K. K. Wagh Institute Of Engineering Education And Research

REAL TIME OBJECT TRACKING USING ML

Under the guidance of
Prof. P. V. Pandit

Presented By: Group No. 18

11 Shruti Bhabad
14 Kshitij Bhalerao
50 Prerna Nagare
60 Divya Shinde

Agenda

1. Abstract
2. Introduction
3. Literature Review
4. Requirement Specification
5. Proposed Architecture
6. Experimental Setup
7. Working
8. UML

Abstract

The Dynamic Object Tracking System presented in this project revolutionizes real-time object tracking through the fusion of Machine Learning (ML), computer vision, and projection technology. The system addresses the escalating need for accurate tracking in diverse scenarios. It seamlessly integrates a projection module, camera network, and advanced object detection algorithms to monitor both tangible and projected objects. By leveraging ML and computer vision, the system captures live video feeds from strategically positioned cameras. Employing state-of-the-art object detection algorithms such as YOLO or Faster R-CNN, it precisely identifies and localizes objects within the environment. Some Critical challenges, including data synchronization and real-time processing, are tactfully managed through optimized strategies. The applications are far-reaching, encompassing interactive training platform, immersive entertainment experiences, surveillance, and human-computer interaction research. This system's convergence of ML, computer vision, and projection engenders a powerful and versatile platform for real-time object tracking, offering unparalleled accuracy and innovation across an array of domains.

Introduction

Problem Statement

Traditional entertainment and educational tools can lack the level of engagement needed to captivate modern audiences. We saw an opportunity to address this challenge by creating an interactive AR experience that combines virtual elements with physical interactions.

Project Concept

Our project will revolves around an augmented reality application.
Picture this: virtual balls are projected onto a screen, and your hands can reach out towards projected screen through Physical object and interact with it as it is real.

Literature Review

Published Year	Title of the Paper	Description
1998	Computer Vision for Interactive Computer Graphics	The research introduces diverse vision algorithms, enabling applications like interactive games and hand gesture controllers for robotic devices. Additionally, a specialized image detector/processor is developed, enhancing functionality while reducing costs.
2015	LittleProjectedPlanet: An Augmented Reality for Camera Projector Phones	This paper explores integrating mini projectors into mobile devices, allowing them to project virtual content onto real-world surfaces. Users can draw or use physical objects, and the device augments these with virtual interactions. This technology bridges virtual and physical worlds, enabling innovative interactive experiences.
2019	A Dice Game in Third-Person Augmented Reality	Innovative AR fantasy dice game prototype, using consumer-grade equipment like webcam and projector for face-to-face gameplay without head-mounted displays, merging digital and traditional gaming seamlessly.
2019	VirtualTable: a projection augmented reality	"VirtualTable" is a dynamic projection augmented reality game where players defend cheese from virtual soot balls. Using physical objects on the table, players strategize to create walls, obstacles, or towers, fostering collaboration and engaging gameplay.

