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| **HCMC UNIVERSITY OF TECHNOLOGY**  Faculty of Transportation Engineering  ----------o0o---------- | **SOCIALIST REPUBLIC OF VIETNAM**  Independence – Freedom – Happiness  ----------o0o--------- |

A BRIEF PROPOSAL OF THESIS /CAPSTONE PROJECT

Semester \_\_222\_\_\_\_

**1. Thesis title:** Modeling and simulation using Matlab/Simulink and its applications in the Electric Power Steering system in VIOS.

**2. Advisor’s full name:** PhD. Ngô Đắc Việt

PhD. Trần Đăng Long

**3. Student’s full name:** Trịnh Tiến Long **- ID: 1852047**

**4. Thesis content:**

**4.1. Type:**  A product design  A technical evaluation

A scientific research  Other: A product analysis design

**4.2. Objectives & Technical requirements:**

\_Contribute to the analysis of the dynamic behavior of the mechanical components of the

Electric Power Steering (EPS) system by using Solidworks to model these parts.

\_Create an EPS model using Solidworks and implement it in a simulation using

Matlab/Simulink, with simulation results analyzed using Simscape Multibody.

**4.3. Core problems to be solved & Solving ideas/methods:**

\_Conduct research to determine the equations for calculating the resistance torque between the tire and road surface for longitudinal force, lateral force, and normal force.

\_Develop an EPS model using Simscape to determine the torque acting on the steering wheel for different steering angles and scenarios, such as following a predefined path or changing the speed of the test vehicle.

**4.4. Works to be done & Required results:**

| **No.** | **Works to be done** | **Required results** *(Ex: data, equations, models, diagrams, parameters, charts, findings…)* |
| --- | --- | --- |
| 1 | Dynamic formula for EPS system | Equation |
| 2 | Solidwork model for simscape simulation | Model |
| 3 | Diagram to demonstrate relationship between steer angle and torque required without motor assisted | Diagrams/Charts |

**4.6. Requested products:**

Technical report  Poster ◻ Scientific paper

◻ Software ◻ Firmware  Simulation model

◻ General layout drawings ◻ Detailed drawings ◻ Assembly drawings

◻ Others:

**4.7. Scope of Thesis:**

\_ The scope of this thesis is to analyze the dynamic behavior of the Electric Power Steering (EPS) system in the VIOS model, by creating a simulation model in MATLAB/Simulink. The analysis will focus on the relation between the front axle and the steering system, and the results may not be applicable to other vehicle models.

**4.8. Tasks of each team member:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Member’s full name** | **Works assigned** |
| 1 | Trịnh Tiến Long | Summarize the dynamic equation, create a Solidworks model, and then import it into Simscape Simulink to analyze the torque required to steer at a certain angle. |

**5. Technical strengths and practical opportunities:**

\_ Skill on summarizing theory

\_ Background knowledge of Matlab Simulink/Simscape

**6. Weeknesses and solution:** \_

\_ Planning and time management skills: Developing effective planning and time management strategies.

\_ Parameter synchronization for model : Establishing a standardized process for parameter synchronization across all team members.

**7**. **Working plan for 15+1 weeks:** *(including: tasks to be done; solutions to overcome weakness and threats; mid-term report (X); …)*

| **No.** | **Works** | **Week** | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **X** | **11** | **12** | **13** | **14** | **15** | **16** |
| 1 | **Introduction of project** | **x** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | **Synthetic theory** |  | **x** | **x** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | **Choose plan and prepare technical paper for reference** |  |  |  | **x** | **x** | **x** |  |  |  |  |  |  |  |  |  |  |
| 4 | **Build tire dynamic model** |  |  |  |  |  |  | **x** | **x** |  |  |  |  |  |  |  |  |
| 5 | **Draw solidworks model** |  |  |  |  |  |  |  | **x** | **x** |  | **x** | **x** |  |  |  |  |
| 6 | **Build EPS model** |  |  |  |  |  |  |  |  |  |  |  |  | **x** | **x** | **x** |  |
| 7 | Make poster |  |  |  |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |
| 8 | Make presentation slides |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **x** |
| 9 | Write full report |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **x** |

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**Student:Trịnh Tiến Long** **-ID: 1852047** - **Signature:** Long

**Date** (dd/mm/yyyy): 22/05/2023

**ADVISOR**