AI TRAFFIC MONITORING

A PROJECT REPORT

Submitted by

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in partial fulfillment of requirements for the award of the course

AGB1211 – DESIGN THINKING

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

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K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY (AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **"AI TRAFFIC MONITORING"** is the bonafide work of **IRIN MINERWA S (2303811724322038) , JANAKA K (2303811724322039), JANAKIRANI V (2303811724322040) , JANANI P (2303811724322041)** who carried out this project during the academic year 2024-2025 under my supervision.

Signature	**Signature**
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Submitted for the viva-voce examination held on 5.12.24

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

I declare that the project report on "**AI TRAFFIC MONITORING**" is the result of original work done by us and best of our knowledge, similar work has not been submitted to "**ANNA UNIVERSITY CHENNAI**" for the requirement of Degree of **BACHELOR OF TECHNOLOGY**. This project report is submitted on the partial fulfillment of the requirement of the award of the **AGB1211 – DESIGN THINKING.**

Signature

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JANAKA K

JANAKIRANI V

JANANI P

Place: Samayapuram

Date: 5/12/2024

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It is with great pride that I express our gratitude and indebtedness to our institution, **"K. Ramakrishnan College of Technology (Autonomous)",** for providing us with the opportunity to do this project.

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VISION OF THE INSTITUTION

To serve the society by offering top-notch technical education on par with global standards.

MISSION OF THE INSTITUTION

- Be a centre of excellence for technical education in emerging technologies by exceeding the needs of industry and society.
- Be an institute with world class research facilities.
- Be an institute nurturing talent and enhancing competency of students to transform them as all- round personalities respecting moral and ethical values.

VISION AND MISSION OF THE DEPARTMENT

To excel in education, innovation and research in Artificial Intelligence and Data Science to fulfil industrial demands and societal expectations.

Mission 1: To educate future engineers with solid fundamentals, continually improving teaching methods using modern tools.

Mission 2: To collaborate with industry and offer top-notch facilities in a conductive learning environment.

Mission 3: To foster skilled engineers and ethical innovation in AI and Data Science for global recognition and impactful research.

Mission 4: To tackle the societal challenge of producing capable professionals by instilling employability skills and human values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO 1: Compete on a global scale for a professional career in Artificial Intelligence and Data Science.

PEO 2: Provide industry-specific solutions for the society with effective communication and ethics.

PEO 3: Hone their professional skills through research and lifelong learning initiatives.

PROGRAM OUTCOMES

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO 1:** Capable of working on data-related methodologies and providing industry-focussed solutions.
- **PSO2:** Capable of analysing and providing a solution to a given real-world problem by designing an effective program.

ABSTRACT

AI-based traffic monitoring systems have emerged as a transformative solution to address the challenges of modern urban mobility. By leveraging advanced machine learning algorithms, computer vision, and sensor technologies, these systems can efficiently collect, analyze, and interpret real-time traffic data. AI-powered solutions facilitate the detection of traffic patterns, vehicle counting, congestion monitoring, accident detection, and traffic flow prediction, providing valuable insights for traffic management and urban planning. This paper explores the development and application of AI techniques in traffic monitoring, highlighting the integration of cameras, IoT devices, and deep learning models for improved traffic flow, safety, and optimization of road networks. The ability of AI to handle large datasets, adapt to dynamic environments, and offer predictive insights makes it a key tool in shaping future smart city infrastructure and promoting sustainable transportation solutions.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

With the growing number of vehicles and traffic in cities, managing and monitoring road conditions has become a big challenge. Traditional systems, such as traffic cameras and basic sensors, are often slow and inefficient. AI technologies like computer vision and machine learning can help solve this problem by analyzing real-time traffic data to improve traffic flow, reduce congestion, and increase safety. By using AI, we can create smarter traffic systems that help cities become more efficient and easier to navigate.

1.2 PROBLEM STATEMENT

Current traffic monitoring systems are outdated and have many limitations. They struggle to handle large amounts of data, cannot detect all types of traffic (like pedestrians and cyclists), and lack the ability to predict traffic problems before they happen. This results in traffic jams, delays, and safety issues. There is a need for a more advanced system that can monitor traffic in real-time, detect congestion, predict future problems, and provide solutions to make traffic management more efficient.

1.3 OBJECTIVE

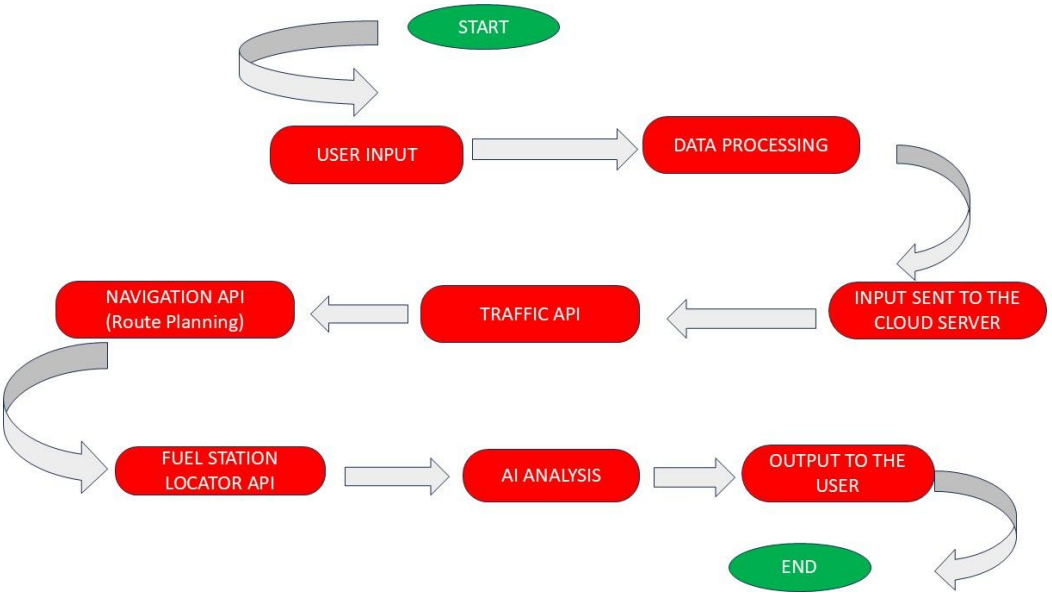
The goal of this research is to develop a traffic monitoring system that uses AI to improve traffic management. The main objectives include:

- **Real-time Traffic Monitoring**: Using AI to track traffic conditions and vehicle counts in real-time.
- **Detecting and Predicting Congestion**: Using AI to identify traffic jams and predict where and when they might happen.
- **Accident Detection**: Creating a system to automatically detect accidents and send alerts for faster response.
- **Improving Traffic Flow**: Using AI to optimize traffic signals and reduce congestion .

CHAPTER 2

PROJECT METHODOLOGY

2.1 BLOCK DIAGRAM



CHAPTER 3

KEY PHASES OF DESIGN THINKING

3.1 EMPATHIZE

In this phase, we focus on understanding the people who will use the AI traffic monitoring system, like city traffic managers, drivers, and pedestrians. We learn about their problems and challenges by:

- Talking to traffic officers and city planners to understand what problems they face in managing traffic.
- Asking commuters about their daily traffic experiences, such as delays or accidents.
- Observing traffic patterns in different areas to see where congestion or accidents occur.

The goal is to gather as much information as possible about the users and their needs.

3.2 DEFINE

Here, we take everything we've learned in the **Empathize** phase and define the main problem we want to solve. For example:

- "Traffic managers need a system to predict where traffic jams will occur and help control traffic flow."
- "Commuters face delays because accidents are not detected quickly enough."
- "Traffic monitoring systems can't track pedestrians and cyclists accurately."

We define the problem clearly to make sure we are solving the right issue.

3.3 IDEATE

Now, we come up with many ideas to solve the problem. We don’t worry about whether the ideas are perfect; the goal is to think of as many creative solutions as possible. Some ideas

for an AI traffic monitoring system might be:

- Using cameras and sensors to predict traffic jams before they happen.
- Creating a system that detects accidents quickly and sends alerts to emergency services.
- Tracking pedestrians and cyclists using AI to keep them safe alongside cars.

  At this stage, we explore different solutions and think about which ones might work best.

3.4 PROTOTYPE

In the context of AI traffic monitoring, it's a basic version of the system (designed in Figma) that shows key features like traffic maps, alerts, and AI predictions. It allows you to test how users interact with it and gather feedback to improve the design before creating the final version.

3.5 TEST

Finally, we test the prototypes with real users, like traffic managers or commuters, to see if the AI system is solving the problem. We might:

- Let traffic managers use the prototype to manage traffic and see if it helps.
- Simulate real traffic conditions to see how well the AI predicts and reacts to congestion or accidents.
- Ask users for feedback on the system’s usability and accuracy.

Based on the feedback, we improve the system, test it again, and keep refining it until it works well.

CHAPTER 4

MODULE DESCRIPTION

4.1 TRAFFIC JAM MODULE

This module helps detect and predict traffic jams in real time by analyzing traffic data from sensors and GPS. It can show areas with heavy traffic and suggest alternate routes to avoid congestion.

Key Features:

- Detects traffic slowdowns
- Predicts where jams might happen
- Sends alerts to avoid congested areas.

4.2 GPS TRACKING MODULE

This module tracks vehicles in real time using GPS. It shows their current location and speed, and keeps a history of where they've been. It’s useful for managing fleets or monitoring vehicles on the road.

Key Features:

- Tracks vehicle location
- Monitors speed and movement
- Sends alerts if vehicles leave certain areas

4.3 PETROL BANK MODULE

This module tracks how much fuel vehicles use and suggests ways to save fuel. It helps drivers find the best routes for better fuel efficiency and gives tips on how to drive more efficiently.

Key Features:

- Tracks fuel usage
- Suggests fuel-efficient routes
- Gives tips to save fuel

4.4 FIND MY ROUTE MODULE

This module helps drivers find the fastest route by checking traffic conditions and road closures. It updates routes in real time to help avoid delays.

Key Features:

- Finds the best routes
- Updates routes based on traffic
- Shows alternate routes if there are delays

4.5 MY ACCOUNT MODULE

The "My Account" module allows users to manage their profile, vehicle details, and driving history. It keeps track of your preferences and gives personalized suggestions based on your driving patterns.

Key Features:

- Stores personal and vehicle information
- Shows traffic and route history
- Provides custom driving tips

CHAPTER 5
CONCLUSION

AI traffic monitoring systems can greatly improve how we manage traffic in cities. By using technologies like machine learning and computer vision, AI can predict traffic jams, detect accidents quickly, and help manage traffic lights to keep everything running smoothly. This makes driving safer and reduces delays.

With AI, traffic managers can make smarter decisions based on real-time data, and commuters benefit from less congestion and safer roads. As more cities use smart technologies, AI will become a key part of how we manage traffic.

However, for AI to work well, it needs accurate data and good algorithms. Future improvements should focus on making these systems more accurate, easier to use, and able to work in different cities.

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APPENDIX A – SCREENSHOTS