Requirement Specification

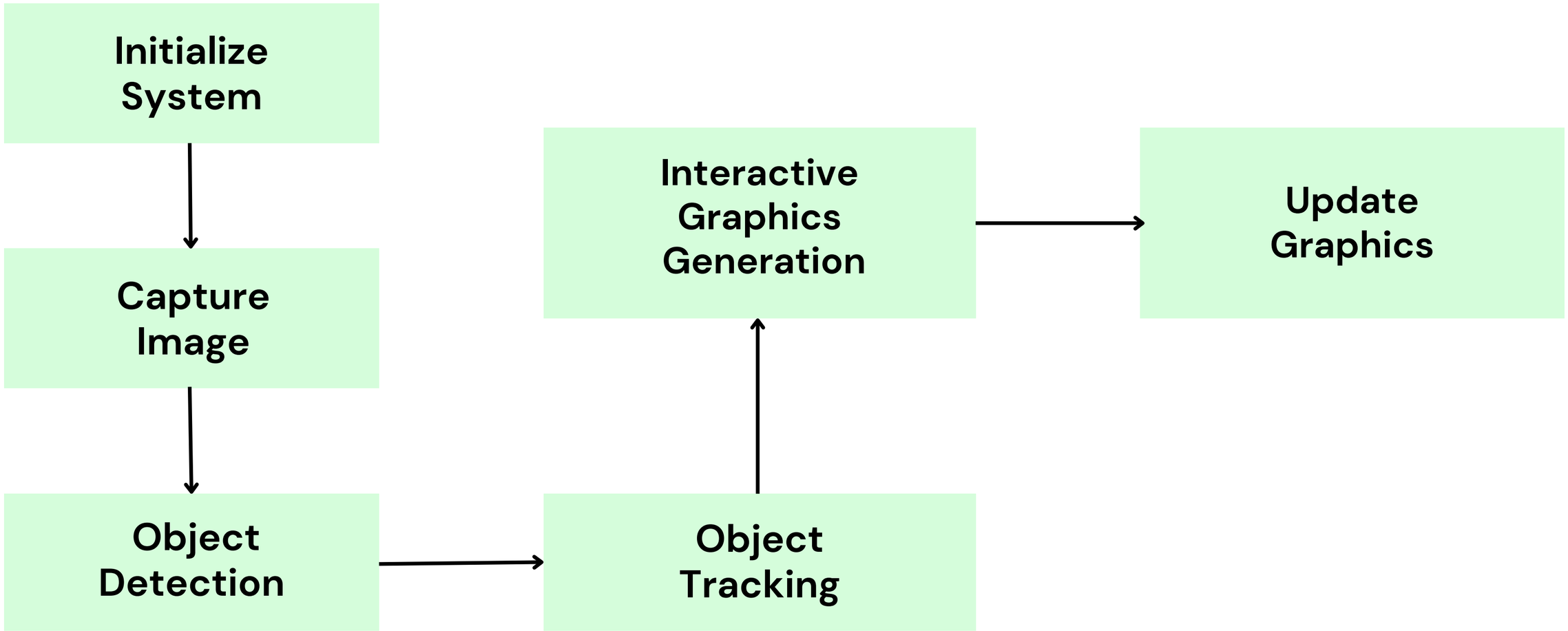
Hardware Requirements:

