Augmented Reality of Laboratory Apparatus: Mobile Application

Joshua Emil P. De Castro
Lyceum of the Philippines University
Capitol Site, Batangas City
09178676261
joshuaemil.decastro@lpubatangas.edu.ph

Jose Mari D. Galicha
Lyceum of the Philippines University
Capitol Site, Batangas City
09995825211
josemari.galicha@lpubatangas.edu.ph

Bernard M. Enriquez
Lyceum of the Philippines University
Capitol Site, Batangas City
09061782802
bernard.enriquez@lpubatangas.edu.ph

Jayson A. Maala
Lyceum of the Philippines University
Capitol Site, Batangas City
090368774580
jayson.maala@lpubatangas.edu.ph

ABSTRACT

This study entitled "Augmented Reality on Laboratory Apparatus: Mobile Application" aimed to provide a more creative way of learning. This application was provided for the students to have an entertaining way of learning this is created especially for chemistry taking students. This mobile application makes the 2D images into 3D model that can rotate and zoom to give more detailed parts. It also provides an entertaining and interactive learning. It generates a composite view for the user that is the combination of the real scene viewed by the user and a virtual scene generated by the computer that augments the scene with additional information.

This is specially created for chemistry courses students to inspire to become develop an application that can enhance our education. This mobile application minimizes the stress and difficulty the student always encounter when they need to study the laboratory apparatus. It provides the intended functionality for the user. This mobile application may also be applied on books; it can turn a simple book into augmented reality book by just printing the registered 2D images on the book. This mobile application can easily get the attention of the users specially those who those who have trouble in learning Apparatus.

KEYWORDS: *Augmented Reality*, *Laboratory Apparatus*, *Mobile Application*, *2D Image*, *3D models*,

1.0 INTRODUCTION

Augmented reality (AR) is a live immediate or roundabout perspective of a physical, certifiable condition whose components are enlarged (or supplemented) by PC created tactile information, for example, sound, video, designs or GPS information. It is identified with a more broad idea called intervened reality, in which a perspective of the truth is altered (perhaps even decreased instead of enlarged) by a PC. Thus, the innovation capacities by improving one's present view of reality.[2] By differentiate, virtual reality

replaces this present reality with a mimicked one.

This application used camera and interaction of the user, it is based on the definition of every apparatus and it will help the user to easily discuss the purpose of the apparatus. AROLA is referred as a mobile application that is interactive and an application having multiple multimedia elements. Those elements are text, video, graphics, animation and sound. It is referred to both software and hardware use to create and run the application. This application will provide the users additional knowledge other than what they have in mind.

There are buttons that are available to use by the users to view the camera and the other information. As the users launch the application, there are buttons that are displayed including: Take a Picture, About, Credits and Exit button.
Start – in this button, you can start the app using the camera lens.
About App– you can use this button to view what is the information about the application.
About Us – you can use this button to view the developers of the application.
Gallery – you can us this button to view the sample 2D images for the application.
Exit – you can use this button to exit the entire application.

This capstone project attempts to build a mobile application that will provide the student the knowledge that they've been seeking and learn how to use the apparatus properly. It is hoped that the application to be developed will be helpful for the instructors or teachers that is teaching Chemistry.

It will provide a different definition for each and every apparatus used in laboratory Chemistry like Beakers, Erlenmeyer flasks, Florence flasks, Test tubes, racks, Crucibles, Microscope, Volumetric flasks, Droppers, Pipettes, Sink and Tongs. This will show a brief discussion on how you will use the apparatus in order or properly. AROLA is created in SDK Android Eclipse and program in Visual Studio Java and C#, this will help the user to understand the scenario of our capstone.

In this application, the users learn about the definition of a laboratory apparatus when the users hovers the phone onto the booklet we provided.

This study will only focus on laboratory apparatus used in Chemistry. This application is limited for android devices only. This is limit for Chemistry Laboratory Apparatus only. This contains twelve (12) Laboratory Apparatus.

1.1 Objectives of the study

1. To develop an Augmented Reality mobile application of Laboratory Apparatus
2. To use multimedia in creating the models and patterns of the Laboratory Apparatus

3. To use Unity Vuforia and Visual Studio in developing the mobile application

2.0 LITERATURE REVIEW

Mobile Application

Mobile applications regularly alluded as "applications", are thought to be one of the quickest developing patterns in Information Systems industry (Eddy, 2011). Clients appreciate the assortment of highlights that portable applications can give rapidly and without bringing pointless intricacy into their plans. Accordingly, portable applications show a more mainstream interface for connection with business frameworks than utilizing web applications by means of Web Browser. While portable streamlining is incredible for end clients enabling boundless access to information and data whenever and anyplace, it postures huge difficulties to the organizations and substance proprietors responsible for conveying versatile client encounters for better portable commitment.

Android

Android is a generally new stage. It is created by Google, Inc., and its first discharge was introduced in 2007 (Meier, 2010). Android is introduced on a wide range of cell phones and its clients can download Android applications and other substance through Google Play service, which supplanted the old Android Market (Bishop, 2012). As the official Android site depicts this stage. Android is a product stack for cell phones that incorporates a working middleware, frameworkand key applications what's more, has powers a huge number of telephones, tablets and different gadgets. Telephones and tablets are cell phones that can have Android applications introduced on them.

These applications are composed in Java programming dialect ("What is Android," 2012) and they are called cell phone applications or applications. Advancement strategies for applications are organized arrangements of Java code concentrated on executing specific errand that gives substance to a cell phone application. In spite of the fact that Java programming dialect incorporates a wide assortment of themes, it centers around advancement methods required for fruitful execution of Android Mobile EMU Portal. The accompanying passages break down research endeavors that tended to these strategies previously. Android Fundamentals Many creators depicted Android application improvement essentials, which incorporate setting up Android advancement condition on the machine, AndroidManifest.xml record, Activities, Intents, and XML designs

Augmented Reality

Augmented reality has a connection to the idea of virtual reality (VR). VR interest to make a fake world that a man can involvement and investigate intuitively, prevalently through his or her feeling of view, yet in addition by means of sound, material, and different types of input. AR additionally achieves an intuitive ordeal, yet intends to added substance this

present reality, as opposed to making a totally manufactured condition. The physical protests in a single individual's environment.

To practically coordinate 3D designs into ill-equipped environment, camera position must be assessed by following common picture highlights. They apply their system to situations where include positions in neighboring edges of a picture grouping are connected by a homography, or projective change. They portray this present change's calculation and show a few applications. To start with, They utilize an increased notice board to clarify how a homography, between two pictures of a planar scene, totally decides the relative camera positions. Second, they demonstrate that the homography can likewise recoup unadulterated camera revolutions, and they utilize this to build up an open air AR following framework. Third, they utilize the framework to quantify head pivot and shape a basic minimal effort virtual reality (VR) following arrangement. [5]. .

They portray an enlarged reality conferencing framework which utilizes the front of virtual pictures on this present reality. Remote associates are spoken to on virtual screens who can be openly situated about a client in space. Clients can cooperatively see and communicate with virtual items utilizing a mutual virtual whiteboard. This is conceivable through precise virtual picture enrollment utilizing quick and exact PC vision systems and head mounted show (HMD) alignment. They propose a strategy for following fiducial markers and an adjustment technique for optical transparent HMD in light of the marker following. [3]

The benefits of paper-based maps have been used in the field of versatile Augmented Reality (AR) over the most recent couple of years. Conventional paper-based maps give high-determination, expansive scale data with zero power utilization. There are various executions of enchantment focal point interfaces that consolidate high-determination paper maps with dynamic handheld presentations. From a HCI viewpoint, the fundamental test of enchantment focal point interfaces is that clients need to switch their consideration between the enchantment focal point and the data out of sight. In this paper, They endeavor to beat this case by utilizing a lightweight versatile camera projector unit to enlarge the paper outline with extra data. The "Guide Torchlight" is followed over a paper outline can absolutely feature purposes of intrigue, avenues, and territories to give headings or other direction for associating with the guide. [9]

The CyberCode is a visual labeling framework in view of a 2D-scanner tag innovation and gives a few highlights not gave by other labeling frameworks. CyberCode labels can be perceived by the minimal effort CMOS or CCD cameras found in more cell phones. This paper portrays cases of expanded reality applications in view of CyberCode, and talks about some key attributes of labeling advancements that must be considered when outlining increased reality environment. It can likewise be utilized to decide the 3D position of the

labeled protest and in addition its ID number. [7]

