**HCMC UNIVERSITY OF TECHNOLOGY**
Faculty of Transportation Engineering
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**SOCIALIST REPUBLIC OF VIETNAM**
Independence – Freedom – Happiness
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# A BRIEF PROPOSAL OF THESIS /CAPSTONE PROJECT

## Semester __222____

**1. Thesis title:** Analysis, 3D modeling and dynamic simulation of the vehicle steering system in the VIOS car.

**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:**

_Develop an Electric Power Steering model using Solidworks then applying to 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 |

| No. | Works to be done | **Required results** *(Ex: data, equations, models, diagrams, parameters, charts, findings…)* |
|---|---|---|
| 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:

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_ 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 | | | | | | | | | | |

| No. | Works | Week | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **X** | **11** | **12** | **13** | **14** | **15** | **16** |
| 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**