



## Department of Computer Science & Engineering and Information Technology

### Major Project Proposal (2024-25)

Group No.

14

1. **Project Title:** Saliency Based Guided Model for Object Detection in Camouflage Environment

2. **Team Members**

S. No.	Roll No.	Name	Mobile No.	Proficiency
1.	211206	Shashank Goel	9311089072	Machine Learning
2.	211385	Akshit Sharma	7876807322	Cloud Computing
3.	211458	Palak Bhardwaj	9015453558	Artificial Intelligence

3. **Name of Supervisor (s)**

Dr. Deepak Gupta, Assistant Professor (SG)

4. **Work Distribution**

S. No.	Roll No.	Work Distribution
1.	211206	<ul style="list-style-type: none"><li>• Research and implementation of Single Shot Detector(SSD) for object detection.</li><li>• Collecting and preprocessing dataset relevant to camouflage environments.</li><li>• Assisting with the final comparison of all implemented models in terms of accuracy and precision.</li><li>• Contributing to the documentation and writing of the final report,</li></ul>
2.	211385	<ul style="list-style-type: none"><li>• Research and implementation of Fast-CNN for object detection.</li><li>• Designing and testing the saliency-based model for object detection in camouflage environments.</li><li>• Leading the project timeline management and coordination among team members,</li></ul>



		<ul style="list-style-type: none"><li>● Presentation preparation and assisting with the writing of the final report.</li></ul>
3.	211458	<ul style="list-style-type: none"><li>● Research and implementation of YOLO (You Only Look Once) for object detection.</li><li>● Developing and evaluating a saliency-based model for detecting objects in camouflaged environments.</li><li>● Analyzing results and contributing to the refinement of models based on findings.</li><li>● Supporting the project with visualization, charts, and preparing the presentation slides.</li></ul>

## 5. Problem Statement

Object detection in complex environments, particularly those involving camouflage, presents a significant challenge in the field of computer vision. Traditional object detection models, such as Single Shot Detector (SSD), Fast R-CNN, and YOLO, have achieved remarkable success in identifying and localizing objects in a variety of settings. However, these models often struggle when faced with camouflaged objects, where the target blends seamlessly with its surroundings, leading to reduced detection accuracy. In scenarios like wildlife monitoring, military applications, and surveillance, the ability to accurately detect camouflaged objects is crucial. The primary issue lies in the models' reliance on features that are easily confounded by background noise or subtle variations in texture and color, which are prevalent in camouflage scenarios.

The objective of this project is to address the limitations of existing object detection models by integrating saliency-based techniques. Saliency detection focuses on identifying regions of an image that stand out from the background, which can be particularly effective in highlighting camouflaged objects that would otherwise go unnoticed by conventional methods. By combining the strengths of saliency-based models with traditional object detection frameworks, we aim to develop a more robust solution for detecting objects in camouflage environments. The project will involve implementing and comparing the performance of SSD, Fast R-CNN, and YOLO against a proposed saliency-based guided model, evaluating their effectiveness in terms of accuracy and precision. The outcome of this research will provide insights into the viability of saliency-based approaches in improving object detection in challenging visual environments, contributing to advancements in fields that rely on accurate and reliable object recognition.



## 6. Main Objectives

- 1) Implement and evaluate traditional object detection models (SSD, Fast R-CNN, YOLO) in camouflage environments.
- 2) Develop and integrate a saliency-based guided model for enhanced object detection in challenging visual settings.
- 3) Compare the performance of traditional and saliency-based models in terms of accuracy and precision.

## 7. Resources Required

Category	Description	
Software Resources	<ul style="list-style-type: none"><li>● Python</li><li>● TensorFlow</li><li>● OpenCV</li><li>● CUDA</li></ul>	<p>Version: 3.8 or later</p> <p>Version: 2.6 or later</p> <p>Version: 4.5 or later</p> <p>Version: 11.0 or later</p>
Hardware Resources	<ul style="list-style-type: none"><li>● High-performance GPU</li><li>● Multi-core CPU</li><li>● Sufficient RAM</li></ul>	
Others	<ul style="list-style-type: none"><li>● Access to a large labeled dataset</li><li>● Research papers and documentation</li><li>● Cloud computing resources</li></ul>	



## 8. Project Plan

Activity	Year 2024										Year 2025				
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May					
Literature Review															
Analysis and Requirements															
Project Design and Architecture															
Implementation															
Testing and Validation															
Documentation and Write-up															

**Signatures** *(please also mention the name of team members and supervisor (s) with date)*

Shashank Goel  
(Name of Member 1)

Akshit Sharma  
(Name of Member 2)

Palak Bhardwaj  
(Name of Member 3)

Dr. Deepak Gupta  
(Name of Supervisor)

(Name of Co-Supervisor, if any)

**Date of Submission:** 21 August 2024