This paper examine increased reality (AR) shows in a general sense, inside the setting of a reality-virtuality (RV) continuum, incorporating an expansive class of `mixed reality' (MR) shows, which additionally incorporates enlarged virtuality (AV). MR shows are characterized by methods for seven cases of existing showcase ideas in which genuine items and virtual articles are compared. Basic variables which recognize diverse MR show frameworks from each other are displayed, first by methods for a table in which the idea of the basic scene, how it is seen, and the spectator's reference to it are thought about, and afterward by methods for a three dimensional ordered system containing: degree of world learning, propagation constancy, and degree of quality representation. A primary goal of the scientific classification is to illuminate phrasing issues and to give a system to ordering . [6]

The MagicBook venture is an early endeavor to investigate how we can utilize a physical protest easily transport clients amongst reality and virtuality. Youthful kids regularly fantasize about flying into the pages of a tall tale and winding up some portion of the story. The MagicBook venture makes this dream a reality utilizing an ordinary book as the principle interface protest. Individuals can turn the pages of the book, take a gander at the photos, and read the content with no extra innovation. In any case, if a man takes a gander at the pages through an increased reality show, they see 3D virtual models showing up out of the pages. The models seem connected to the genuine page so clients can see the enlarged reality scene from any point of view by moving themselves or the book. The virtual substance can be any size and is enlivened, so the expanded reality see is an improved rendition of a conventional 3D fly up book. [4]

This paper displays a reality-virtual fusional grounds condition. It is an online 3D stage with a few parts of genuine data combined. The entire stage depends on OpenSimulator with nitty gritty geo-models to speak to the college grounds. Some preparatory examinations were done to coordinate the sensible data with the virtual grounds for making the geo-condition with point by point indoor and open air models, as well as with the genuine portrayals of the physical world. The general inspiration is to give a structure solid help for reality-virtuality fusional demonstrating in a collective 3D online stage for explore purposes [10]

In this paper we show new association strategies for virtual conditions. In light of an expansion of 2D MagicLenses, we have created methods including 3D focal points, data separating and semantic zooming. These strategies furnish clients with a characteristic, substantial interface for specifically zooming all through particular regions of enthusiasm for an Augmented Reality scene. They utilize fast and liquid activity to enable clients to absorb the connection between perspectives of itemized center and worldwide setting. And also supporting zooming, the method is promptly connected to

semantic data separating, in which just the appropriate data subtypes inside a sifted area are appeared. We portray our executions, preparatory client input and future headings for this exploration. [1]

This paper studies the field of enlarged reality (AR), in which 3D virtual articles are coordinated into a 3D genuine condition continuously. It portrays the restorative, producing, representation, way arranging, excitement, and military applications that have been investigated. This paper depicts the qualities of increased reality frameworks, including a point by point discourse of the exchange offs amongst optical and video mixing approaches. Enlistment and detecting mistakes are two of the most serious issues in building successful expanded reality frameworks, so this paper abridges current endeavors to defeat these issues. Future headings and zones requiring further research are talked about. This overview gives a beginning stage to anybody intrigued by looking into or utilizing augmented reality.[8]

3.0 METHODS

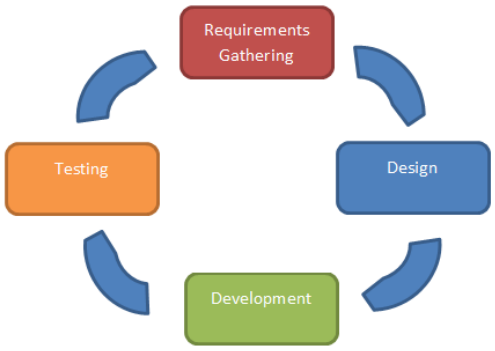


Figure 1: Agile Method

The Agile Method is a specific way to deal with venture administration that is used in programming advancement. This strategy helps groups in reacting to the unconventionality of developing programming. It utilizes incremental, iterative work groupings that are normally known as runs.

Requirement Gathering

This phase is based on gathering information by knowing the different requirements and steps on creating object scanner in the internet. The researchers also browse for video clips tutorials in YouTube to easily coup up with the topic.

Design

This is where the authors focus on making the layout of the application to be user friendly. The authors used Photoshop for editing and processing the Graphic User Interface

Development

This is where the application is being put together

Testing

The authors then verified the whole application. They tested the buttons and the camera if they are responding properly. The authors also tested the accuracy of their application

