Premier University, Department of CSE
Spring 2024, 4th Semester, Assignment
Course Title: Microprocessors and Microcontrollers**, Course Code:** CSE 3815
Course Outcome: CO3**, Total Marks:** 10

Problem Statement:
You are leading a team of engineers tasked with designing an Autonomous Traffic Management System (ATMS) for a three way road in a city. The ATMS aims to optimize traffic flow, enhance safety, and reduce congestion by incorporating autonomous vehicles and smart infrastructure. Your challenge is to design and implement an ATMS using embedded systems that coordinates the movement of autonomous vehicles, reduces traffic congestion, improves transportation efficiency, and addresses the diverse interests and requirements of multiple stakeholders. Stakeholders in this project include city authorities, transportation agencies, autonomous vehicle manufacturers, commuters, and environmental organizations.

Objectives:
Following are the objectives of your solution:

1. To optimize the flow of vehicles at the three-way intersection to minimize congestion, reduce delays, and ensure efficient movement of traffic.
2. To reduce vehicle idling time and fuel consumption by optimizing traffic signal timings and vehicle movements. Promote eco-friendly transportation options and reduce emissions. 3. To implement mechanisms that allow emergency vehicles to preempt regular traffic signals, ensuring rapid response during emergencies.

Investigation:
Designing an Autonomous Traffic Management System (ATMS) for a three-way road is a complex task that requires careful investigation and consideration of various factors. Here are key aspects to investigate during the design process:
1. Analyze historical and real-time traffic data to understand traffic patterns, peak hours, and traffic volume at the intersection.
2. Investigate the types of vehicles using the road, including cars, buses, trucks, bicycles, and pedestrians.
3. Examine the physical characteristics of the road and intersection, including road width, number of lanes, and road surface conditions.
4. Identify suitable locations for sensor deployment

Evaluation:
Student's solutions will be evaluated based on improvements in traffic flow, reduction in congestion, environmental impact reduction, stakeholder satisfaction, adherence to safety standards, and overall transportation efficiency.

Design:
Students' solution design must achieve the given objectives.

Deliverables:
A printed assignment reporting the following tasks:
(i) A properly reasoned solution using embedded system.

(ii) Briefly address the complex problem-solving questions:

a. Does problem-solving need in-depth engineering knowledge?

b. Does the problem-solving involve wide-ranging or conflicting technical, engineering and other issues?

c. Is the solution well-known or require abstract thinking and analysis to formulate?

d. Does the problem-solving involve infrequently encountered issues?

e. Does problem-solving need adherence to standards and codes of practice?

f. Does the problem-solving involve stakeholders with conflicting technical requirements? g. Does the problem-solving involve interdependence between sub-problems or component parts?

Rubrics for Assignment marking:

Task	**Criteria**	**Good (4-5) Moderate (2-3) Poor (1)**
i.	Problem analysis	In-depth analysis Shallow analysis Incomplete analysis
ii.	Problem solution	Properly or near Appropriate solution for Inappropriate or appropriately reasoned some cases no solution solution