MICHIGAN STATE UNIVERSITY

Project Plan Presentation

Web Interface for Car Simulation Tool

The Capstone Experience

Team Bosch

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From Students…
…to Professionals

Project Sponsor Overview

- German Multinational Engineering and Technology Company Headquartered in Gerlingen, Germany
- Leading global supplier of technology and services
- Focused on developing the codes for more sustainability in the future
- The company has been witnessing a double-digit growth in profitability and has free cash flow of 100 percent

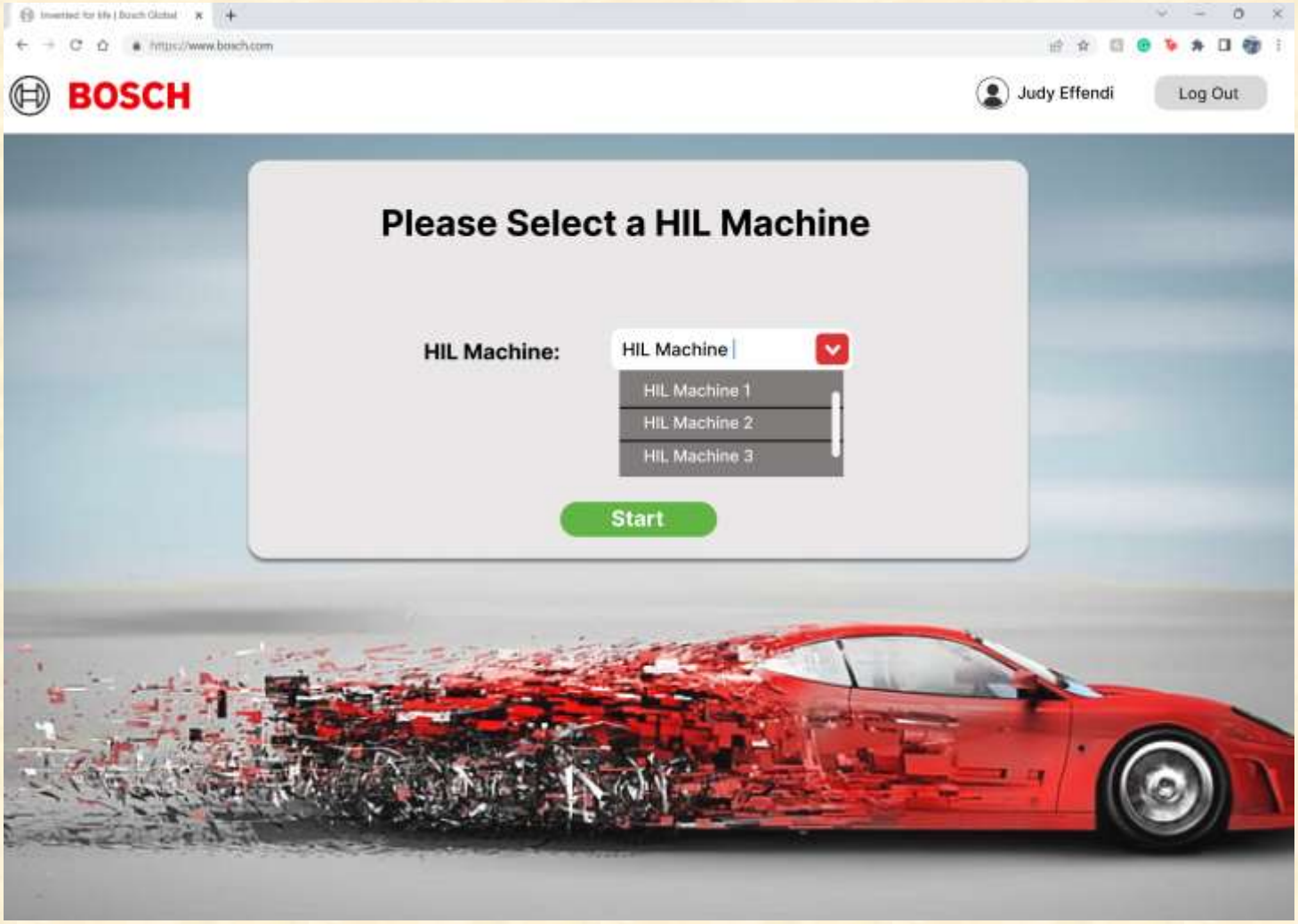
Project Functional Specifications

- Make Autonomous Vehicles Safer
- Web-Application to help Engineers modify and run simulations on CarMaker, a IMG Automotive specific virtual simulation.
- Secure to only the Engineers on the team
- Ability to control simulations through different scenarios.

