K. K. Wagh Institute Of Engineering Education And Research
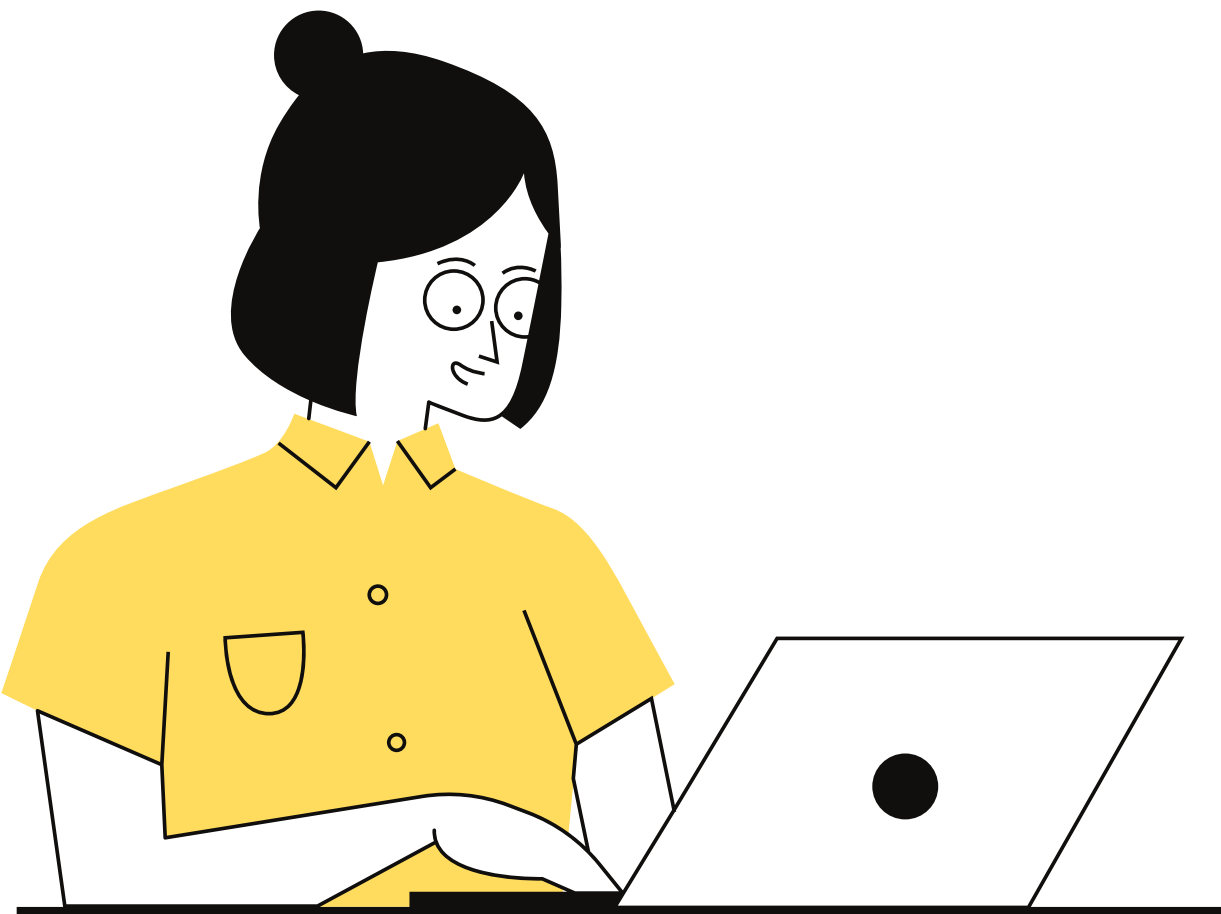
REAL TIME OBJECT TRACKING USING ML

Under the guidance of
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Agenda

1. Requirement Specification
2. Literature Review
3. Detailed Design
4. Experimental Setup
4. Performance Parameter
5. Efficiency Issue

Requirement Specification

Hardware Requirements:

- **Camera**
- **Projection Device**

Software Requirements:

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

Literature Review

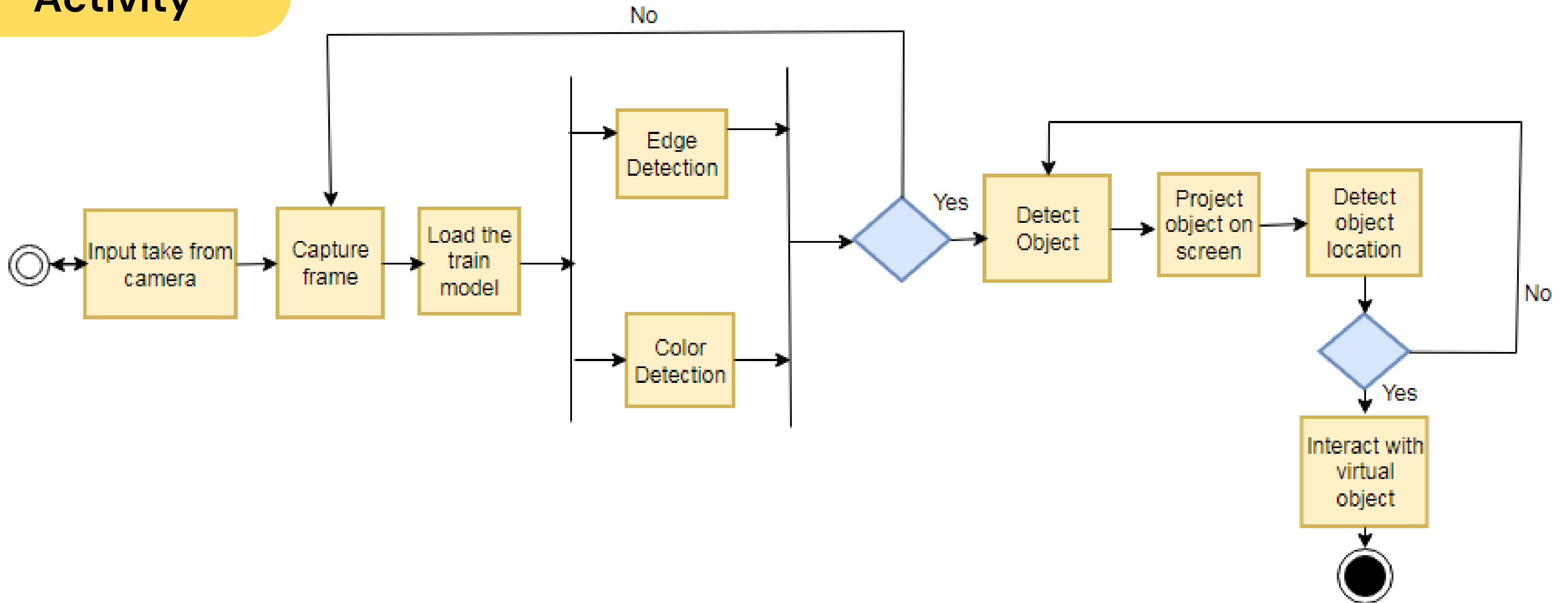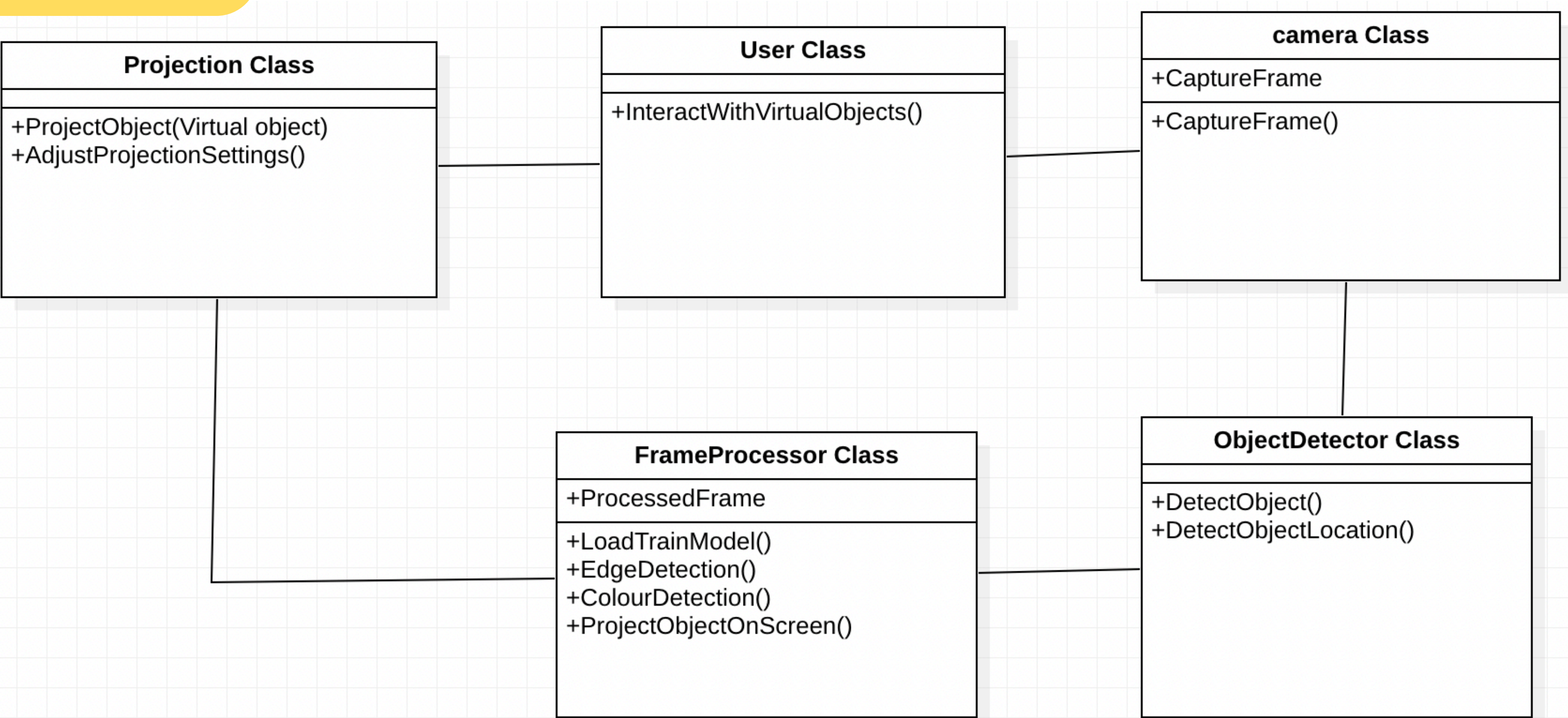| Published Year	Title of the Paper	Description
2018	Computer Vision for Interactive Computer Graphics	The research introduces diverse vision algorithms, enabling applications like interactive games and hand gesture controllers for robotic devices. Additionally, a specialized image detector/processor 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.