- Camera
- Projection Device

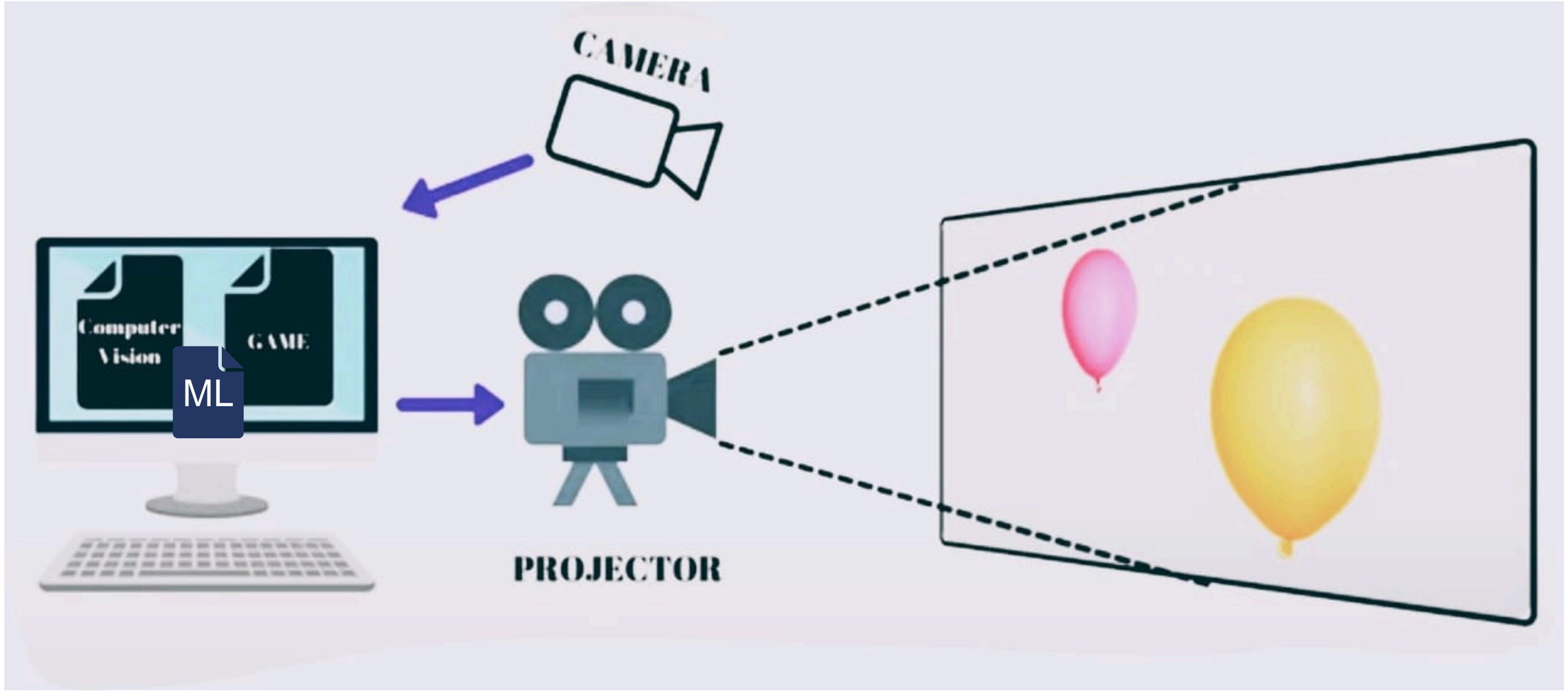
Software Requirements:

- Operating System
- Programming Languages:
  - Python
- Machine Learning Framework:
  - YOLO
- Computer Vision Libraries:
  - OpenCV