4.0 DISCUSSIONS

Flowchart

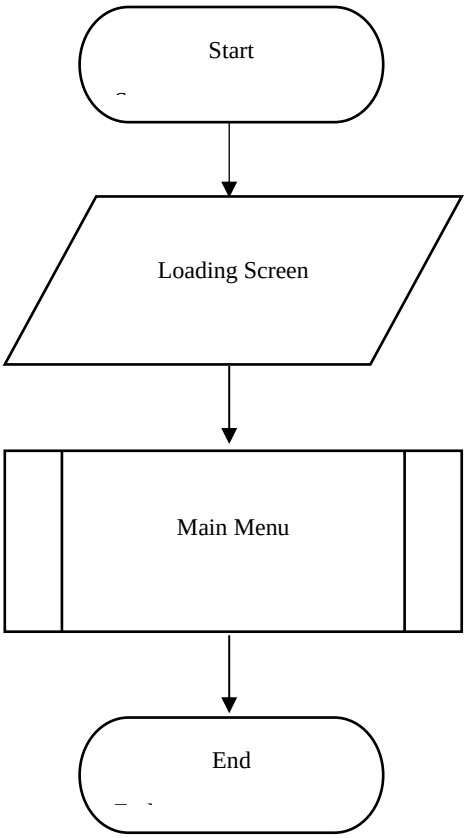


Figure 2 : Loading Screen

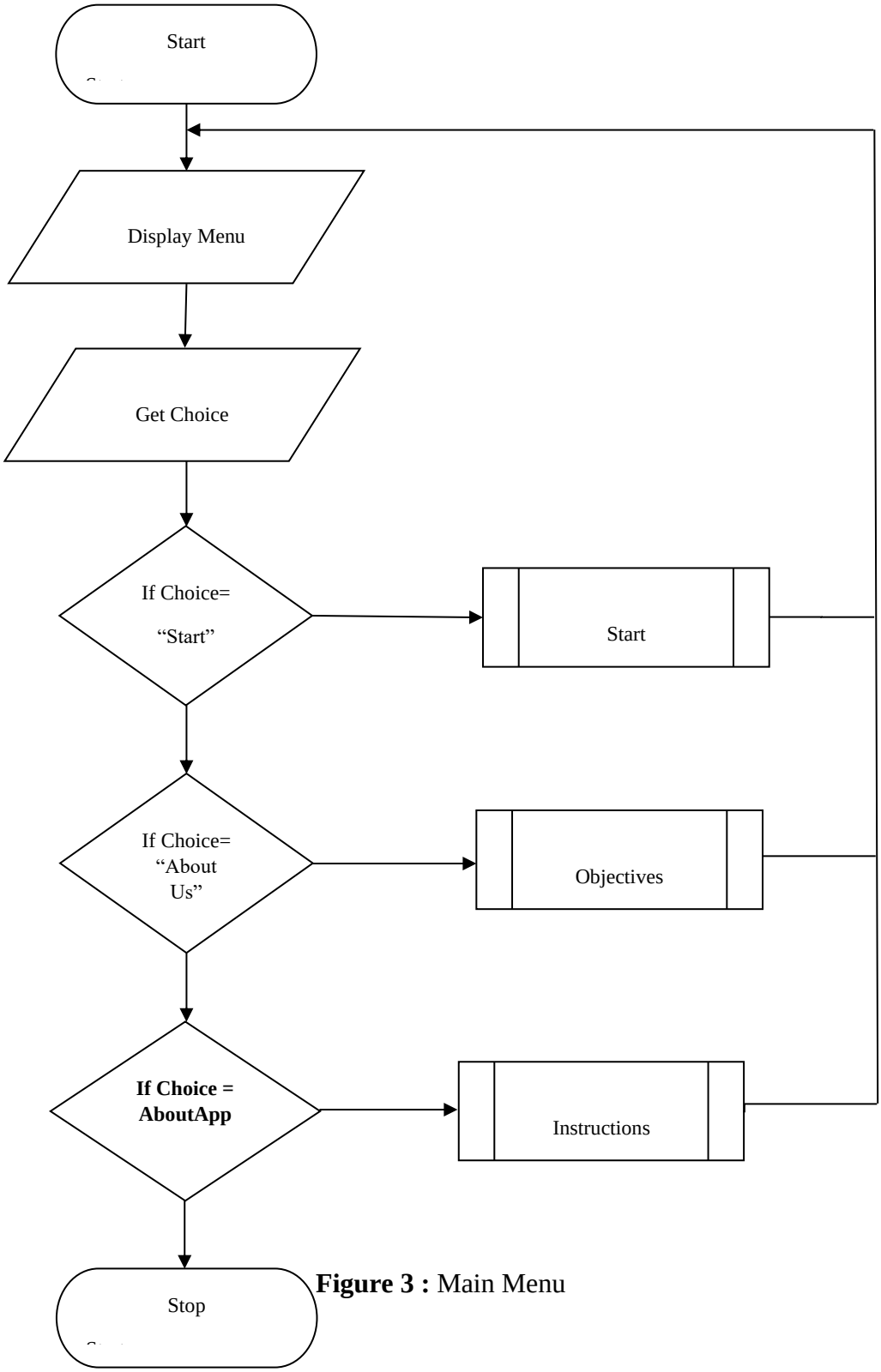


Figure 3 : Main Menu

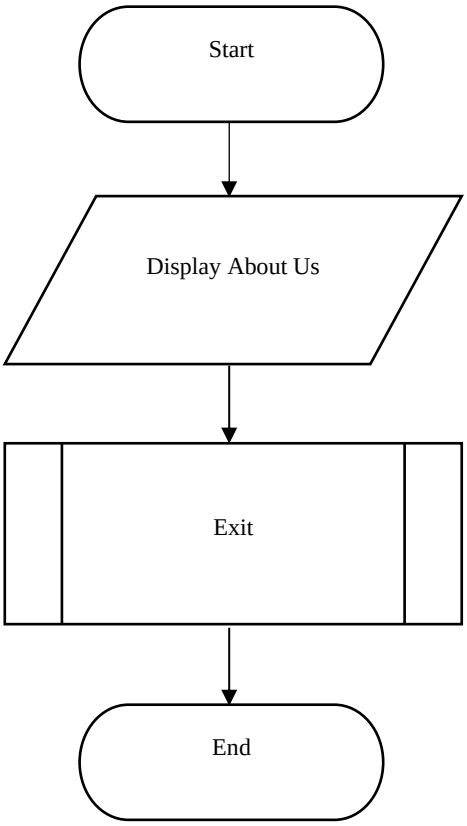


Figure 4 : About Us

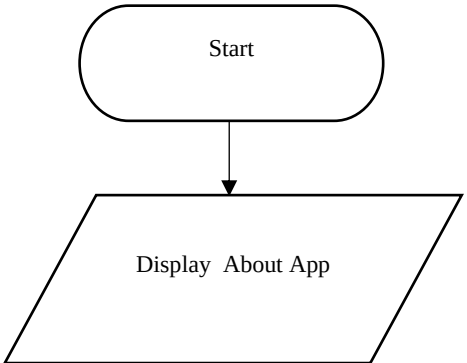


Figure 5 : About App

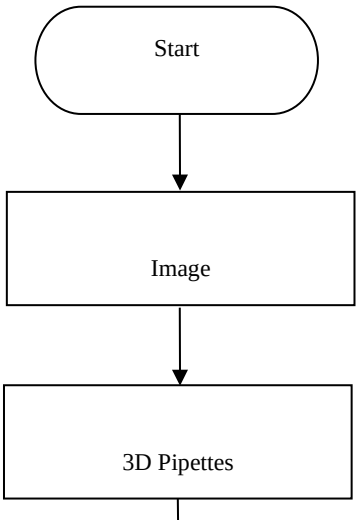


Figure 6 : Start Pipettes

