

**COLLEGE CODE:** 1105

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**COMPLETED THE PROJECT NAMED AS**

**AUTONOMOUS VEHICLES AND ROBOTICS**

**SUBMITTED BY,**

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**Phase 5: Project Demonstration & Documentation**

**Title: Autonomous Vehicles and Robotics**

**Abstract:**

The *Autonomous Vehicles and Robotics* project explores the fusion of artificial intelligence, robotics, and automation technologies to build self-navigating robotic vehicles. The system integrates computer vision, sensor fusion, and machine learning for real-time navigation, obstacle detection, and autonomous decision-making. This final report covers the demonstration, technical documentation, performance evaluations, source code, and testing results. The project aims to improve transportation efficiency, safety, and adaptability in dynamic environments. Visual content like diagrams, source code snapshots, and system architecture visuals are included for comprehensive understanding.

**Index (with Page Numbers)**

1. Project Demonstration
2. Project Documentation
3. Feedback and Final Adjustments
4. Final Project Report Submission
5. Project Handover and Future Works

**1. Project Demonstration**

**Overview:**  
The *Autonomous Vehicles and Robotics* system will be demonstrated to stakeholders, exhibiting its core capabilities such as autonomous navigation, sensor integration, and object detection.

**Demonstration Details:**

* **Live Navigation Walkthrough:** A real-time demo of the vehicle navigating through obstacles using sensors and path-planning algorithms.
* **Object Detection Accuracy:** Showcasing the system’s real-time detection of pedestrians, vehicles, and other objects using camera and LiDAR data.
* **Sensor Fusion:** Demonstration of how GPS, accelerometers, ultrasonic sensors, and cameras work in unison for accurate movement and environment perception.
* **Performance Metrics:** Evaluation of speed, obstacle avoidance accuracy, and response time under different conditions.
* **Safety Protocols:** Explanation and demonstration of emergency braking and fail-safe mechanisms.

**Outcome:**  
A successful demonstration will validate the vehicle's ability to operate autonomously in semi-structured environments while ensuring safety and reliability.

**2. Project Documentation**

**Overview:**  
Detailed technical and user documentation is provided, covering system design, codebase, and operational instructions.

**Documentation Sections:**

* **System Architecture:** Diagrams of control flow, sensor architecture, and robotic systems.
* **Code Documentation:** Explanation of key modules such as path planning, vision systems, and motor controls.
* **User Guide:** How to operate, monitor, and troubleshoot the robotic vehicle.
* **Admin Guide:** For maintenance, configuration of sensors, and system calibration.
* **Testing Reports:** Data on road tests, failure scenarios, and improvements.

**Outcome:**  
A complete reference manual for future development and deployment.

**3. Feedback and Final Adjustments**

**Overview:**  
Stakeholder feedback during and after the demonstration will guide improvements.

**Steps:**

* **Feedback Collection:** Via forms, video analysis, and observer input.
* **System Refinement:** Adjustments to navigation algorithms and safety features based on feedback.
* **Final Testing:** Post-adjustment tests to confirm enhancements.

**Outcome:**  
A stable and improved system prepared for real-world applications.

**4. Final Project Report Submission**

**Overview:**  
A report summarizing development phases, key outcomes, and future directions.

**Sections:**

* **Executive Summary:** Goals and milestones achieved.
* **Phase Breakdown:** Key technologies integrated in each phase—AI, robotics, sensors.
* **Challenges & Solutions:** E.g., terrain adaptation, sensor misreads, and how they were mitigated.
* **Outcomes:** Demonstrated capability and roadmap for deployment.

**Outcome:**  
A formal report showcasing the project’s progress and potential.

**5. Project Handover and Future Works**

**Overview:**  
Transfer of project materials and future plans.

**Handover Details:**

* **Next Steps:** Ideas include full-scale vehicle deployment, cloud-based fleet management, or drone integration.
* **Documentation & Code:** Complete codebase and documentation provided.

**Outcome:**  
A robust foundation for future academic or industrial development.

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