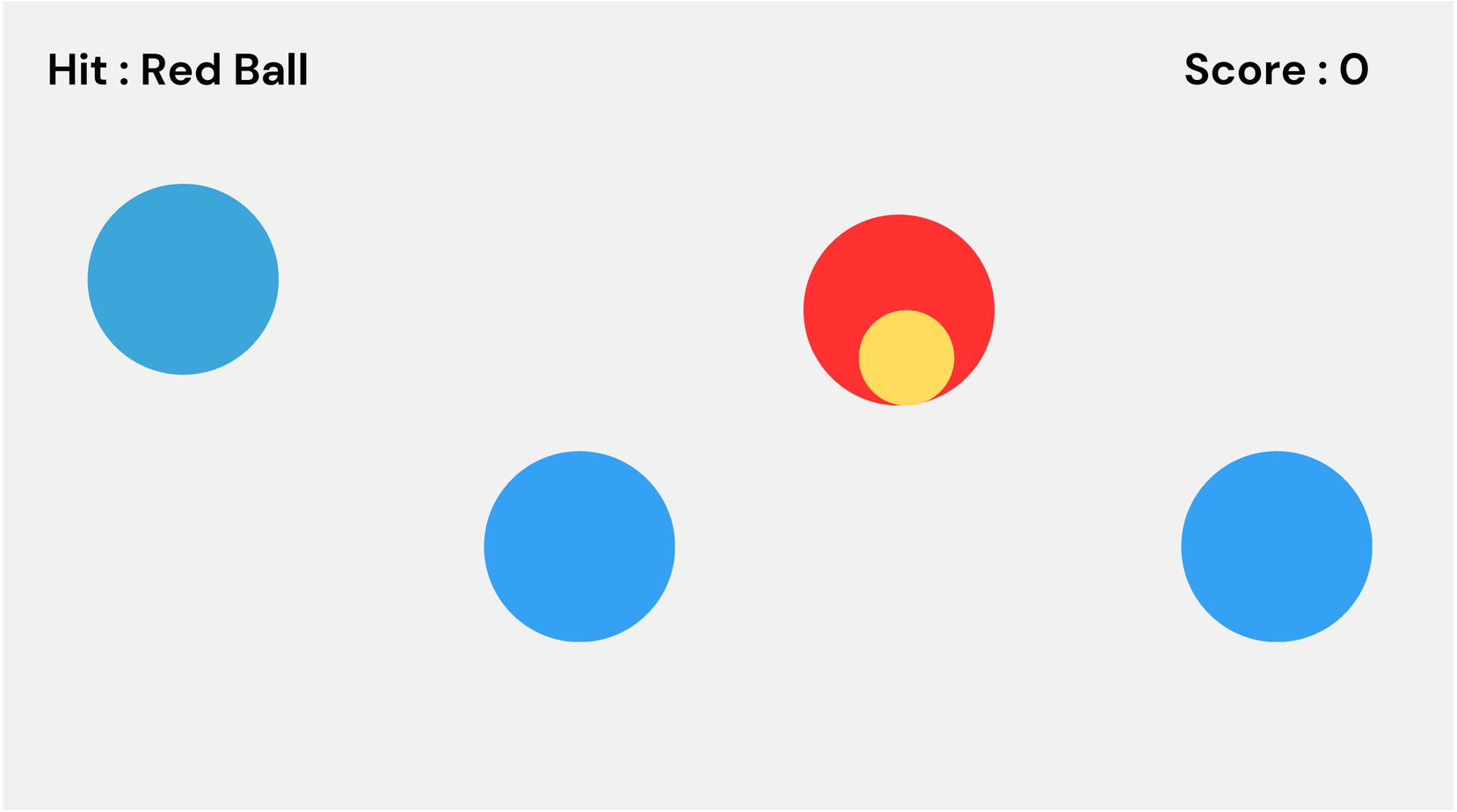
Proposed Architecture



Experimental Setup