Detailed Design

Use Case

Real time object detection system

Detailed Design

Detailed Design

Class

Projection Class

+ProjectObject(Virtual object)
+AdjustProjectionSettings()

User Class

+InteractWithVirtualObjects()

camera Class

+CaptureFrame

+CaptureFrame()

FrameProcessor Class

+ProcessedFrame

+LoadTrainModel()
+EdgeDetection()
+ColourDetection()
+ProjectObjectOnScreen()
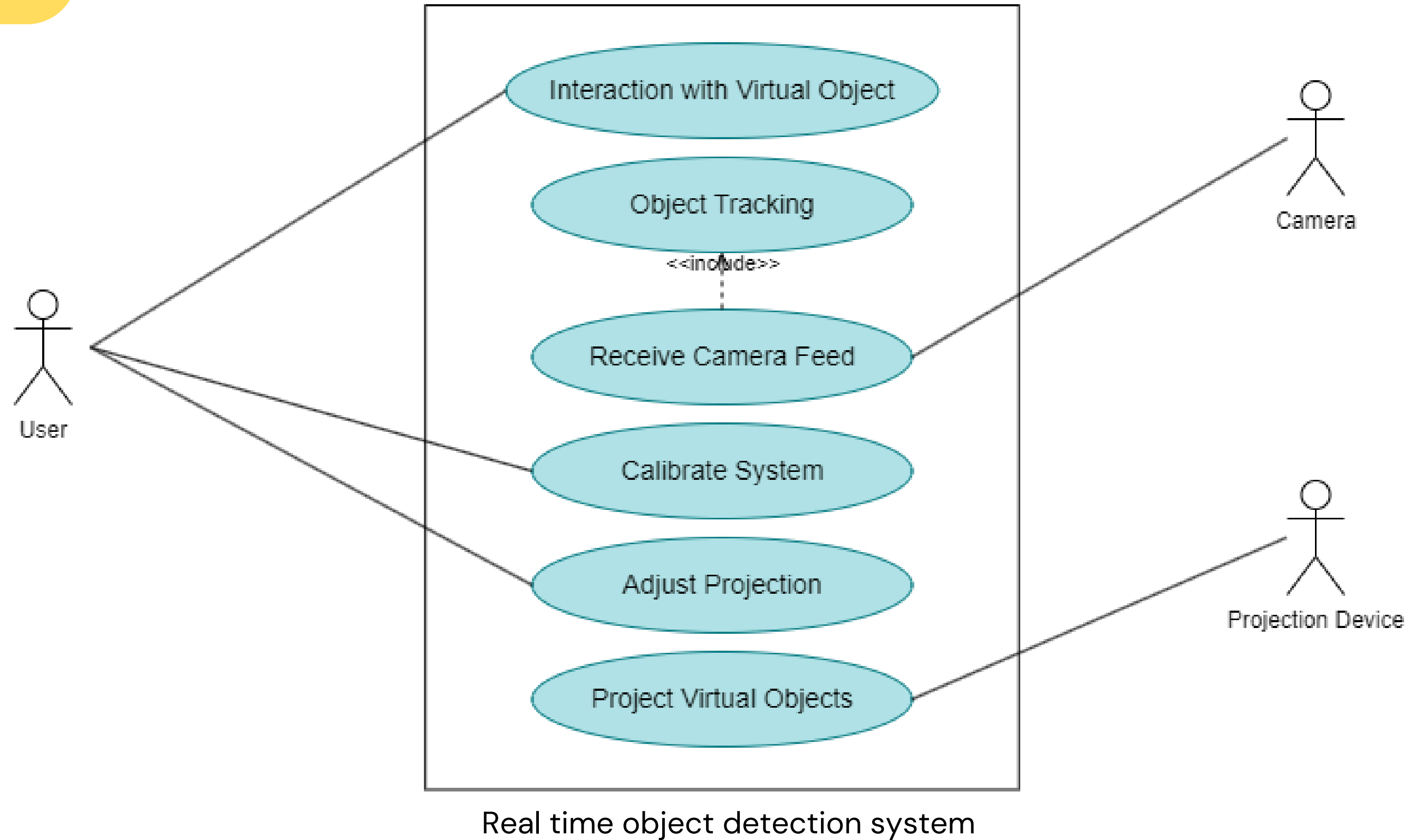
ObjectDetector Class

+DetectObject()
+DetectObjectLocation()

