Virtual Design Review 3

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**Summary of Previous Work**

At the onset of our collaboration, Dr. Anubi enlisted our expertise to craft a meticulously designed and demonstrably engineered chassis. Drawing on his insights from their prior design endeavors, we integrated his valuable perspectives into the conceptualization of the F1TENTH vehicle chassis. To guide our efforts, we set forth a comprehensive set of primary objectives, including the delineation of mechanical metrics, the development of a scalable design, and the streamlining of the production process. Employing a systematic approach, we conducted a thorough functional decomposition, breaking down the project into its essential elements. This process enabled us to establish clear project targets and metrics, providing a robust framework as we advanced through the phases of concept generation and selection. The culmination of this process is our initial concept, a modified roll cage, a chassis we will further develop in subsequent stages.

**Current Work**

Our team meetings revolve around a suitable body model to serve as the outer shell for our skeletal chassis. These sessions delve into in-depth discussions regarding the feasibility of the initial concept and the other top two contenders. We have communicated with the manufacturer of the chassis subframe, seeking their collaboration to obtain a CAD model for educational purposes, specifically focusing on the subframe. Currently, we await a response from their team. The integration of this CAD model is anticipated to significantly enhance the precision of our finite element analysis, providing a more refined definition of absolute metrics. Despite the ongoing wait for the subframe component, our team is actively engaged in subjecting our CAD chassis model to structural, fluid, and Ansys simulations. Concurrently, we implement necessary adjustments based on simulation outcomes, striving to achieve the desired results in our ongoing development process.

**Future Work**

As we advance in refining our chassis model, our approach involves conducting additional analyses and progressively tightening parameters. Simultaneously, we are delving into research on advanced composites and materials of higher tiers, integrating them into our model for a comprehensive assessment of their structural capabilities. Furthermore, maintaining close communication with the machine shop is pivotal, as we seek to ensure the feasibility of our theoretical designs for their practical completion.

Upon the successful fabrication of our model, the next phase involves physical testing. This step is to validate the theoretical conclusions drawn from our computer analyses, ensuring that our chassis not only meets the simulated expectations but also aligns with real-world performance standards. Once we confirm the functionality and integration of the chassis with the subframe, our next step involves conducting field tests using a prototype, with the participation of Dr. Anubi and selected lab assistants. Concurrently, we will make refinements to the CAD model, aligning it more closely with their feedback gathered during these tests in steering our ongoing efforts for the chassis.

**Potential Challenges**

Some challenges have been identified going into the spring semester as work shifts from developing models to having them fabricated and assembling them. Its come to our awareness that depending on the diameter of rods that the machine shop will not be able to work and weld the material together. We will also have to create our own testing mechanisms to do physical test on our vehicle and chassis.