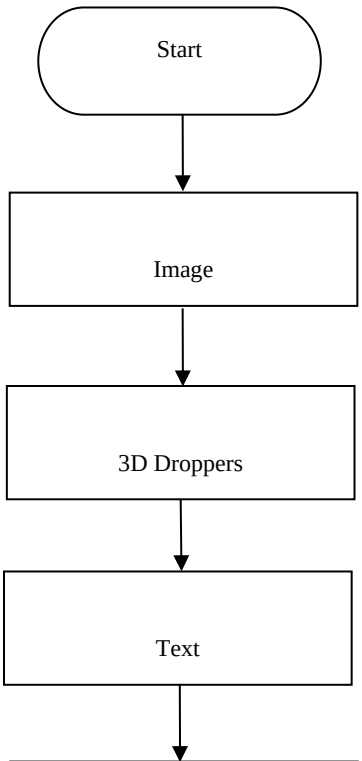


Figure 7 : Start Droppers

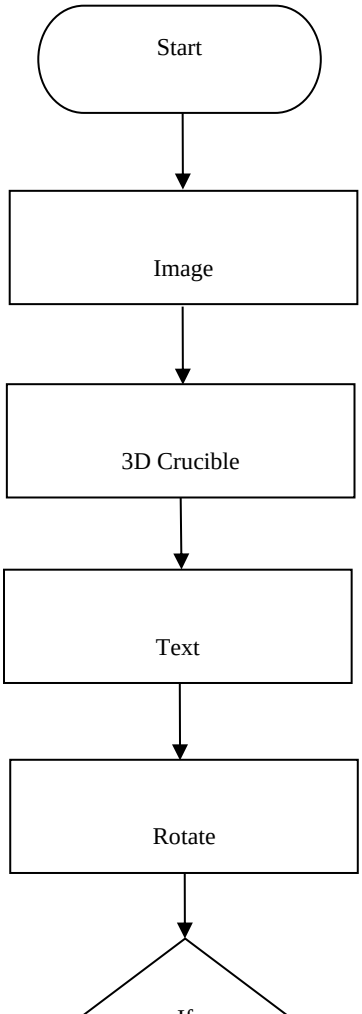


Figure 8 : Start Crucible

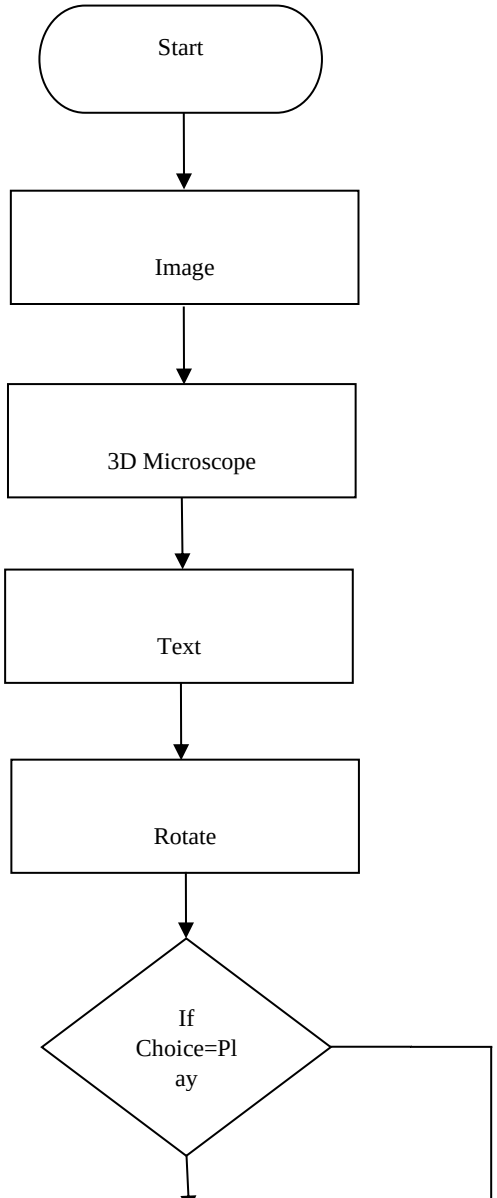


Figure 9: Start Microscope

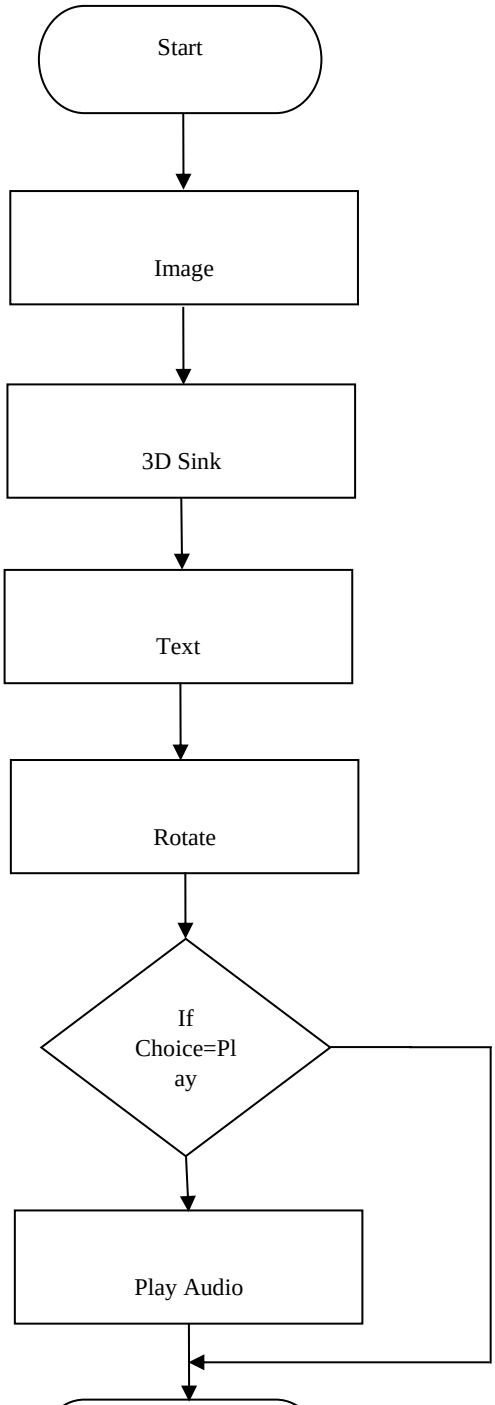


Figure 10 : Start Sink

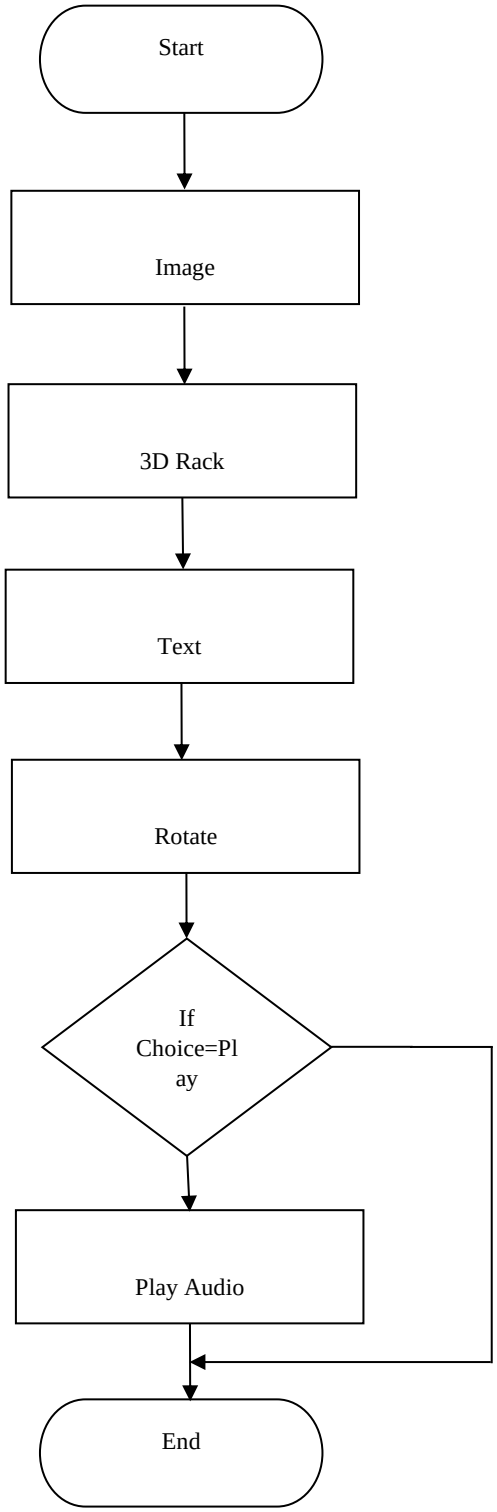
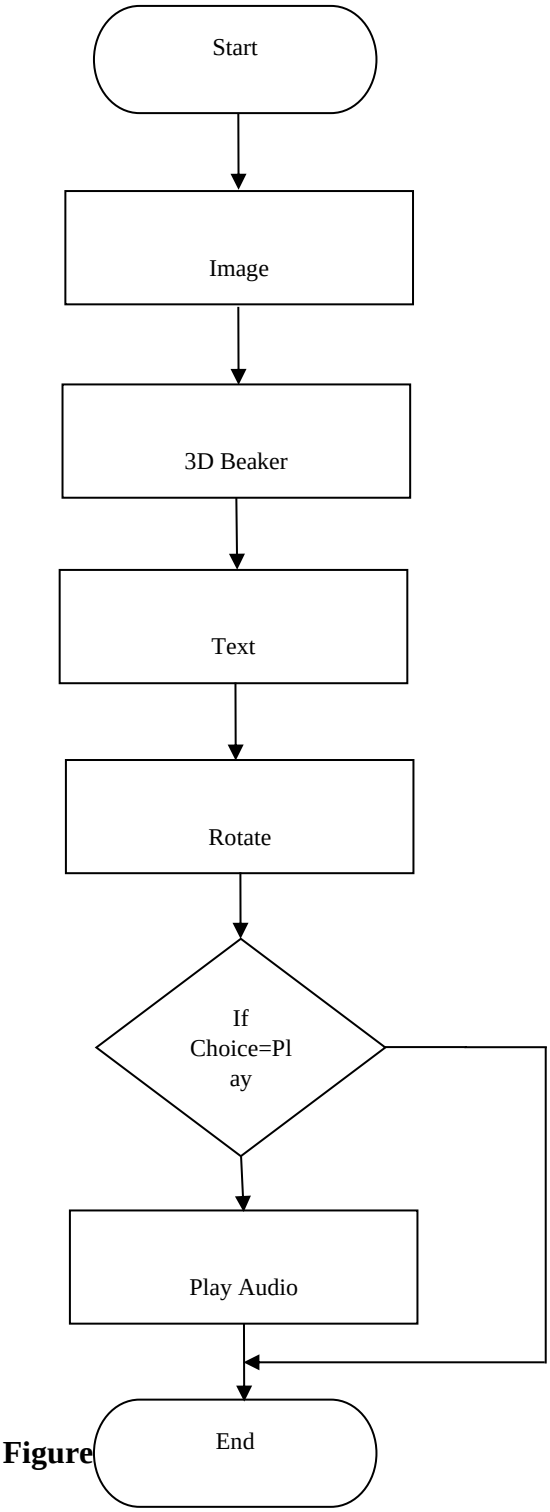
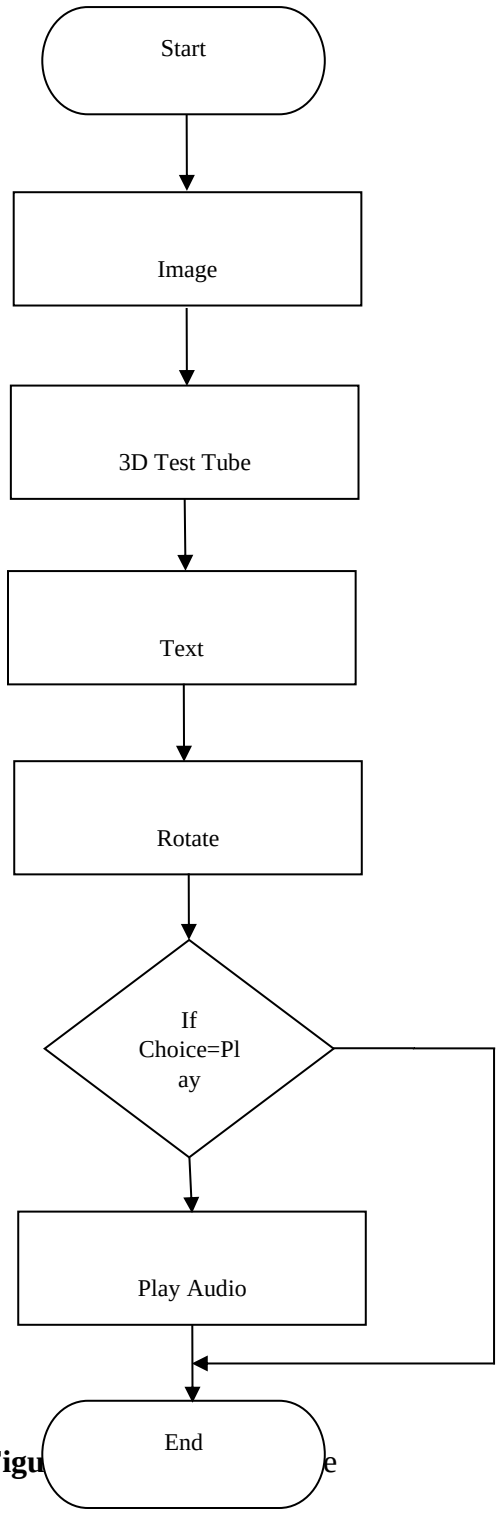