Detailed Design

Swimlane
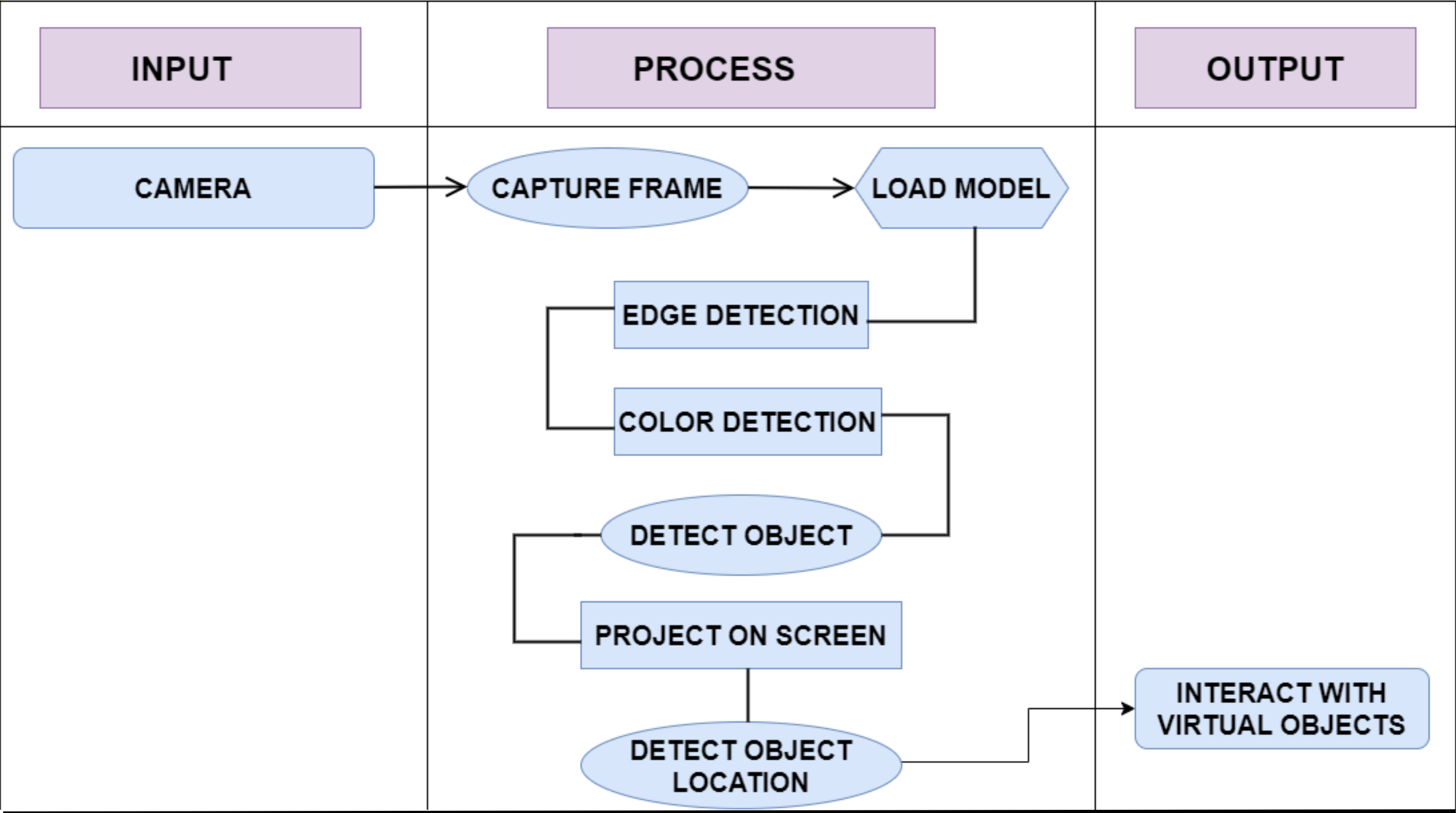
Block Diagram
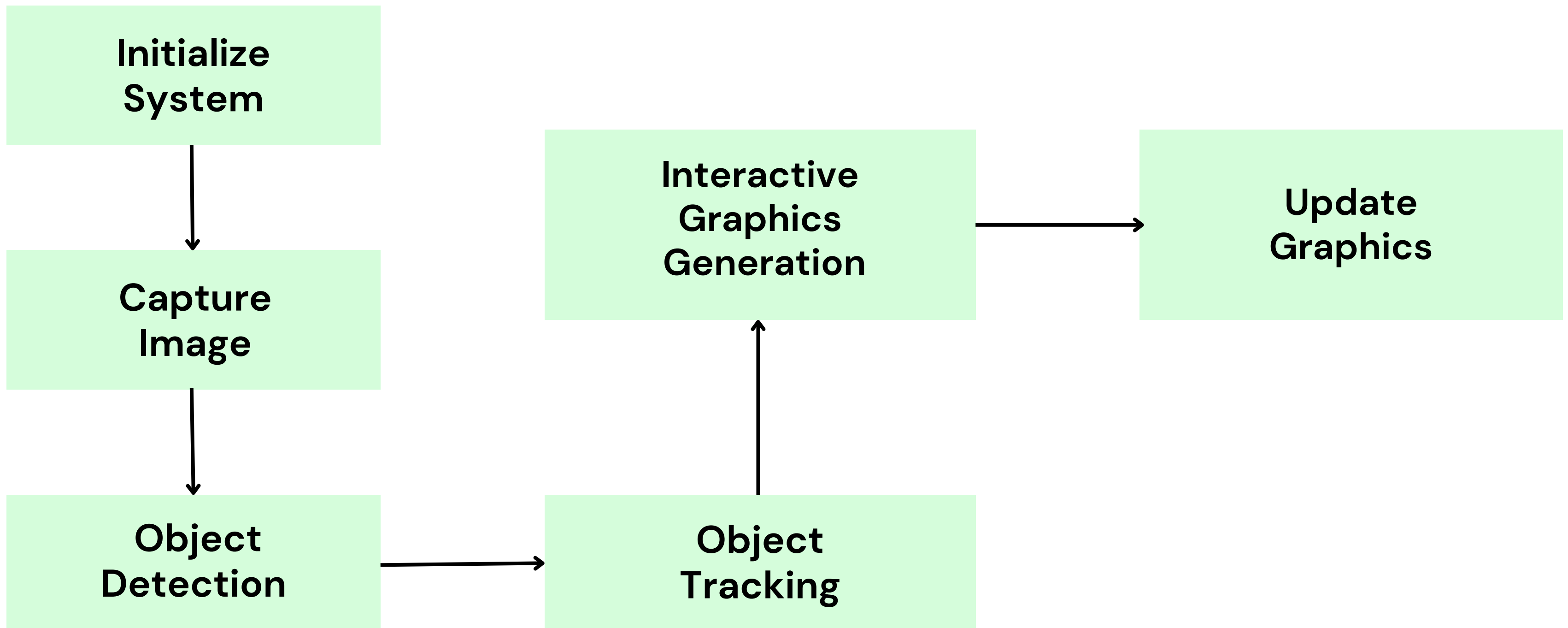
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┌─────────────────┐
│   Initialize    │
│     System      │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│    Capture      │
│     Image       │
└─────────────────┘
         │
         ▼
┌─────────────────┐        ┌─────────────────┐
│     Object      │───────▶│     Object      │
│    Detection    │        │    Tracking     │
└─────────────────┘        └─────────────────┘
                                    │
