Concept Generation

Concept generation is crucial in the design process. There are multiple methods on how to come up with concepts, such as morphological charts, anti-problems, and crap shoots. The team came up with 100 design concepts that provide solutions for the project. The list is located in Appendix D.

Concept Generation Tools

Of the multiple methods that can be utilized to generate concepts for the project, Team 503 used ideation and a morphological chart. Ideation is the formation of ideas and concepts, and Team 503 conducted a brainstorming session to generate 50 concepts for the chassis design of the F1TENTH vehicle. The next 50 concepts were generated using a morphological chart. The morphological chart was constructed using critical functions of the project and listing out possible parameter choices for each function. Concepts were generated using different combinations of these parameters as Team 503 saw fit.

Medium Fidelity Concepts

Team 503 chose five concepts from the list of generated concepts to act as their medium fidelity concepts. These were concepts that the team thought to satisfy most of the required functions but didn't feel were strong enough to represent a final design for the project.

Concept #	Description
2	A car that has cable chambers to organize cords, cables, and wires.
17	Quick Release Shell Chassis design for quick access and maintenance to internal components.
19	Recessed Camera Housing Chassis Design for camera protection.
22	Implement a moving mass inside the chassis to change the center of mass of the car. This allows the car to make tighter turns by keeping the force distribution on the inner and outer wheels closer to 50/50 during a turn.

53	Screwed Down, Magnetic Fasteners, Fully Rigid Construction, Damping on Fasteners, Increase Spring Stiffness.

High Fidelity Concepts

Team 503 chose three concepts from the generated concepts to act as their high fidelity concepts. These concepts were determined to satisfy many of the required functions for the project and could confidently represent a final design.

Concept #	**Description**
12	Centralized Electronics Hub Chassis that houses the computer, LiDAR, and other sensors for easy maintenance.
55	Screwed Down, Uniform Mounting Holes, Rely on Subframe Bumpers, Dampening on Fasteners, Increase Spring Stiffness.
61	Welded Chassis, Slot & Pin, Crash Detection and Avoidance/Protection, Cushioning, Bump Stops.