Problem Statement and Goals
ProgName

Team #, Team Name
Student 1 name
Student 2 name
Student 3 name
Student 4 name

Table 1: Revision History

Date	Developer(s)	Change
Sept 19	Travis	Wrote down Problem, stakeholders and potential extras/challenge level
Sept 22	Travis, Kai	Intial Draft of Problem Statement and Goals
...	...	...

1 Problem Statement

1.1 Problem

The McMaster Baja engineering team is seeking to improve the tuning process for their Continuous Variable Transmission (CVT). The tuning of a CVT typically involves extensive real-world testing of physical components, which is time-consuming and prone to inconsistencies due to factors such as wear and weather. These conditions complicate the ability to fine-tune the CVT's torque transfer, which directly impacts vehicle acceleration and hill-climbing performance, both which are two of the team's main objectives in competition.

1.2 Inputs and Outputs

1.2.1 Inputs

- CVT parameters

    - Primary weight
    - Primary Ramp Geometry

- Primary Spring Rate
- Primary Spring Pretension
- Secondary Helix Geometry
- Secondary Spring Rate
- Secondary Spring Pretension

- Vehicle and Driver Weight

- Traction

- Angle of Incline

1.2.2 Outputs

- Graphs

  - Accleration
  - Speed
  - Distance
  - Clamping Force
  - CVT Ratio
  - RPM
  - Torque
  - Belt Slippage

1.3 Stakeholders

- McMaster Baja Racing Team

- Dr. Spencer Smith

1.4 Environment

1.4.1 Hardware

- Device can be configured through the use of a personal computer or laptop.

1.4.2 Software

- The application will be supported on both Mac, Windows and Linux operating systems.

2 Goals

Develop a 3D simulation of the CVT system, which will include the driven pulley, driving pulley, belt, and engine, and will be implemented within a graphical user interface.

2.1 Matthematical Model

- Develop a mathematical model of the CVT system
- Implement the mathematical model in the simulation

2.2 Graphical User Interface

The graphical user interface will allow users to input various parameters such as CVT specifications, vehicle and driver weight, traction, and angle of incline, while also displaying graphs of the simulation output and enabling the export of simulation data. Users will then be able to see the output of there simulation in the form of graphs and export the data for further analysis.

2.3 Data Output and Visualization

After the simulation is complete, the application will display graphs of the simulation output and allow users to export simulation data.

2.4 Data Validation

Validation of the simulation data against real-world data is crucial to ensure the accuracy of the simulation. Will need to gather data from the McMaster Baja Racing Team to validate the simulation data.

3 Stretch Goals

3.1 Simulating Heat

3.2 Simulating Inertia of Non Rigid Components

3.3 3D model something something

3.4 Optimization Algorithm

Implement an optimization algorithm to find the optimal CVT parameters for a given set of conditions.

3.5   Advanced Data Validation somethign something

4   Challenge Level and Extras

4.1   Challenge Level

The challenge level for this capstone project is General

4.2   Extras

The extras for this capstone project are:

- Code walkthroughs

- Validation Report

Appendix — Reflection

The purpose of reflection questions is to give you a chance to assess your own learning and that of your group as a whole, and to find ways to improve in the future. Reflection is an important part of the learning process. Reflection is also an essential component of a successful software development process.

Reflections are most interesting and useful when they're honest, even if the stories they tell are imperfect. You will be marked based on your depth of thought and analysis, and not based on the content of the reflections themselves. Thus, for full marks we encourage you to answer openly and honestly and to avoid simply writing "what you think the evaluator wants to hear."

Please answer the following questions. Some questions can be answered on the team level, but where appropriate, each team member should write their own response:

1. What went well while writing this deliverable?

   - Defining problem, inputs, stakeholders, goals and environemnt were very easy. That part was well defined.

2. What pain points did you experience during this deliverable, and how did you resolve them?

   - Determing ouputs, stretch goals and extras were hard

3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?

   - Had to turn some goals into stretch goals to ensure it was suitable for capstone (optimaztion, etc)