

3D Marker-Enabled Augmented Reality for Anamorphic Illusions User's Manual

A Thesis
Presented to
the Faculty of the College of Computer Studies
De La Salle University - Manila

In Partial Fulfillment
of the Requirements for the Degree of
Bachelor of Science in Computer Science

by
MANGUNE, Alexandra Cyrielle L.
NERIE, Sean Paulo F.
JOYA, Patrick Jaspher B.

Neil Patrick Del Gallego
Faculty Adviser

June 1, 2022

Table of Contents

3D Marker-Enabled Augmented Reality for Anamorphic Illusions User's Manual

| | | |
|------|---|-----|
| I. | Introduction | |
| | A. System Information | 2 |
| | B. Manual Organization | 2 |
| II. | System Requirements | |
| | A. System Summary | 3 |
| | B. System Configuration | 3 |
| | C. User Access Levels | 3 |
| | D. Contingencies | 3 |
| III. | Installation | |
| | A. Where to Install | 4 |
| | B. How to Install and Run the Application | 4 |
| IV. | Using the Application | |
| | A. 3D Markers Compatible with the System..... | 5 |
| | B. User Interactions with the System..... | 6 |
| | C. Puzzle Sets/3D Models..... | 6-7 |
| V. | System Flow..... | 8 |

I. Introduction

A. System Information

The current instance of this application is still in its testing phase and the available version is currently a prototype. The application simulates a predefined 3d model that has been spliced into multiple pieces. The pieces are virtually attached to predetermined real life markers which allows a user to assemble the pieces back together by manually positioning the markers onto their respective correct anchors. This application may help users appreciate and learn something new about anamorphic art by interacting with them.

B. Manual Organization

This manual is organized into the following sections: Introduction, System Requirements, Installation, Using the Application, System Flow, and Sample Results. The Introduction section presents the summary of general information of the application, its main features, and its purpose. The System Requirements section gives a general overview of the hardware and software requirements needed to install and run the application. The Installation section describes how to install, build, and run the application from a desktop to an Android application. The Using the Application section provides a description of each segment of the application and their functions. The System Flow section illustrates the flow of the application using an illustrated flowchart.

II. System Requirements

A. System Summary

The application must be installed into an android phone and given permission to access the device's camera in order for it to work. The markers that are loaded into the database should also be readily available at hand.

B. System Configuration

Unity was used in order to create the basic functions of the application, which is then aided by the extension Vuforia in order to operate the augmented reality aspects of the program. The device required to run the application must be supported by Vuforia.

C. User Access Levels

The application can be used by anyone.

D. Contingencies

When the application has been running for a long period of time, it has a tendency to experience lag which causes the application to freeze for an indefinite period. This is resolved by restarting the application.

III. Installation

A. Where to Install

The latest version of the prototype is available and can be downloaded or cloned from <https://github.com/lexcyman/3DARPuzzle>.

B. How to Install and Run the Application

Once you have the APK simply install the application and allow camera access for the app.

IV. Using the Application

A. 3D Markers Compatible with the System



Figure 1. Sample setup with the compatible 3D markers.

A sample setup of the play area. The area should be at least 70cm x 40cm and should be able to house the following compatible markers: (Left to right) Pringles Can, KoKo Krunch box, Vuforia Stones image target, Safeguard Box, Shell Ferrari toy car with image target stickers.

B. User Interactions with the System

The application starts with a main menu that leads to puzzle selection and exiting the application. The puzzle selection screen will give an option of 5 puzzles to solve. Once a puzzle has been selected you will then select the amount of markers you will use in the Pre-Calibration stage. Before you start the Pre-Calibration stage be sure to point the camera away from markers to avoid any issues with detection. With the number selected you will then need to scan the markers by pointing the camera clearly at the markers. Below is an image of the Pre-Calibration stage.

C. Puzzle Sets/3D Models

Here we have images of the puzzles you may complete.



Figure 2. Puzzle 1 - Empire State Building and Stanford Bunny



Figure 3. Puzzle 2 - Utah Teapot and Dolphin



Figure 4. Puzzle 3 - Eiffel Tower and Helicopter



Figure 5. Puzzle 4 - Stanford Armadillo and Stanford Dragon

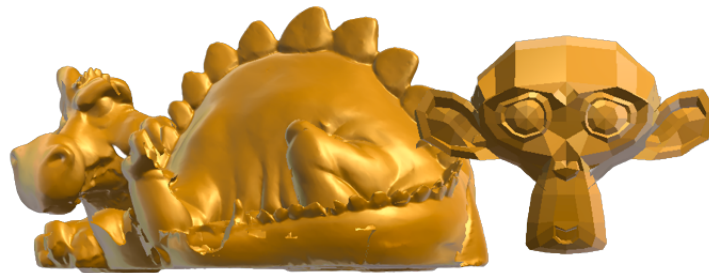


Figure 6. Puzzle 5 - Phlegmatic Dragon and Suzzane

V. System Flow

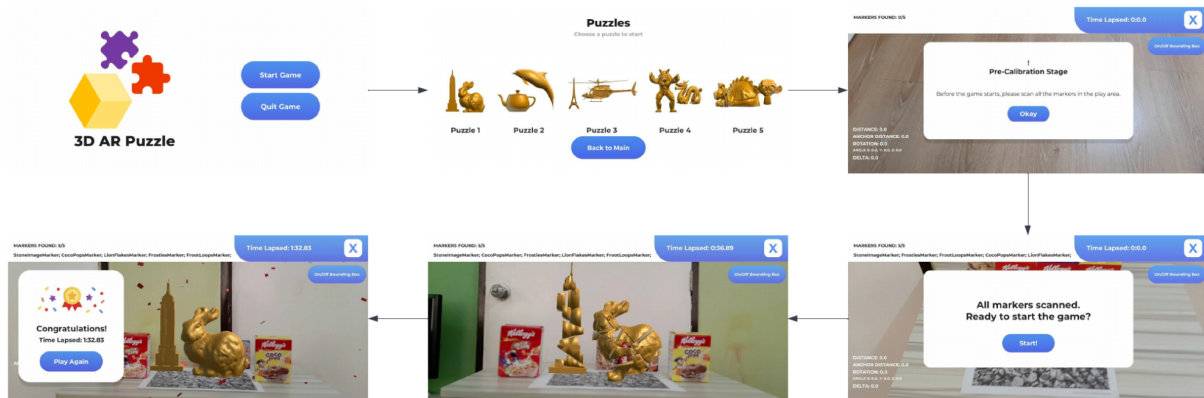


Figure 7. System pipeline.

Above is a sample flow of using the application. Starting from opening the application to puzzle selection and pre-calibration and finally solving the puzzle.