



DIGITAL EGYPT PIONEERS INITIATIVE

Real-Time Object Detection for Autonomous Vehicles

Project Proposal Document

1. Project Overview

The Real-Time Object Detection for Autonomous Vehicles project focuses on developing a machine learning model capable of detecting and classifying objects in real-world driving environments — such as pedestrians, vehicles, traffic signs, and obstacles.

This system will enhance safety and decision-making capabilities in autonomous vehicles by providing real-time object recognition and situational awareness.

The project addresses key challenges in autonomous perception systems, including variations in lighting, road types, and environmental conditions.

2. Team Organization & Role Assignments

Team Member	Primary Role	Key Responsibilities	Secondary Focus
Mohamed Gamal	Project Management	Model development and machine learning implementation	Algorithm research and optimization
Youssef Mohamed	ML Model Developer	Model development and machine learning implementation	Model training and validation
Youssef Ahmed	ML Model Developer	Model development and machine learning implementation	Performance optimization and testing
Ahmed Sami	Data Specialist	Data collection, preprocessing, and management	Dataset preparation and quality assurance

Team Member	Primary Role	Key Responsibilities	Secondary Focus
Ahmed Mohamed	Software Developer	System integration and software development	Application development and deployment
Ali Abdelaziz	System Administrator	Infrastructure management and system maintenance	Deployment and monitoring
Youssef Ibrahim	Testing & Documentation	Testing coordination and documentation management	Quality assurance and reporting

3. Project Milestones & Team Assignments

Milestone 1: Data Collection, Exploration, and Preprocessing

Objective: Prepare a high-quality dataset for model training

Tasks & Assignments:

■ **Dataset Collection & Acquisition**

Lead: Ahmed Sami | Support: Mohamed Gamal
Collect and organize datasets relevant to autonomous driving

■ **Data Exploration & Analysis**

Lead: Mohamed Gamal | Support: Ahmed Sami
Explore data distribution, assess label quality and class balance, generate statistical reports

■ **Preprocessing & Augmentation**

Lead: Ahmed Sami | Support: Youssef Ahmed
Implement preprocessing pipelines (resizing, normalization, flipping, rotation)

Deliverables:

Dataset Exploration Report

Preprocessed and Augmented Dataset

Milestone 2: Object Detection Model Development

Objective: Build and train an accurate, real-time object detection model

Tasks & Assignments:

▪ Architecture Selection & Design

Lead: Youssef Ahmed | Support: Youssef Mohamed
Select optimal model architecture based on project requirements

▪ Model Training & Fine-tuning

Lead: Youssef Mohamed | Support: Mohamed Gamal
Train and fine-tune the machine learning model

▪ Performance Evaluation

Lead: Youssef Ibrahim | Support: Youssef Ahmed
Evaluate model performance and conduct validation tests

Deliverables:

Model Evaluation Report

Trained and Optimized Object Detection Model

Model Architecture Documentation

Milestone 3: Deployment and Real-Time Testing

Objective: Deploy the model and test it under real-world conditions

Tasks & Assignments:

▪ Model Deployment

Lead: Ahmed Mohamed | Support: Ali Abdelaziz
Deploy the model for real-world usage

■ Integration & Testing

Lead: Youssef Ibrahim | Support: Ahmed Mohamed
Integrate with live camera feeds and test in various driving conditions

■ Performance Optimization

Lead: Ali Abdelaziz | Support: Youssef Ahmed
Fine-tune based on field test results and optimize system performance

Deliverables:

Deployed Model System

Real-Time Testing Report

Deployment Guide Documentation

Milestone 4: MLOps and Monitoring

Objective: Establish continuous monitoring and improvement mechanisms

Tasks & Assignments:

■ MLOps Pipeline Implementation

Lead: Ali Abdelaziz | Support: Ahmed Mohamed
Implement automated pipeline for model management

■ Automated Retraining Setup

Lead: Ali Abdelaziz | Support: Ahmed Sami
Set up automated system updates and maintenance

■ Monitoring System

Lead: Youssef Ibrahim | Support: Mohamed Gamal

Monitor system performance and maintain quality standards

Deliverables:

System Management Report

Monitoring System Documentation

Automated Maintenance Framework

Milestone 5: Final Documentation and Presentation

Objective: Summarize the project and present outcomes

Tasks & Assignments:

■ Comprehensive Documentation

Lead: Mohamed Gamal | Support: All team members
Compile final project report detailing all phases, methodologies, and results

■ Presentation Preparation

Lead: Youssef Ahmed | Support: Mohamed Gamal, Youssef Ibrahim
Prepare presentation for stakeholders demonstrating system functionality and impact

■ Knowledge Transfer

Lead: Youssef Mohamed | Support: All team members
Create technical handover documentation and conduct knowledge transfer sessions

Deliverables:

Final Project Report

Final Presentation Slides

4. Expected Impact

This project contributes to advancing autonomous driving safety and efficiency by enabling vehicles to make real-time decisions based on accurate environmental perception. The outcomes may also be adapted for applications in traffic monitoring, surveillance, and smart city systems.

Key Benefits:

- Enhanced road safety through improved object detection capabilities
- Contribution to autonomous vehicle technology advancement
- Potential applications in smart city infrastructure
- Development of expertise in cutting-edge AI technologies
- Foundation for future research and commercial applications