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                           │   Interactive   │───────▶│     Update      │
                           │    Graphics     │        │    Graphics     │
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Experimental Setup
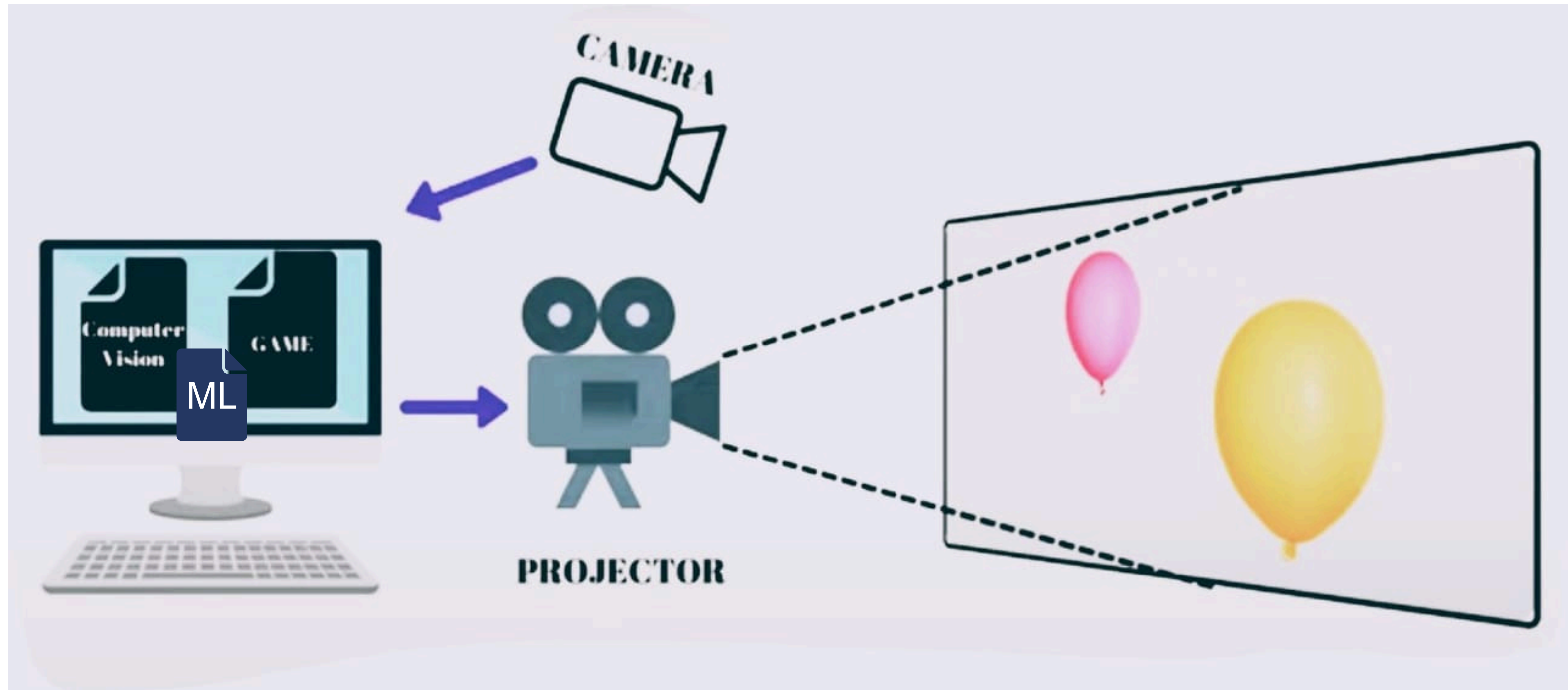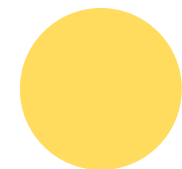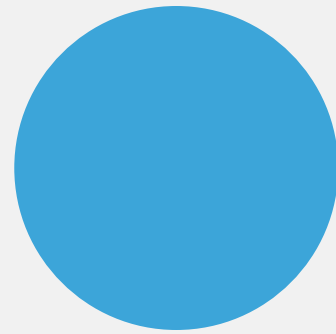
Performance Parameter

- **Object Detection Accuracy:**
  Measure the accuracy of the object detection algorithm in identifying and localizing physical and virtual objects in the scene.

- **Real-time Processing:**
  Evaluate the system's ability to process video feeds and perform object detection in real-time without significant delays.

- **Robustness to Lighting Conditions:**
  Assess the system's performance under different lighting conditions, including low light and bright light scenarios.

- **Area Coverage:**
  Evaluate the system's scalability concerning the size of the tracking area.

- **Processing Latency:**
  Measure the time taken from capturing a frame to detecting and tracking objects, ensuring low latency for real-time interaction.

Efficiency Issue

- **User Interaction Latency**

- **Object Occlusion**

- **Processing Power and Speed**

- **Lighting Variations**

THANK YOU