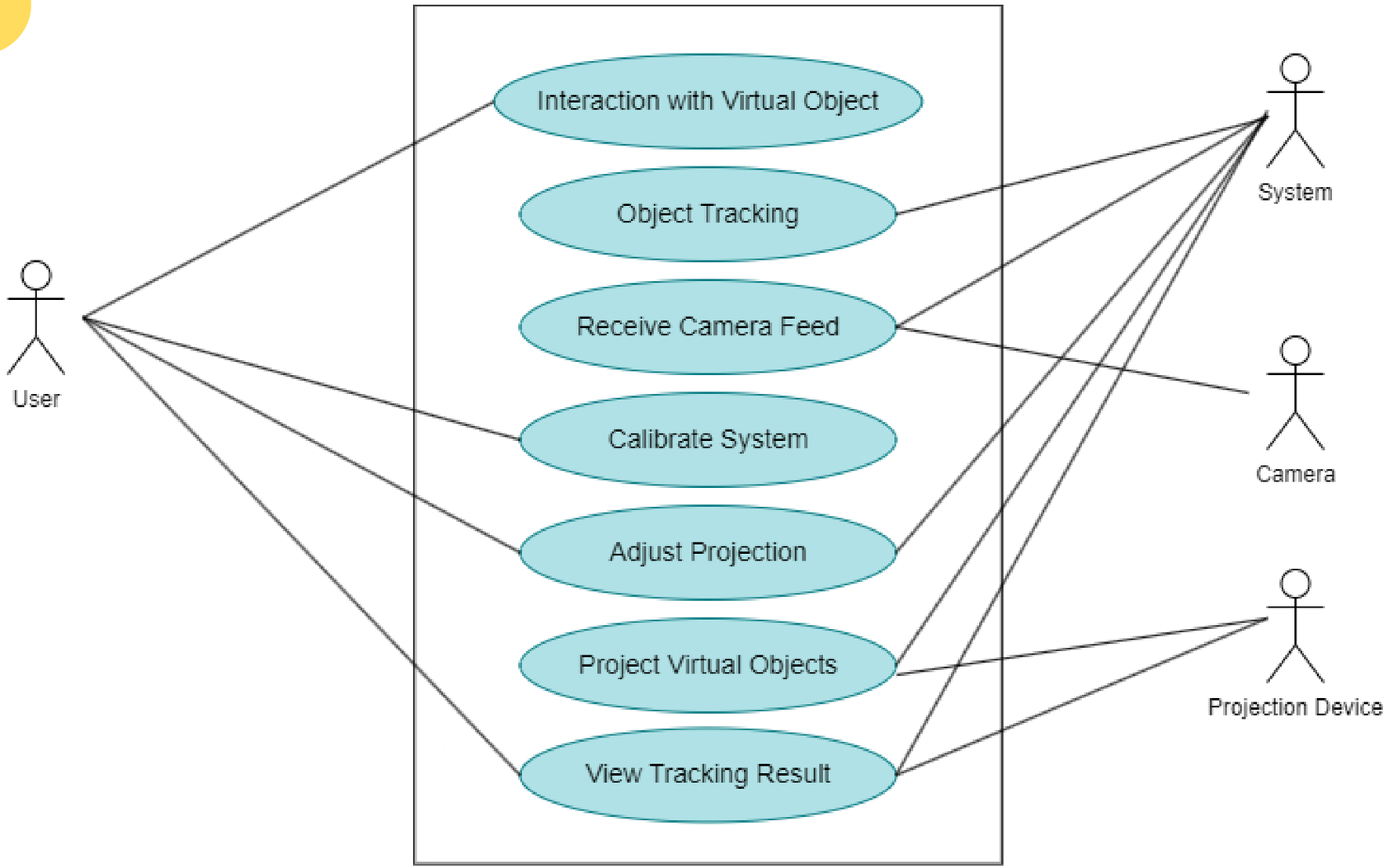
Working Module



Physical Object (Ball)

