayanda Asyar suggests that "learning media can be understood as anything that can convey or distribute messages from sources in a planned manner, resulting in a conducive learning environment where recipients can perform the learning process efficiently and effectively.

1.3 Multimedia

Multimedia in general is the incorporation of various information using the facilities of the computer. Multimedia derived from multi word meaning many or more than one and media which can be interpreted to represent a place. Multimedia is the use of computers to create and combine text, audio, images, moving (video and animation using links and tools that allow the use of navigating, interacting, creating and communicating.

1.4 3D Animation

3D animation is defined as a process of animating or moving images to something static in order to look alive and dynamic. Animation briefly refers to the process of adding movement to static images using various methods. Animations can also refer to the graphically exposed set of frames in a frame or object.

1.5 Blender

Blender is a suite of 3D software that is quite complete among open source software. The tools provided are simple, but they already cover the entire need for animated movie making. One major advantage Blender is an integrated game engine and with the game engine can be created interactive software, be it games, presentations, or interactive web. For lighting Blender provides radiosity facility.

With radiosity, realistic lighting effects can be created, resembling the real world.

Although its implementation in Blender is still fairly simple and still far from perfect but radiosity is a facility that is not found in some commercial animation software even the big name.

1.6 Unity 3D

Unity 3D is a cross-platform based game engine. Unity can be used to create games that can be used on computer devices, smart phones android, iPhone, PS3, and even X-BOX. Unity is an integrated tool for creating games, building architecture and simulations. Unity can be for PC games and Online games. For Online games required a plugin, the Unity Web Player, as well as Flash Player on Browser.

Unity is not designed for design or modeling, because unity is not a tool for designing. If you want to design, use another 3D editor such as 3dsmax or Blender. Many things can be done with unity, there is an audio feature reverb zone, particle effect, and Sky Box to add sky. Scripting feature provided, supports 3 programming languages, JavaScript, C #, and Boo. Flexible and EasyMoving, rotating, and scaling objects need only a line of code. So also with Duplicating, removing, and changing properties.

2. RESEARCH CONTENTS

2.1 Analysis of Learning Methods

Learning methods used can affect the success of the learning process, of course, need to be supported using the right media for learning purposes can be achieved. Learning method used in this application development is Computer Assisted Instruction (CAI) method with concept of tutorial, drill and practice, and simulation [3].

1. Tutorial

The tutorial concept is used for delivery or as an introduction to be delivered by the trainer at each meeting. So in a short time, it is expected that prospective employees can understand and understand. Can be seen in the following picture:

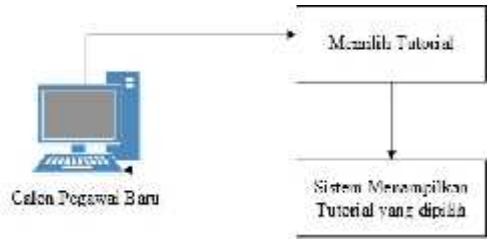


Figure 2. Plot Concept Flow

2. Drill And Practice

Drill concepts are used to train or test new employee candidates by displaying a series of tests, whether prospective new employees already understand the delivery given or not. Test performed in the form of theory and practicum.

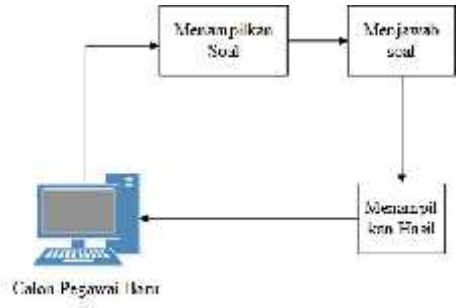


Figure 3. Drill and Practice Concept Flow

3. Simulation

The concept of simulation is used to provide an idea to prospective new employees how the process of activities carried out. So prospective new employees are expected to understand and know how activities are done.

The simulation concept flow in simulation application of fuel oil tank filling and fire prevention way can be seen in the following figure.

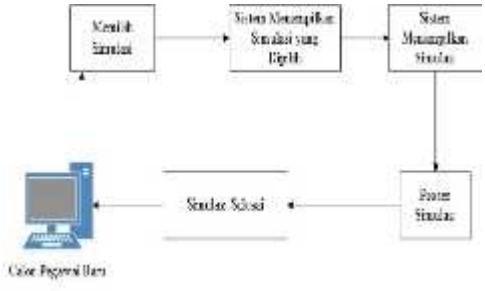


Figure 4. Flow of Concept Simulation

2.2 Analysis of Object Modeling

At this modeling stage modeling using Blender tools. This stage will produce 3D models in the form of buildings, vehicles and property. The modeling of training object and work procedure planning at PT Limas Engineering currently is as follows:

2.3.1 Cars

1. Phase Sketch and Modeling Car is the initial stage in making the modeling and can be seen in the picture below:



Figure 5. Sketches and Modeling Cars

2. Texturing The car is the stage in making improvements of colors, kebuthan and other features to be built in the modeling.



