

# FINAL PROJECT ASSIGNMENT

## Full EV Simulation

### Objective

Design and simulate a comprehensive electric vehicle (EV) model using MATLAB/SIMULINK, integrating the key topics covered throughout the course.

### Scope

Your project should address the following systems and components:

1. **Vehicle Dynamics:**
  - Simulate speed, torque, acceleration, and power consumption.
2. **Energy Management:**
  - Incorporate state monitoring and energy flow optimization.
3. **Electric Motors:**
  - Model motor characteristics and evaluate efficiency under varying conditions.
4. **Power Electronics:**
  - Include components like inverters and DC-DC converters for power control.
5. **Control Systems:**
  - Implement a drive cycle simulation to analyze performance.
  - Integrate regenerative braking for energy recovery.

### Deliverables

- A **functional MATLAB/SIMULINK model** of an EV system.
- A **detailed report** covering:
  - System architecture and design considerations.
  - Simulation results (graphs, tables, and analysis).
  - Challenges faced and solutions applied.
- **Presentation slides** summarizing your project for Week 14.

## Key Milestones

- **Week 13:** Complete simulation, including all components. (Present it in class)
- **Week 14:** Present your final project in class.

## Grading Criteria

1. **Model Functionality and Accuracy (40%)**
  - Correct implementation of vehicle range, energy consumption, acceleration, and power requirement calculations.
  - Accurate use of formulas and adherence to real-world constraints.
  - Validation of MATLAB/SIMULINK model outputs with expected theoretical results.
2. **Exercise Completion and Detail (30%)**
  - Completion of all required simulations in MATLAB/SIMULINK, including vehicle range and energy consumption.
  - Inclusion of at least one real-world scenario simulation, such as WLTP (Worldwide Harmonized Light Vehicles Test Procedure) or other standard drive cycles, to analyze energy consumption and range under varying driving conditions.
  - Clear annotations in the MATLAB code and SIMULINK blocks to explain system design.
3. **Report Quality (20%)**
  - Detailed explanation of the simulation setup, methodology, and results.
  - Use of graphs, tables, and other visual aids to present findings.
  - Discussion of factors affecting EV performance (e.g., battery size, terrain, efficiency losses).
4. **Classroom Engagement (10%)**
  - Active participation during discussions and Q&A sessions.
  - Ability to explain and justify design choices clearly and concisely.

## Expectations

- Apply concepts from **assignments and exercises** throughout the course.
- Showcase creativity and problem-solving in system integration.
- Demonstrate a deep understanding of EV technologies.

For any further clarification or support, feel free to ask. Good luck with your project!