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| **PROJECT PLAN** | | | | | | | | |
| Department: AI | | | | Semester: 5 | | | Academic Year: 2025–26 | |
| **I** | **Proposed Title of the Project:** | | | Vision-driven semantic segmentation for contextual road scene understanding | | | | |
| **Area of Specialization/Stream** | | | Artificial Intelligence ,Computer Vision,  Deep Learning | | | | |
| **Mapping with POs & PSOs** | | | Apply engineering knowledge, analytical skills, modern tools, and ethical practices to design and implement effective solutions for real-world computer vision problems. | | | | |
| **II** | **Name(s) of guide(s):** | | | **Prof. / Dr**. VAISHNAVI K V | | | | |
| **III** | **Name of Team Members** (Not more than four students in a batch): | | | | | | | |
| Sl. No. | Name | | | USN | | | Contact No. |
| **1** | DEEPTHIK RAI B | | | 4VP23AI014 | | | 9731076885 |
| **2** | DHRUVANARAYANA S | | | 4VP23AI017 | | | 6362951905 |
| **3** | PAVAN KUMAR H P | | | 4VP23AI031 | | | 8971608957 |
| **4** | TANMAY SHIVAKUMAR SUNAGAR | | | 4VP23AI058 | | | 7019663399 |
|  | | | | | | | |
| **IV** | **Introduction** | | | | | | | |
| The rapid growth of autonomous driving technology requires systems capable of accurately perceiving and interpreting complex road environments. Road Scene Understanding is the process of recognizing and classifying every element in a road scene—such as drivable roads, vehicles, pedestrians, lane markings, traffic signs, and other objects. This project focuses on implementing semantic segmentation techniques to achieve pixel-level classification of road scenes. By enabling a vehicle to understand its surroundings in real-time, the system will significantly contribute to safer navigation, effective lane-keeping, obstacle avoidance, and intelligent decision-making in autonomous vehicles. | | | | | | | |
| **Objectives of the project** | | | | | | | |
| * To develop a semantic segmentation model for pixel-level classification of road scenes. * To accurately detect and label road elements such as roads, vehicles, pedestrians, lane markings, and traffic signs. * To achieve real-time or near real-time performance for autonomous driving applications. * To test and evaluate the system under varied weather and lighting conditions. * To integrate the segmentation output into a visualization or simulation environment. | | | | | | | |
| **V** | **Methodology** | | | | | | | |
|  | * Dataset Collection & Preprocessing:   Use publicly available datasets like Cityscapes, BDD100K, or CamVid.  Resize and normalize images; apply data augmentation (rotation, brightness change, noise).   * Model Selection & Training:   Implement deep learning models such as DeepLabv3+, Fast-SCNN, or ENet.  Use transfer learning for faster convergence and better accuracy.   * Evaluation:   Evaluate using metrics like Mean Intersection over Union (mIoU) and Pixel Accuracy.   * Deployment:   Optimize model for real-time inference using TensorRT or ONNX.  Deploy on hardware such as NVIDIA Jetson Nano for live testing.   * Integration:   Visualize results by overlaying segmentation masks on the original video feed. | | | | | | | |
| **VI** | **Expected Outcome of the project** | | | | | | | |
|  | The expected outcome will be a functional road scene understanding system capable of performing semantic segmentation on road images or video streams in real-time. The deliverables include:   * A trained segmentation model * A demonstration of the model running on real or simulated driving footage * Performance evaluation reports * Integration of the system into a basic autonomous driving simulation | | | | | | | |
| **VII** | **Application of the project** | | | | | | | |
|  | * Autonomous driving systems for safer navigation * Advanced driver assistance systems (ADAS) * Traffic monitoring and analysis * Smart city traffic management * Robotics and delivery vehicle navigation | | | | | | | |
| **VIII** | **Does the project proposed is relevant to any of the Industry or Institution in and around your area: Yes / No**  Yes — This project is relevant to industries working in autonomous driving, intelligent transportation systems, and surveillance. Example: Tata Elxsi (Bengaluru) – Contact: +91-80-2297 9123**‬, Email: info@tataelxsi.co.in***.*‬ | | | | | | | |
| **IX** | **Budget** | | | | | | | |
|  | Materials Cost: | | | | | ₹5,000 | | |
| Labour Charges: | | | | | - | | |
| Any other cost: | | | | | ₹2,000 | | |
| Total: | | | | | ₹7,000 | | |
| Source for Funds: | | | | | Self / Industry / Others | | |
|  |  | | | | | | | |
| **X** | **Schedule for Major Activities** | | | | |  | | |
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| Date of commencement of project: | | | | | 04-08-2025 | | |
| Project Plan (Synopsis) submission to the Guide | | | | | 15-08-2025 | | |
| Review of the Project Plan by Guide/Project Coordinators/HoD | | | | | 16-08-2025 to 18-08-2025 | | |
| **Presentation 1:** Presentation of Project Plan (Synopsis), Introduction, Literature review | | | | | 20-08-2025 to 21-08-2025 | | |
| Last date for re-submission (if applicable) & review | | | | | 25-08-2025 | | |
| **Presentation 2:** Presentation on Requirements Specification and Analysis / Materials & Methodology | | | | | 17-09-2025 to 19-09-2025 | | |
| **Presentation 3:** Presentation on System Design & System Implementation/ System Testing and Experimental Results & Conclusions and Scope for Future Enhancement.  Complete Demonstration, **Internal Viva Voce** | | | | | 13-10-2025 to 15-10-2025 | | |
| Probable date of completion of the project: | | | | | 25-10-2025 | | |
| Last date for Submission of Completed Project Report with Journal Paper**/** Participating in the competition/exhibition certificate | | | | | 05-11-2025 | | |
| *Note: Above schedule may change as per VTU academic calendar.* | | | | | | | |
| **XI** | **Team members** | | | | | | | |
|  | Student(s) | | | | | Signature with date | | |
| 1. DEEPTHIK RAI B | | | | |  | | |
| 1. DHRUVANARAYANA S | | | | |  | | |
| 1. PAVAN KUMAR H P | | | | |  | | |
| 1. TANMAY SHIVAKUMAR SUNAGAR | | | | |  | | |
| **XII** | **Guidance** | | | | | | | |
|  | Guide (s) allotted: | | | | | Signature (s) with date | | |
|  | 1. Guide: | | Prof. / Dr. VAISHNAVI KV | | |  | | |
|  | 2. Co-Guide (if any): | | Prof. / Dr. | | |  | | |