Figure 6. Texturng Car

3. Rendering Stage The car is the last stage of workmanship in modeling and texturing, and the stage can be seen in the following figure:



Figure 7. Car Rendering

2.3.2 Trucks

1. Phase Sketch and Modeling Truck is the initial stage in making truck modeling results from the stages can be seen in the picture below:



Figure 8. Sketches and Model Trucks

2. Texturing the truck is the stage in making improvements of the colors, kebuthan and other features to be built in the modeling.

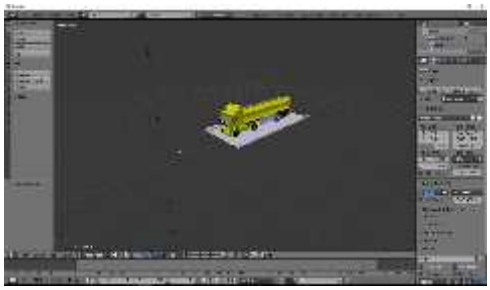


Figure 9. Texturing Trucks

3. Rendering Stage The car is the last stage of the work in making the modeling and texturing, and the stages can be seen in the picture below:



Figure 10. Rendering Trucks

2.3.3 Building

1. Phase Sketch and Building Modeling is the initial stage in making the modeling and can be seen in the picture below:

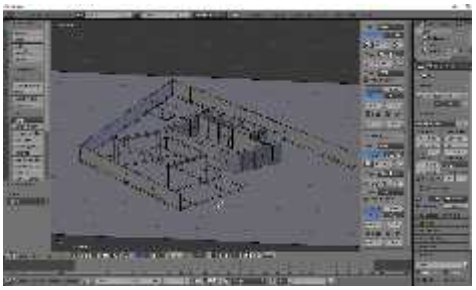


Figure 11. Sketches and Building Modeling

2. Texturing Building is the stage in making improvements of colors, kebuthan and other features to be built in the modeling.

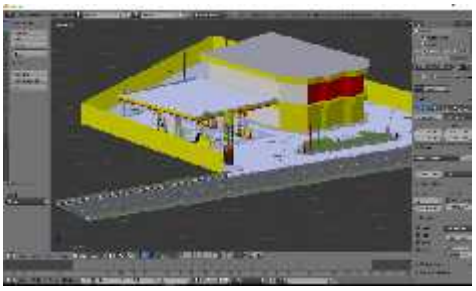


Figure 12. Texturing Building

3. Building Rendering Stage is the last stage of workmanship in making modeling and texturing, and the stage can be seen in the following picture:



Figure 13. Building Rendering

2.3 Fungsional Requirement Analysis

In this case, the concept of Object Oriented Programming is used to develop it modeled with UML (Unified Modeling Language).

Use Case Diagram, Activity Digram, Class Diagram and Order Chart.

2.4.1 Use Case Diagram

Use case diagram is used to describe a number of external actors with use cases contained in the system. Use case diagram only describes the state of the system environment that can be viewed from the outside by the actor. Use case consists of three parts, namely actor definition, use case definition, and use case scenario.

Use case contained in the construction of this application can be seen in the following figure:

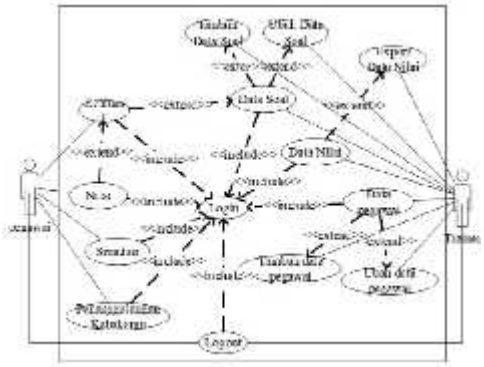


Figure 13. Use Case Diagram

2.4.2 Use Case Scenario

Here is the use case scenario table Conducting Simulations that exist on the system being built, in the table below is an explanation of the actions of the use case Doing Simulation.