Figure 41 : Start Rack



Figure


Start
Image
3D Test Tube
Text
Rotate
If
Choice=Pl
ay
Play Audio
End

Figu e

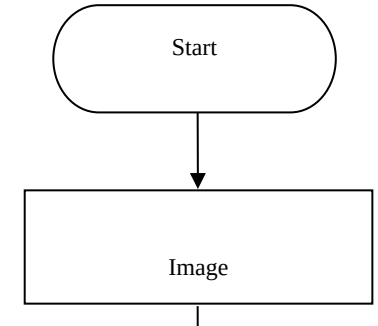

Start
Image

Figure 14 : Start Florence Flask

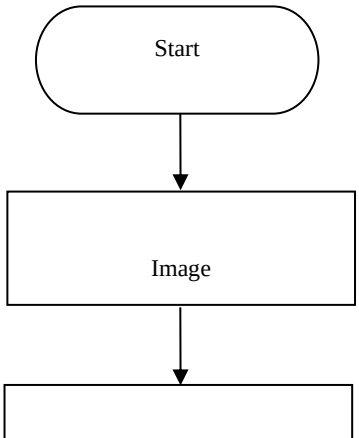


Figure 15 : Start Erlenmeyer Flask

Screen Layout

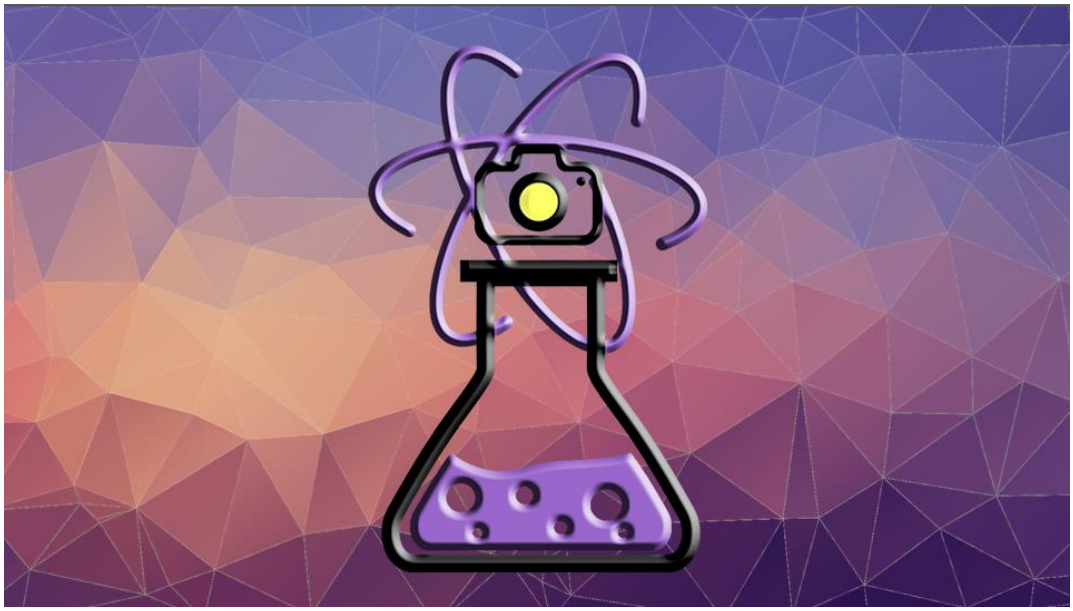


Figure 16 : Loading Screen

This is the loading screen. This is the first time that the user will see when the application is opened.

Figure 17 : Main Menu

This is the screen main menu. This includes the logo in the middle and below the logo is the application name. This screen contains buttons, It is the camera button, gallery button, credits button, about application button and exit.

Figure 18 : About App

This screen is about the information of the application.

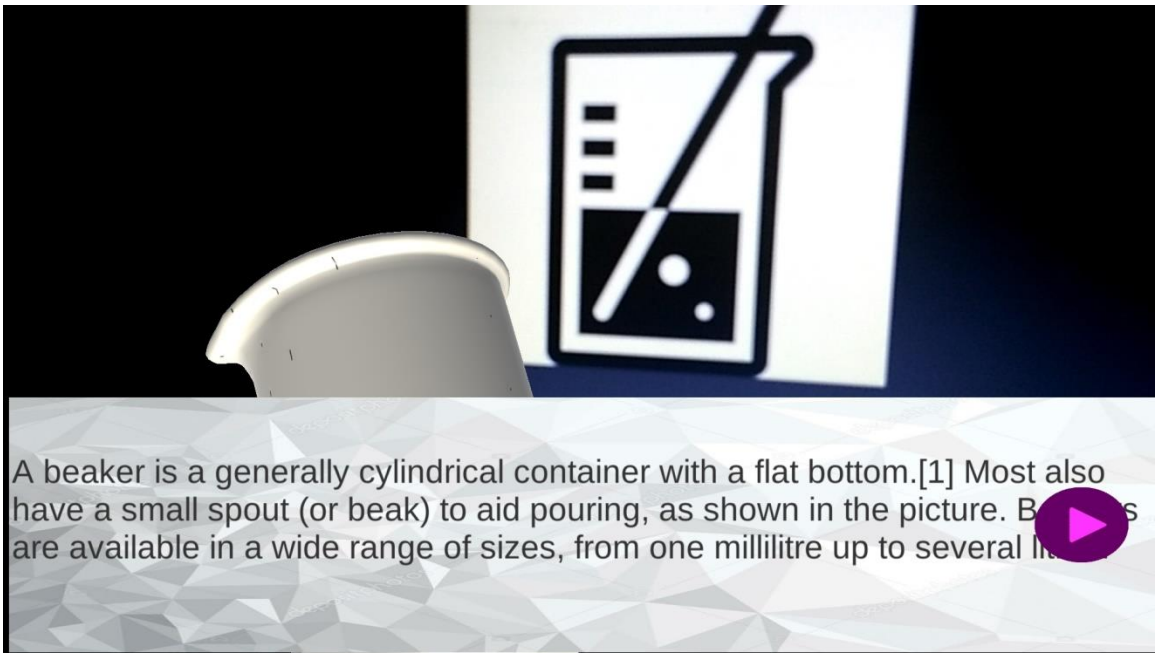


Figure 19 : Beaker

This screen is where you can see the description of the code that is recognized by the camera.