Detailed Design

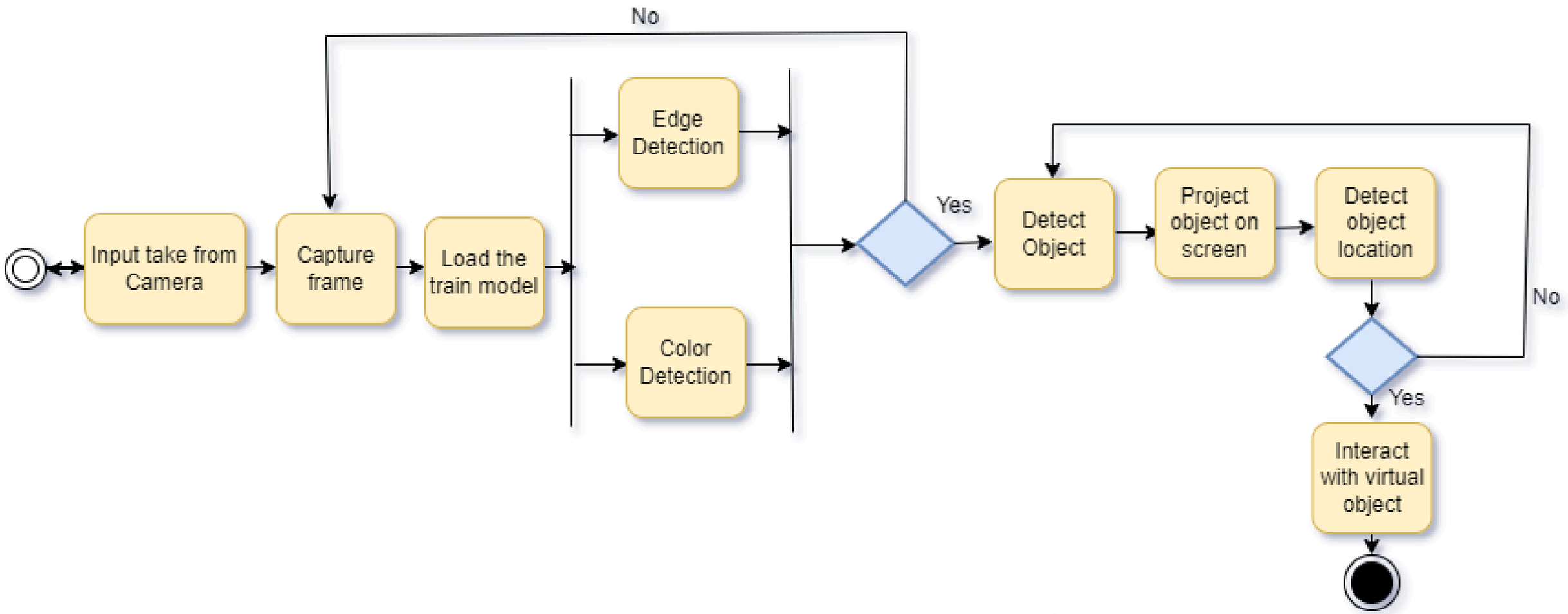
Use Case



Real time object detection system

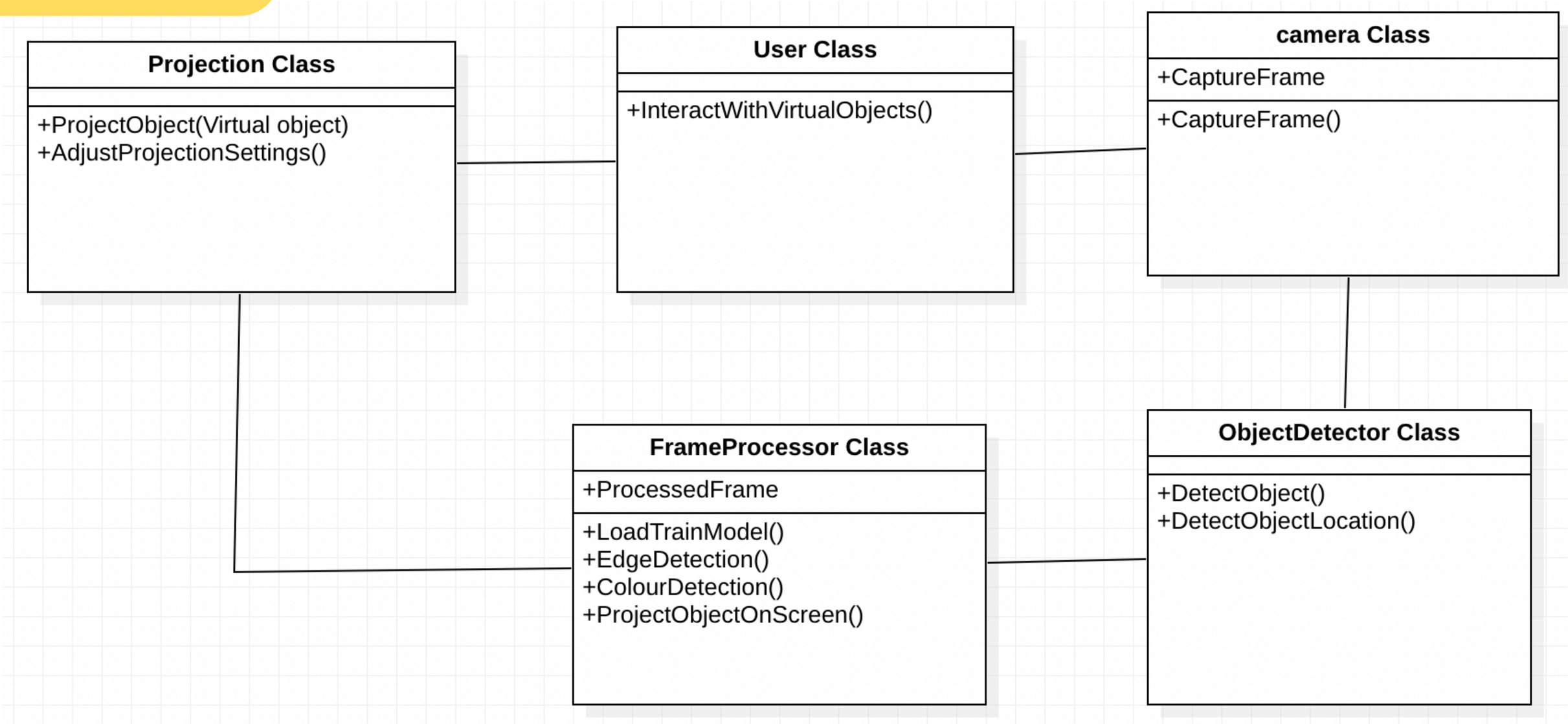
Detailed Design

Activity

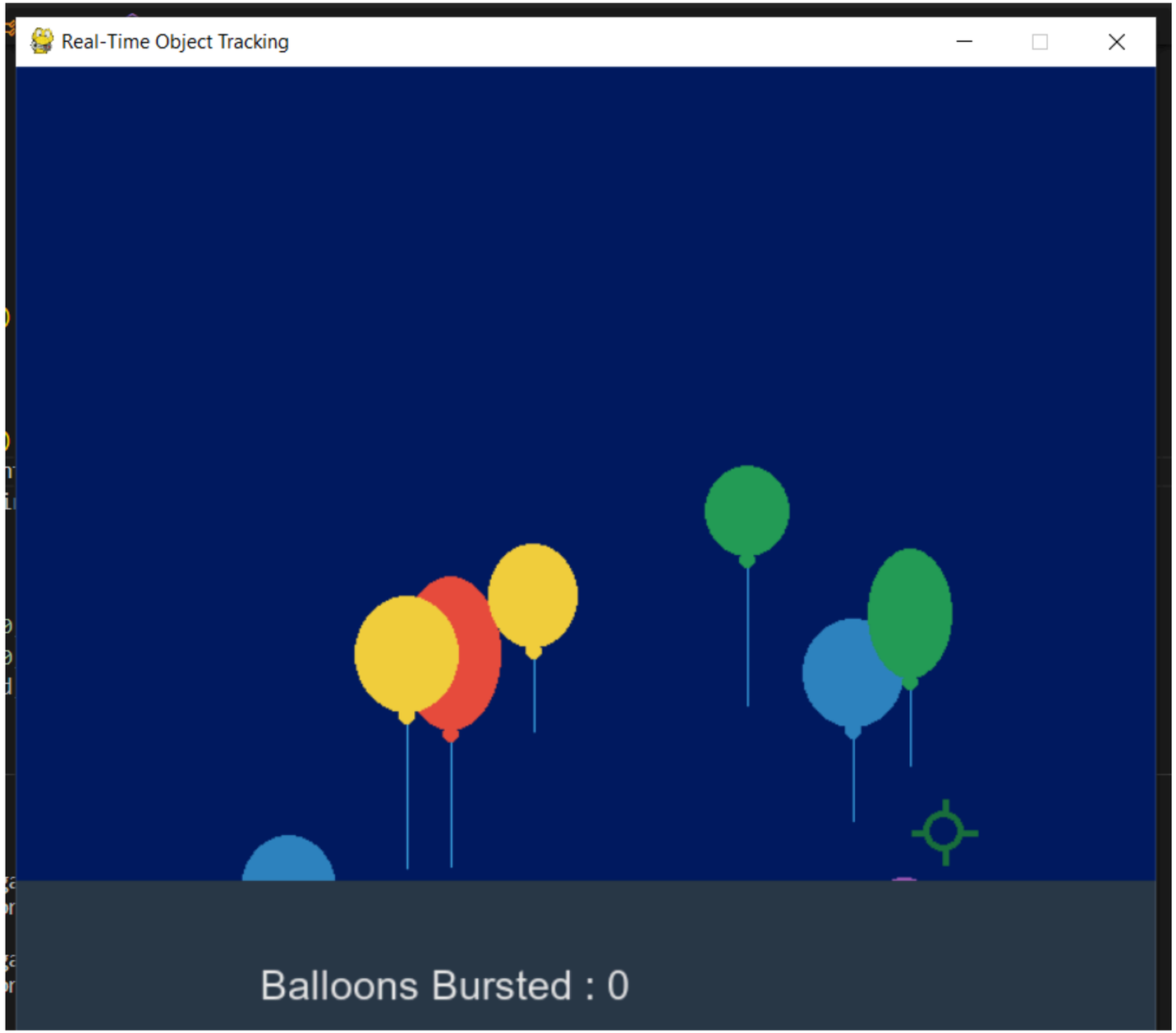


Detailed Design

Class



Output



Project Plan

SEMESTER - I		
1.	Searching for Project Topic and Reading Journal (IEEE) Papers	3rd and 4th Week -July 2023
2.	Finalization of project topic and scope	1st and 2nd Week -August 2023
3.	Project scope finalization	3rd Week -August 2023
4.	Project approval presentation	4th Week -August 2023
5.	Abstract preparation	1st Week-September 2023
6.	Working on literature review and architecture	2nd and 3rd Week - September 2023
7.	Project review I presentation	4th Week-September 2023
8.	Working on requirement specification and design	1st Week-October 2023