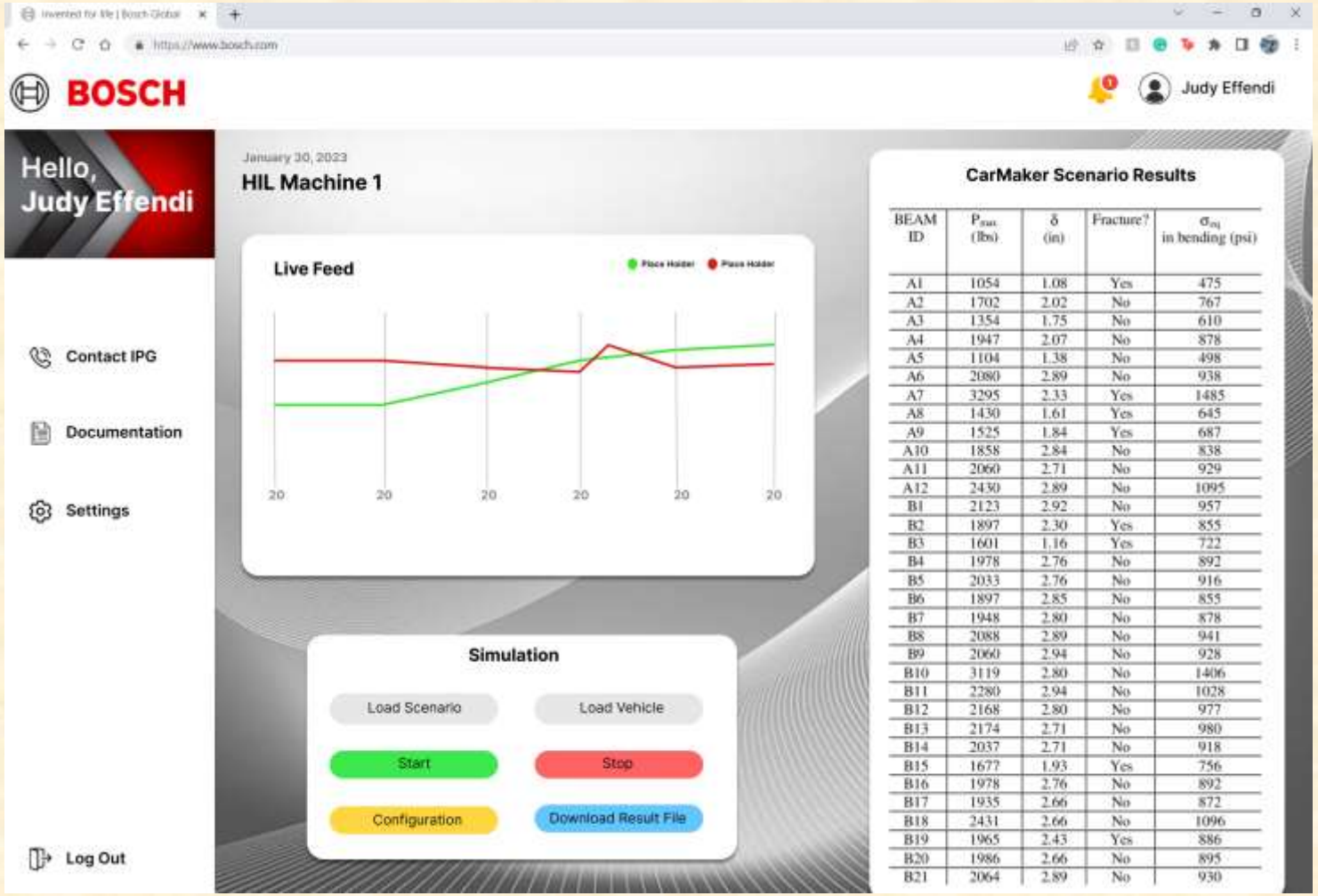
Project Design Specifications

- User friendly interface for interacting with each HIL system
- Ability to load, configure, start, stop, and save a simulation instance of CarMaker
- Secure user authentication system