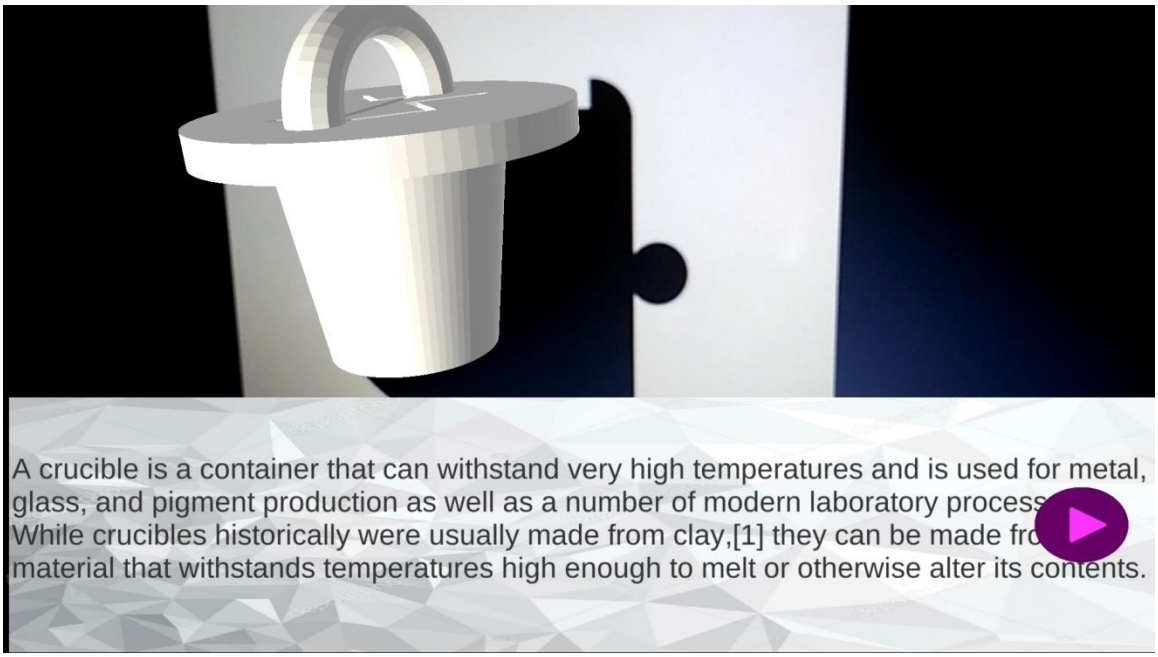


Figure 20 : Crucible

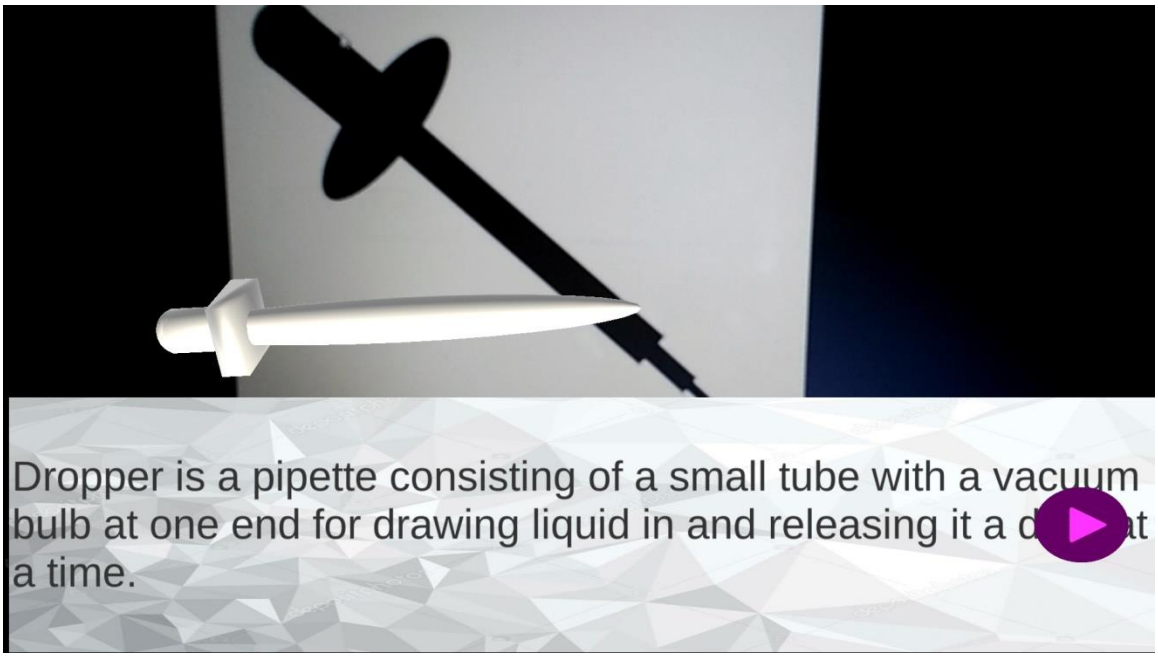


Figure 61 : Dropper

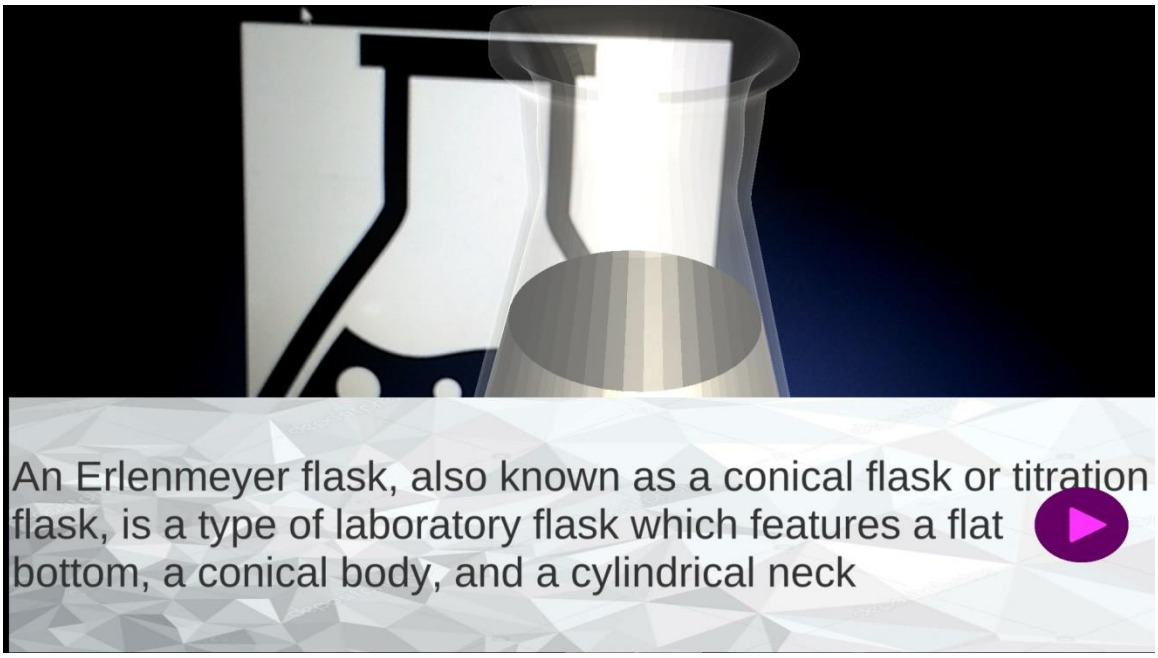


Figure 72 : Erlenmeyer Flask

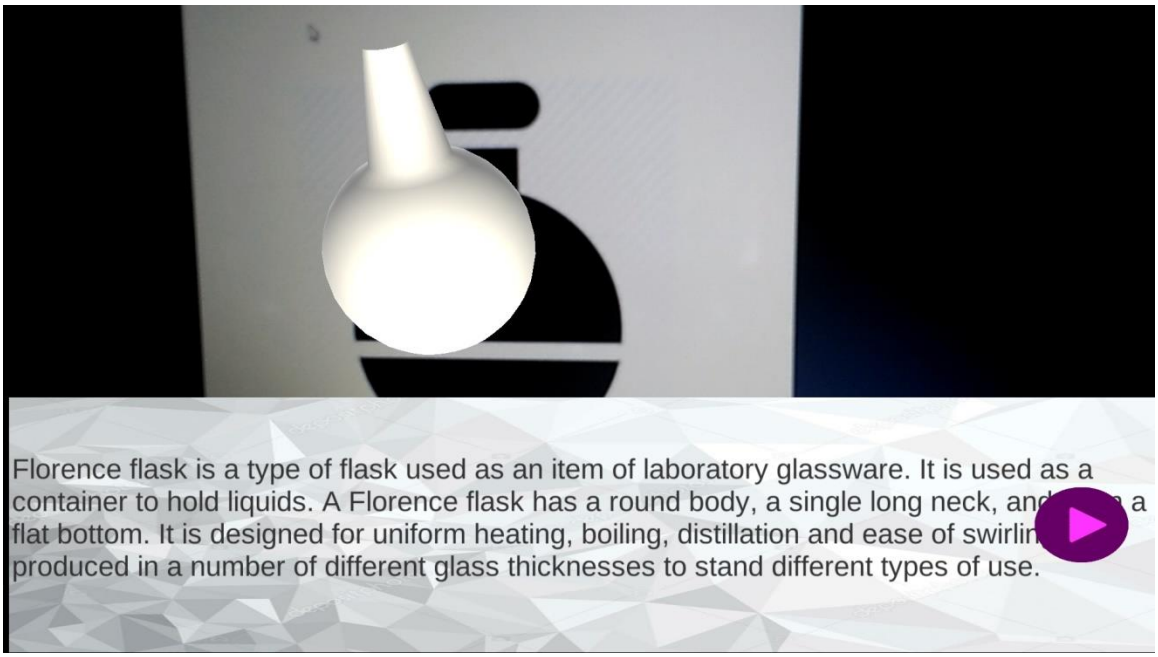


Figure 8 : Florence Flask

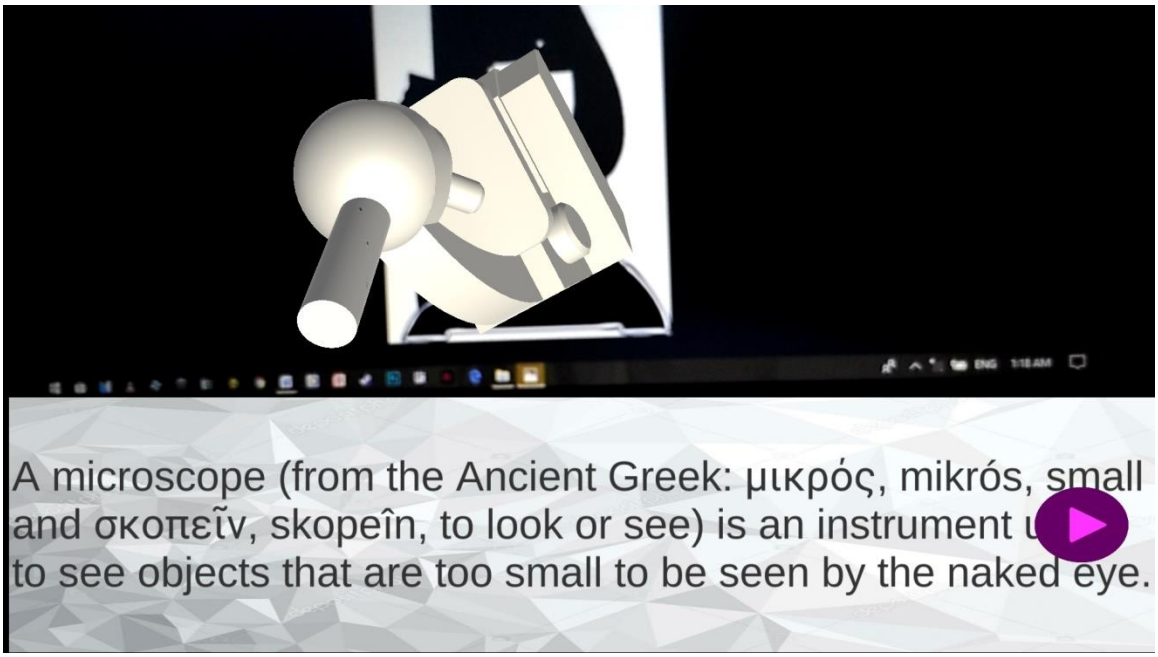


Figure 94 : Microscope

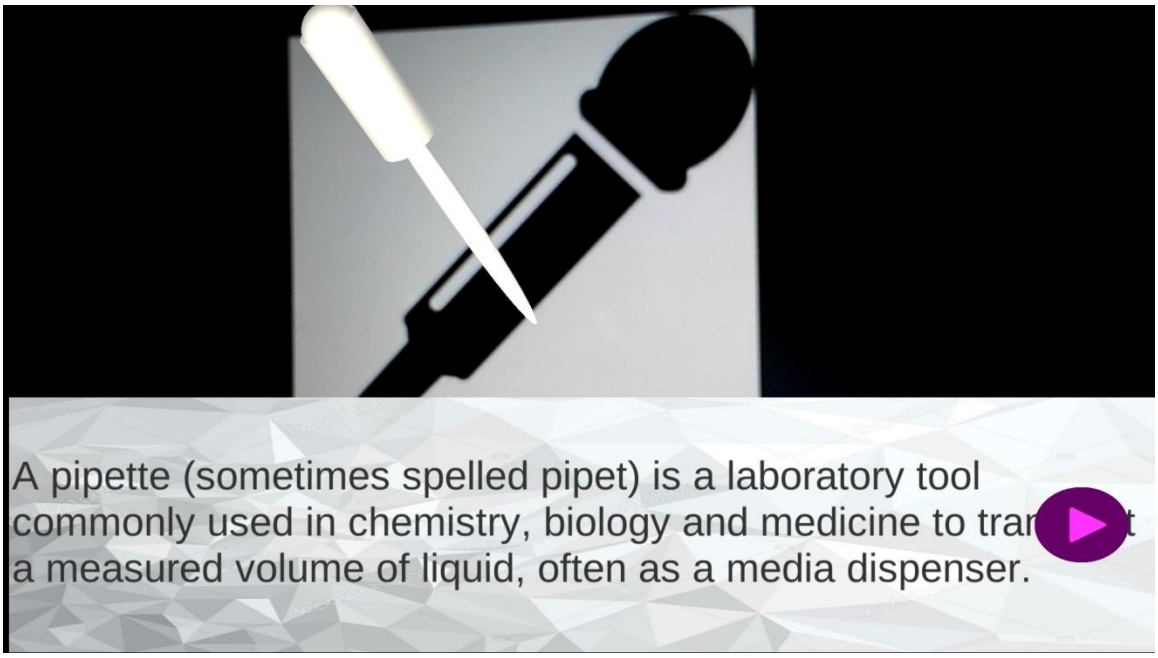


Figure 105 : Pippette

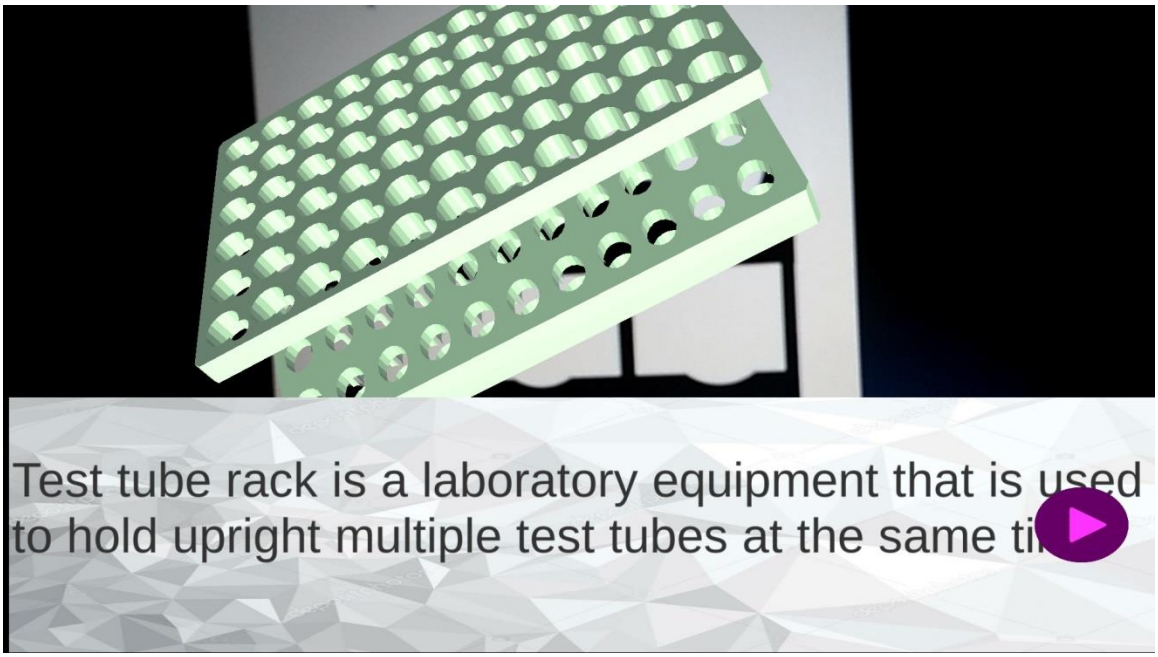


Figure 116 : Rack

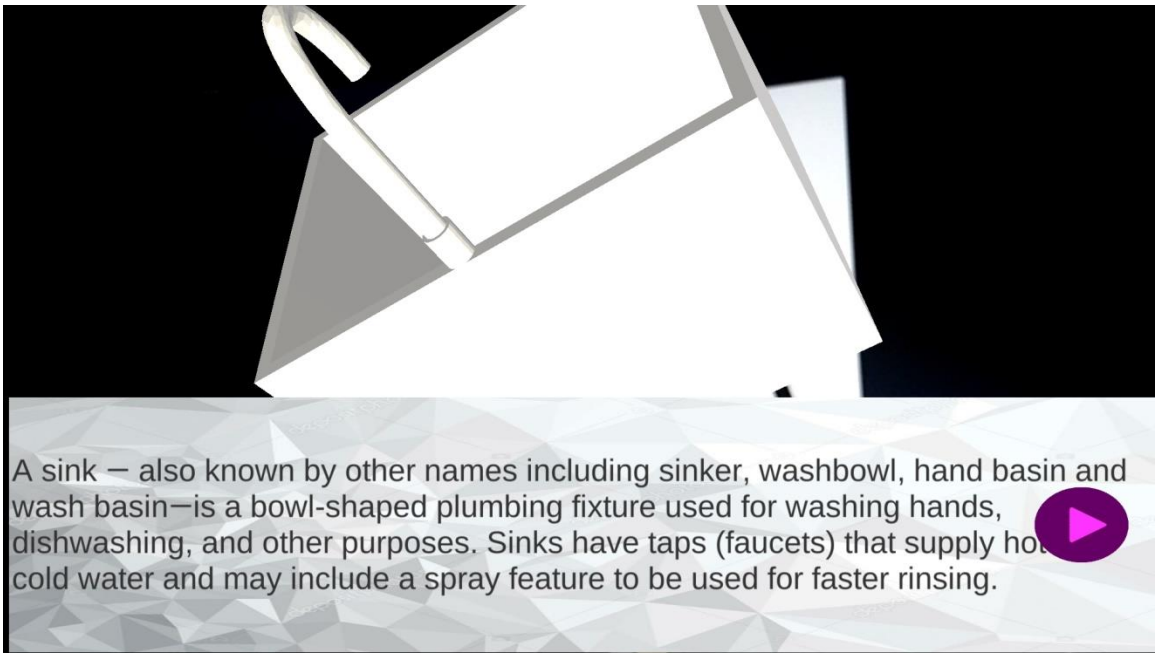


Figure 127 : Sink

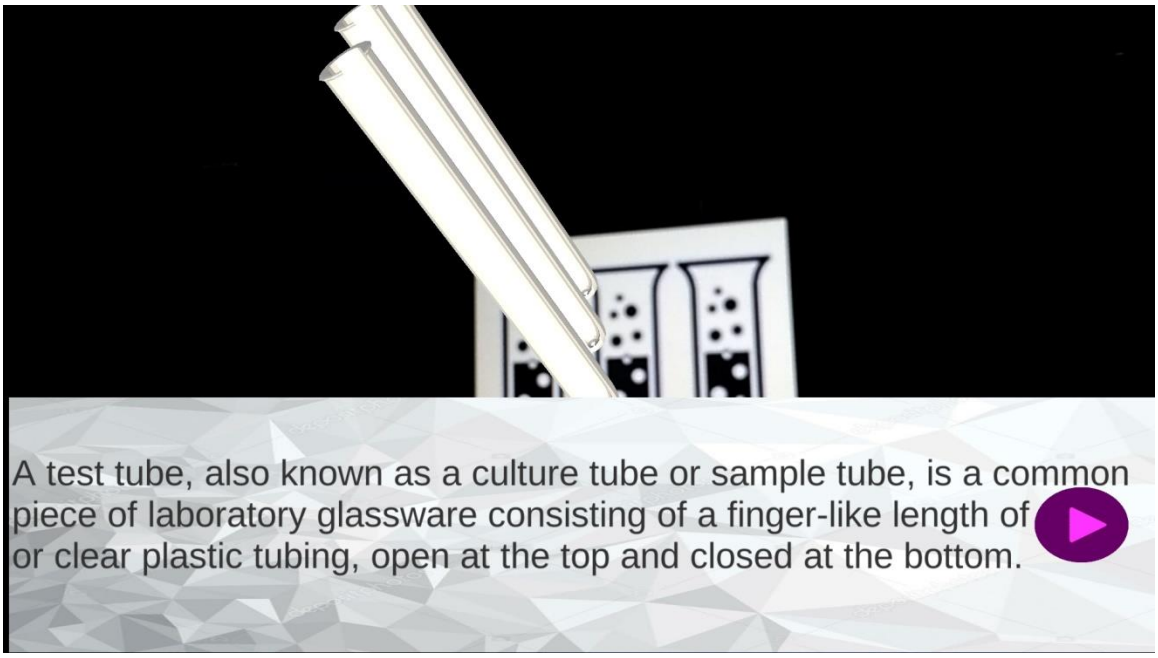


Figure 138 : Test Tube

Figure 149 : About Us

This screen is all about the developers. It contains the name and the emails of the developers.

5.0 SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5.1 Summary

This study entitled "Augmented Reality on Laboratory Apparatus: Mobile Application" aimed to provide a more creative way of learning. This application was provided for the students to have an entertaining way of learning this is created especially for chemistry taking students. This mobile application makes the 2D images into 3D model that can rotate and zoom to give more detailed parts. It also provides an entertaining