9.	Working on the experimental setup and performance parameter	2nd and 3rd Week -October 2023
10.	Project review II presentation	4th Week-October 2023
11.	Compilation of project report stage I	1st and 2nd Week - November 2023
12.	Preparation for project stage 1 examination	3rd Week-November 2023
13.	Project stage I examination	4th Week-November 2023

Conclusion

In conclusion, the real-time object tracking project prioritizes continuous model refinement for high accuracy, efficient low-latency processing, and adaptability to varying conditions. Balancing algorithmic efficiency, scalability, and resource optimization ensures a well-optimized and high-performing system, aiming to deliver a robust real-time object tracking solution for interactive applications.

Reference

[1] William T. Freeman, David B. Anderson, Paul A. Beardsley, Chris N. Dodge, Michal Roth, Craig D. Weissman, and William S. Yerazunis Computer Vision for Interactive Computer Graphics Article in IEEE Computer Graphics and Applications DOI: 10.1109/38.674971

[2] VirtualTable: a projection augmented reality game, A. Dal Corso M. Olsen K. H. Steenstrup J. Wilm S. Jensen R. Paulsen E. Eiriksson,J. Nielsen J. R. Frisvad G. Einarsson H. M. Kjer.Department of Applied Mathematics and Computer Science, Technical University of Denmark.

[3] Markus Löchtefeld,Johannes Schöning, Michael Rohs,Antonio Krüger, LittleProjectedPlanet: An Augmented Reality Game for Camera Projector Phones .

[4] A Dice Game in Third-Person Augmented Reality, Richard Colvin, Ted Hung, David Jimison, Benjamin Johnson, Eben Myers, Tina Blaine Entertainment Technology Center Carnegie Mellon University 700 Technology Drive Pittsburgh, PA I521 9 USA

THANK YOU