K. K. Wagh Institute Of Engineering Education And Research

REAL TIME OBJECT TRACKING USING ML

Under the guidance of
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Agenda

1. Introduction
2. Scope & Objectives
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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.

Hardware Components

Camera , Projector

Scope & Objective

Scope

Dynamic Object Tracking System

Virtual Object Integration

Object Detection Algorithms

Multi-camera Synchronization

Real-time Processing

Objective

Incorporate Machine Learning

Integrate Projection Technology

Synchronization

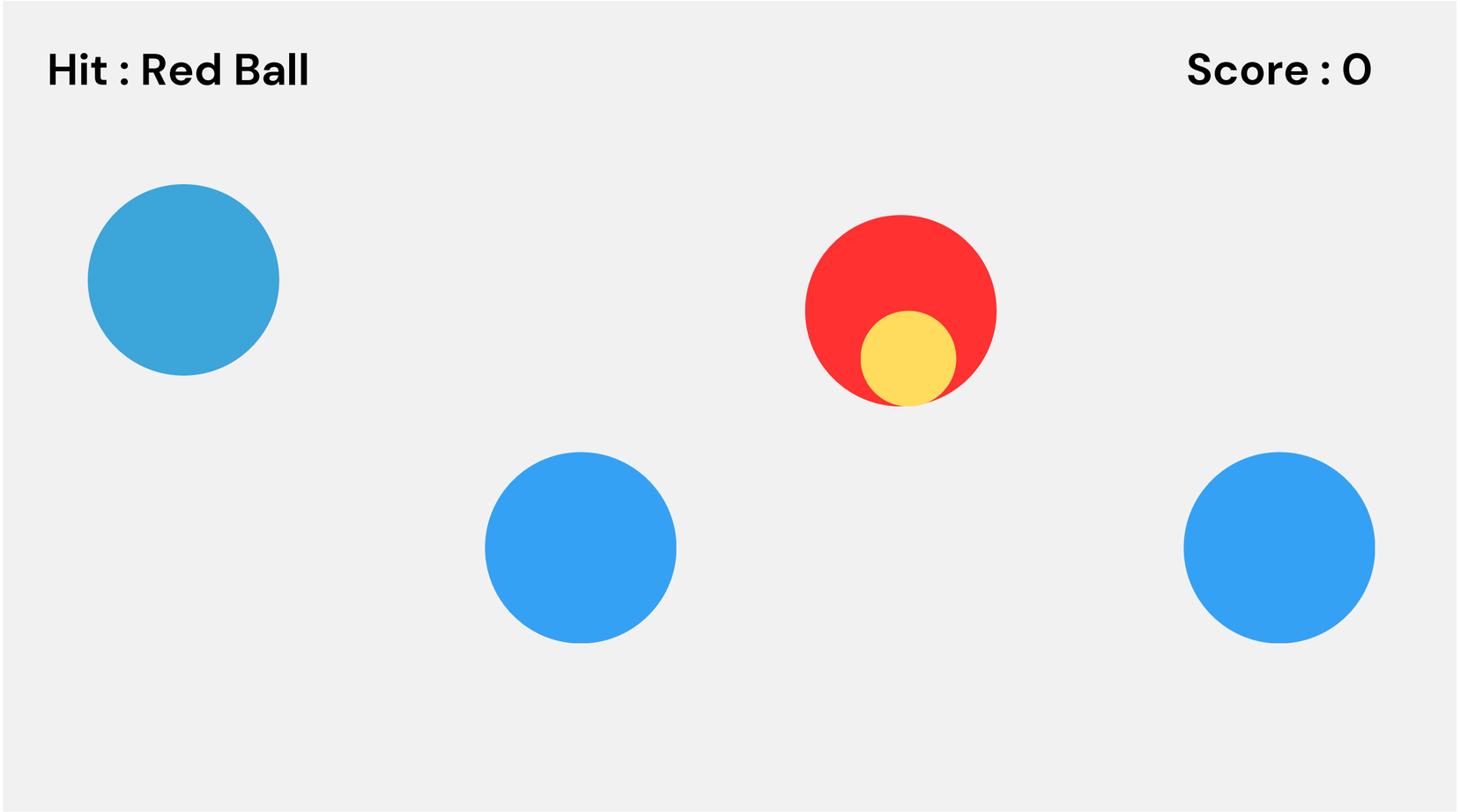
Testing and Validation

Potential Expansion

Literature Review

Published Year	Title of the Paper	Description
2018	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.
2019	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.
2015	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.

Working



Physical Object (Ball)

Methodology

Research and Literature Review:

- Begin with an in-depth review of existing literature and research related to machine learning-based object detection and tracking, computer vision, projection technologies, and real-time processing.
- Identify and evaluate state-of-the-art algorithms and techniques like YOLO and Faster R-CNN for object detection and tracking.

Data Collection and Preparation:

- Collect a diverse dataset of physical objects that represent the typical scenarios where the system will be used.
- Pre-process and augment the dataset as needed to ensure its suitability for training and testing machine learning models.

Machine Learning Model Development:

- Implement and fine-tune advanced ML algorithms (e.g., YOLO or Faster R-CNN) for object detection and tracking using the collected dataset.
- Use transfer learning to adapt pre-trained models to the specific tracking requirements.