and interactive learning. It creates a composite view for the client that is the mix of the genuine scene saw by the client in a virtual scene produced by the PC that expands the scene with extra data.

This is specifically designed and developed for chemistry students who are inspired to enhance their education. This mobile application minimizes the stress and difficulty the student always encounter when they need to study the laboratory apparatus. It provides the intended functionality for the user. This mobile application may also be applied on books; it can turn a simple book into augmented reality book by just printing the registered 2D images on the book. This mobile application can easily get the attention of the users specially those who those who have trouble in learning Apparatus.

5.2 Conclusion

According to the findings of this study, the following conclusions are drawn: This application can be a great help to students and developers to improve the system of learning for computer subjects.

1. The Augmented Reality Mobile application of Laboratory Apparatus was developed by the time provided.

2. This Application uses multimedia to create the 2D images as patterns and 3D Model of the Laboratory Apparatus and used Unity – Vuforia for the image recognition and Visual Studio for the codes that the researchers conducted.

3. Augmented reality will provide unique opportunity to make the user more captivated in learning and gaining knowledge by giving an interactive and modern way of learning and teaching.

5.3 Recommendation

The following recommendations are hereby forwarded:

Augmented Reality of Laboratory Apparatus: Mobile Application is recommended to all students and other users, specifically those who are in medical professions, to make studying laboratory apparatuses more fun and easy yet interactively high-tech. This will serve as an effective substitute for books

and can help the users identify correctly which laboratory apparatus to be used.

The mobile application can be an ease of reference for future researchers in developing their mobile application project. Furthermore, it is recommended that they enhance and develop it in other kind of topic to use it in other courses.

It also strongly recommended for the Science-related books author who wants to apply augmented reality in their books.

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