**Problem Definition: Modeling and Implementing a Night Vision Intelligent System (NVIS) Using SYSMOD Approach**

**Background:** In the realm of road safety, the Night Vision and Intelligent Systems (NVIS) play a crucial role in mitigating accidents caused by poor visibility, especially during low-light conditions. Incorporating infrared technology and smart lighting features, NVIS enhances driver awareness and responsiveness on the road.

**Problem Statement:** Utilizing the Systems Engineering approach based on a Model-Driven methodology (SYSMOD), design, implement, and verify a SysML model of a Night Vision Intelligent System (NVIS). The NVIS must meet the following requirements:

1. Incorporate two headlights with infrared emitters, each serving specific distances.
2. Integrate a high-resolution video camera capable of capturing reflected infrared rays.
3. Utilize a compatible monitor device screen for displaying NVIS imagery.
4. Implement an Infrared filter to eliminate interference from light waves.
5. Include a control unit for processing received signals and managing system functionality.

**Functionality:** The NVIS must provide the following functionality:

* Obstacle detection and warning at varying distances (50m, 100m, 150m, and 200m).
* Adaptive lighting modes based on road and weather conditions, including winding roads, high-speed driving, and foggy environments.

**SYSMOD Approach:** To successfully model the NVIS system using SysML, follow these steps:

1. Understand the problem and project contexts.
2. Gather and model NVIS requirements using SysML Requirement Diagrams, organized into different packages.
3. Create a System Context Diagram and a Block Definition Diagram/Internal Block Diagram to represent the NVIS's interactions and internal structure.
4. Develop a structural model of the NVIS architecture using SysML structured diagrams.
5. Model NVIS services using Use Case Diagrams, including essential descriptions for each Use Case.
6. Model NVIS behavior using Activity Diagrams, Sequence Diagrams, or State Machine Diagrams.
7. Populate the NVIS structure with values, operations, and relationships.
8. Develop a GUI in NVIS Rhapsody, simulating user interaction with the system.
9. Execute and test the model in IBM Rhapsody and integrate it with the Unity Game Engine Environment.
10. Prepare a PowerPoint presentation showcasing the results, including group details and members.
11. Upload the IBM Rhapsody project, presentation, video(s), and Canvas report.

**Constraints:**

* Adherence to SYSMOD approach and SysML modeling standards.
* Integration with Unity Game Engine Environment for testing.
* Compliance with road safety regulations and standards.
* Consideration of cost-effectiveness and practicality for automotive implementation.

**Deliverables:**

* Completed SysML model of the NVIS system.
* Integration with Unity Game Engine Environment for testing.
* PowerPoint presentation detailing project results and group information.
* IBM Rhapsody project files, video(s), and Canvas report.

**Stakeholders:**

* Tutor