Projection Technology Integration:

- Develop a seamless integration of virtual objects onto physical surfaces, leveraging computer vision techniques and projection technologies.
- Ensure that the virtual objects align accurately with the physical objects being tracked.

Methodology

Real-time Processing Optimization:

- Optimize algorithms for efficiency and parallel processing to achieve real-time performance.
- Consider hardware acceleration options (e.g., GPUs) to enhance processing speed.

User Interaction Design:

- Design an intuitive user interface that allows users to control and interact with tracked objects.
- Conduct user testing and gather feedback to refine the interface iteratively.

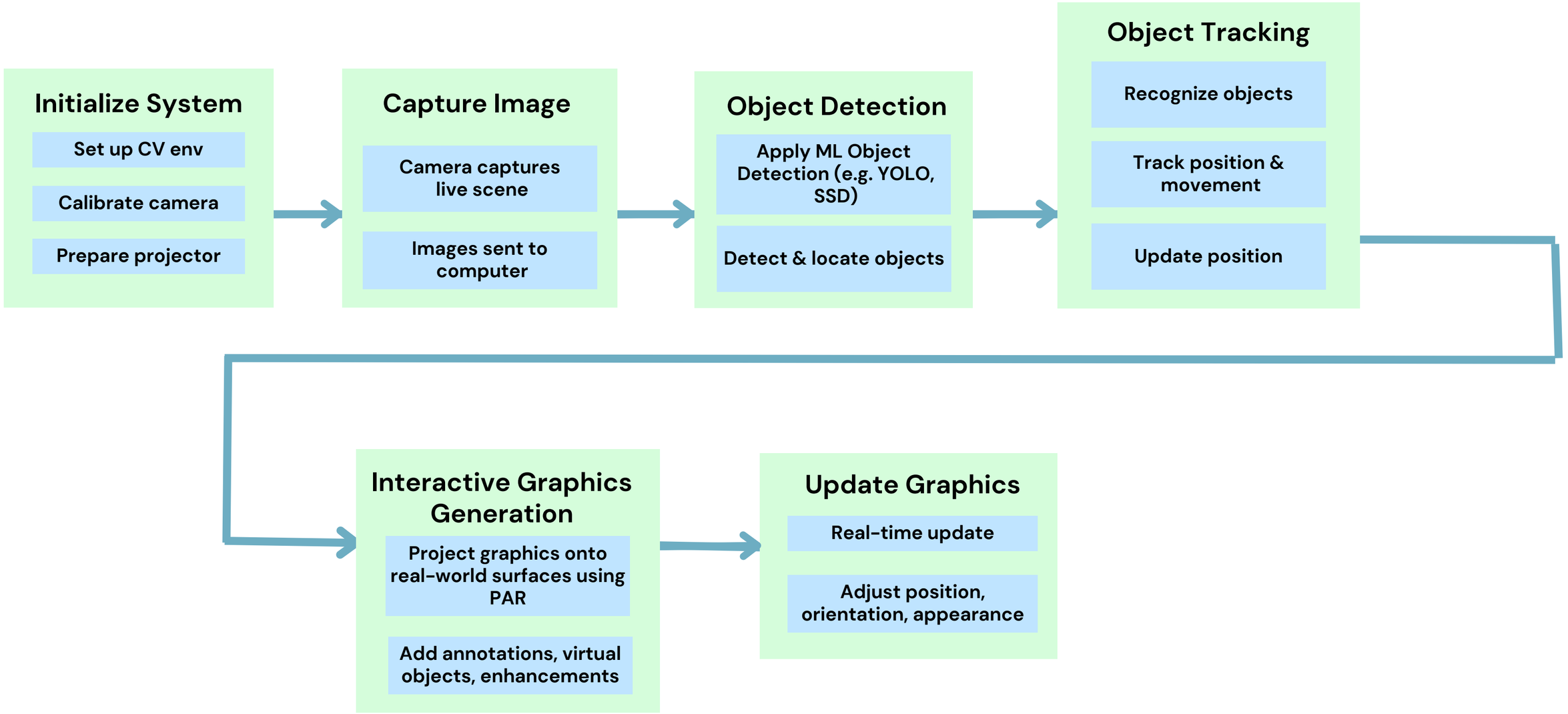
Testing and Validation:

- Rigorously test the system in various real-world environments and scenarios, including interactive art installations, entertainment setups, surveillance settings, and human-computer interaction studies.
- Collect data on accuracy, reliability, and real-time performance in each scenario.

Potential Expansion Analysis:

- Explore opportunities for future expansion, such as integrating more advanced ML models as they become available or adding additional sensors (e.g., depth cameras) for enhanced object tracking capabilities.
- Consider scalability and adaptability for future developments.

Architecture



Project Planning

Sr No.	Activity Scheduled	Week(s) of Month
1	Searching for Project Topic and Reading IEEE Papers	
2	Finalization of Project Topic and scope	
3	Project Approval Presentation	
4	Project Scope Finalization	
5	Abstract Preparation	
6	Working on Literature Review and Architecture	
7	Project Review – I Presentation	
8	Working on Requirement Specification and Design	
9	Working on Experimental Setup and Performance Parameters	
10	Project Review – II Presentation	
11	Compilation of Project Report Stage – I	
12	Preparation for Project Stage – I Examination	
13	Project Stage – I Examination	

THANK YOU