Table 1. Use Case Simulation Scenario

Use Case Name	**Simulasi**	
Goal In Context	Menampilkan simulasi	
Preconditions	Pegawai berada pada menu utama	
Succesful End Condition	Berhasil menampilkan simulasi	
Failed End Condition	Gagal menampilkan simulasi	
Primary Actors	Pegawai	
Secondary Actors	-	
Trigger	Menekan tombol simulasi	
Main Flow	***Step***	***Action***
	1	Menekan tombol simulasi
	2	Menampilkan halaman simulasi
	3	Melakukan simulasi
	4	Menekan tombol selesai
	5	Kembali ke Main menu

2.4.3 Activity Diagram

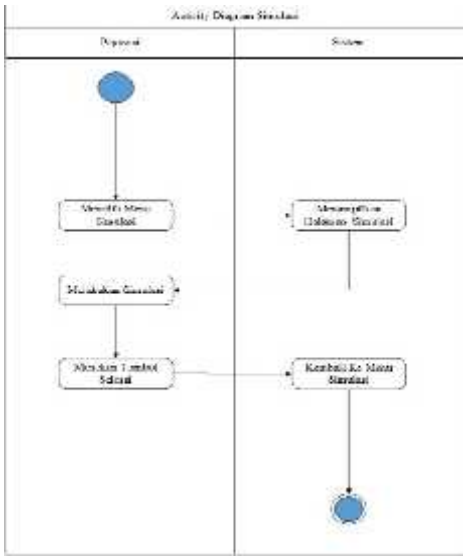


Figure 14. Activity Diagram Simulation

2.4.4 Class Diagram

Class diagrams or class diagrams contain three types of classes in the system, namely Boundary class, Control class, and Entity class. The Boundary class is a class used to build the system interface.Control class is a class that is used as a place of all processes in the system and also validator that checks validation of incoming data, and Entity class is a class that is used as data container or data representation itself.

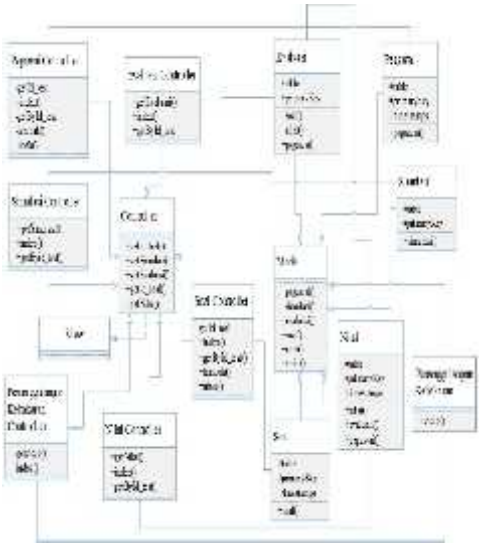


Figure 15. Class Diagram

2.4.5 Sequence Diagram

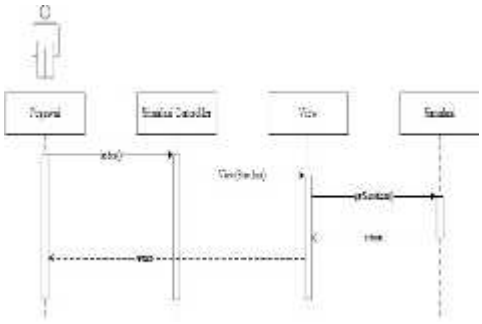


Figure 16. Sequence Diagram Simulation

2.5 System Design

System design aims to specify the technical aspects of the solution in the planning. At this stage design will be defined in detail to address more technical issues, related to implementation activities such as menu design, interface design, and semantic networking.

2.5.1 Employee Menu Structure

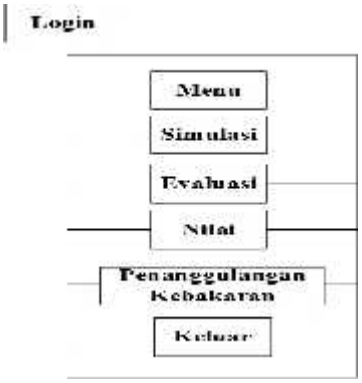


Figure 17. Employee Menu Structure

2.5.2 Structure of the Menu Trainer

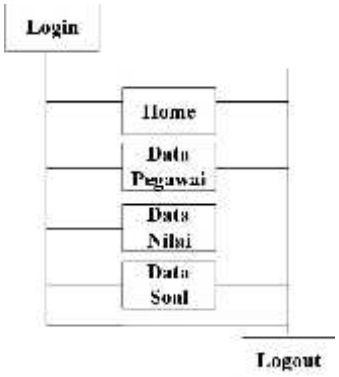


Figure 18. Structure Menu Structure

2.6 Interface System Implementation

Implementation of the interface is done with each program page created in the form of program files. The following is the result of the implementation of the interface of the design that has been made before can be seen in the table and picture:

Table 2. Interface Implementation

No	Nama Antarmuka	Keterangan
1	Halaman Login	Halaman untuk pengguna aplikasi
2	Halaman Menu Utama Karyawan	Halaman yang didalamnya terdapat 5 menu pilihan untuk karyawan seperti simulasi, evaluasi, nilai, penanggulangan kebakaran, keluar
3	Halaman Simulasi	Halaman yang didalamnya terdapat simulasi yang nantinya akan dilaksanakan
4	Halaman Evaluasi	Halaman yang didalamnya berisi soal dari simulasi yang dilaksanakan
5	Halaman Nilai	Halaman yang berisi nilai dari hasil evaluasi yang telah dilakukan
6	Halaman Penanggulangan Kebakaran	Halaman yang didalamnya berisi pilihan vidio pengenalan kebakaran
7	Halaman Home Trainer	Halaman yang didalamnya berisi informasi trainer, pegawai, nilai, soal
8	Halaman Data Pegawai	Halaman yang didalamnya berisi data-data pegawai
9	Halaman Data Soal	Halaman yang didalamnya berisi data soal
10	Halaman Data Nilai	Halaman yang didalamnya berisi data nilai keseluruhan pegawai

1. Implementation of Login Interface



Figure 18. Implementation of Login Interface

2. Main Menu Interface Implementation

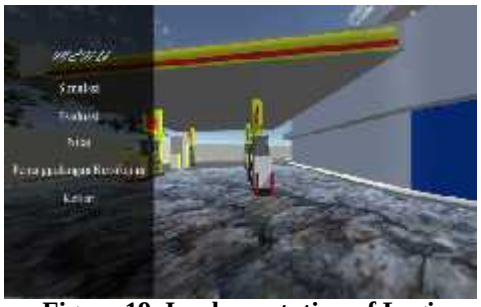


Figure 19. Implementation of Login Interface

3. Implementation of Simulation Menu Interface

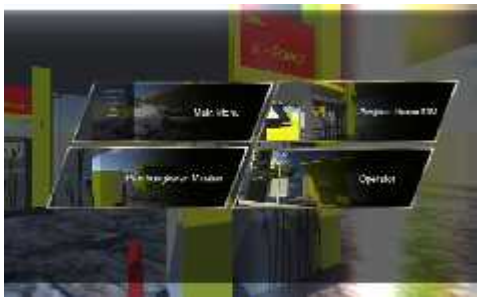


Figure 20. Implementation of the Simulation Menu Interface

4. Implementation of Simulation Interface



Figure 21. Implementation of Simulation Interface

5. Implementation of Evaluation Menu Interfaces



Figure 22. Implementation of Evaluation Menu Interfaces

6. Implementation of Value Menu Interface

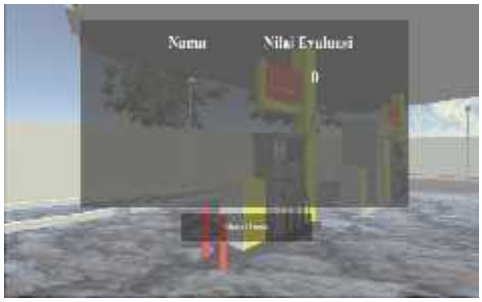


Figure 23. Implementation of Value Menu Interface

7. Fire Menu Interface Implementation



Figure 24. Implementation of Fire Interface

8. Implementation of Menu Trainer Interface



Figure 25. Implementation of Trainer Interface

9. Implementation of Employee Information Interface



Figure 26. Employee Information Interface Implementation

3. CLOSING

3.1 Conclusions

Based on the results of research, analysis, system design, and implementation and testing, it can be concluded that the Development of simulation application of fuel tank fueling and fire prevention measures are as follows:

a. Simulation applications help facilitate trainers in training so that they are more efficient.

b. Simulation applications help facilitate trainers in the delivery of work procedure planning to prospective employees with more interactive media.

c. The simulation application helps make it easier for prospective employees to more easily understand about work procedure planning.

3.2 Suggestions

Based on the results of the research, the suggestions that can be put forward for future improvement and consideration are as follows:

a. Added number of simulations to be simulated.

b. Adds interesting features to the app to make it more appealing like VR and touch screen.

c. Added a much more interactive simulation feature.

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