Screen Mockup: Select HIL

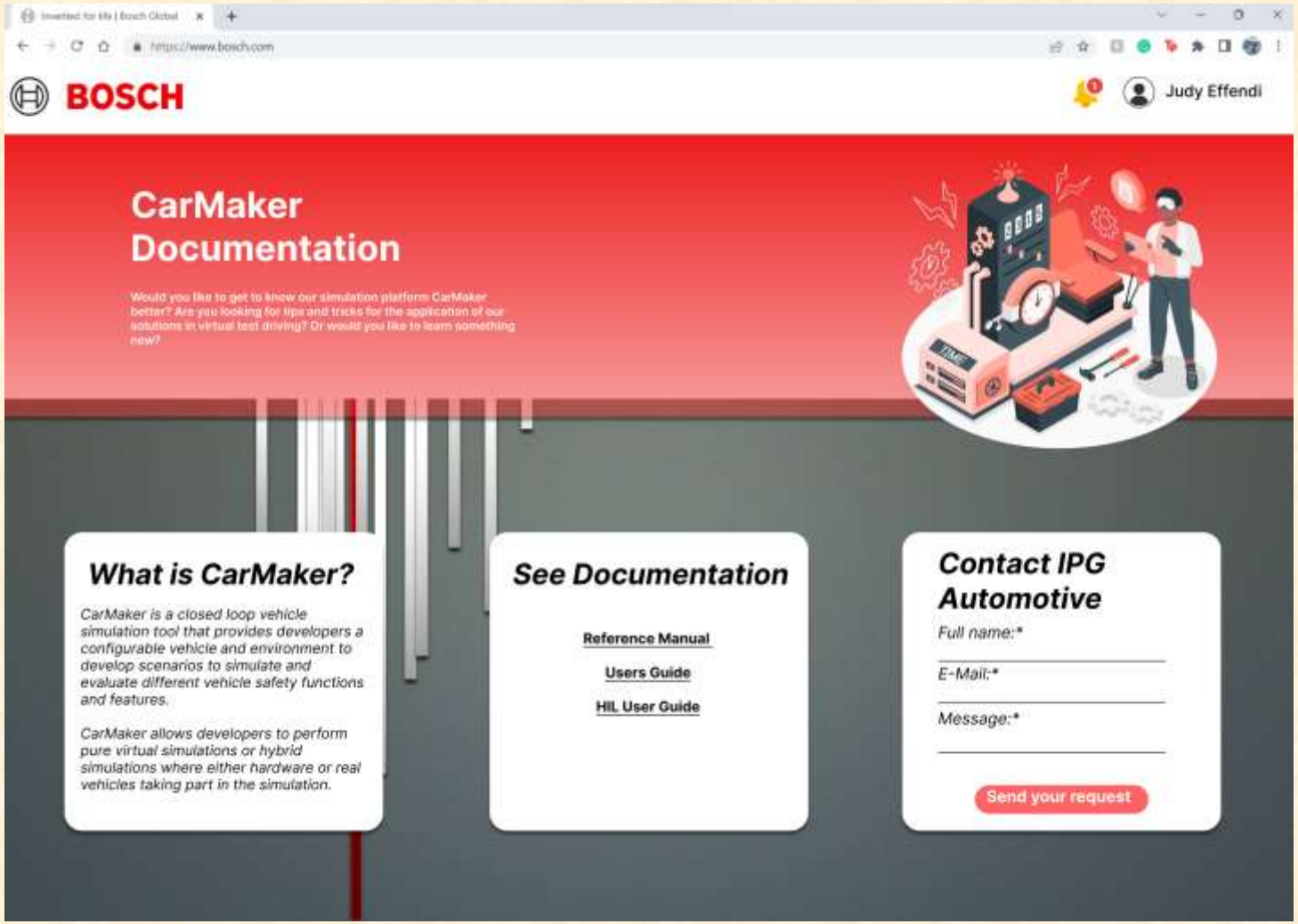


Screen Mockup: HIL Machine Page

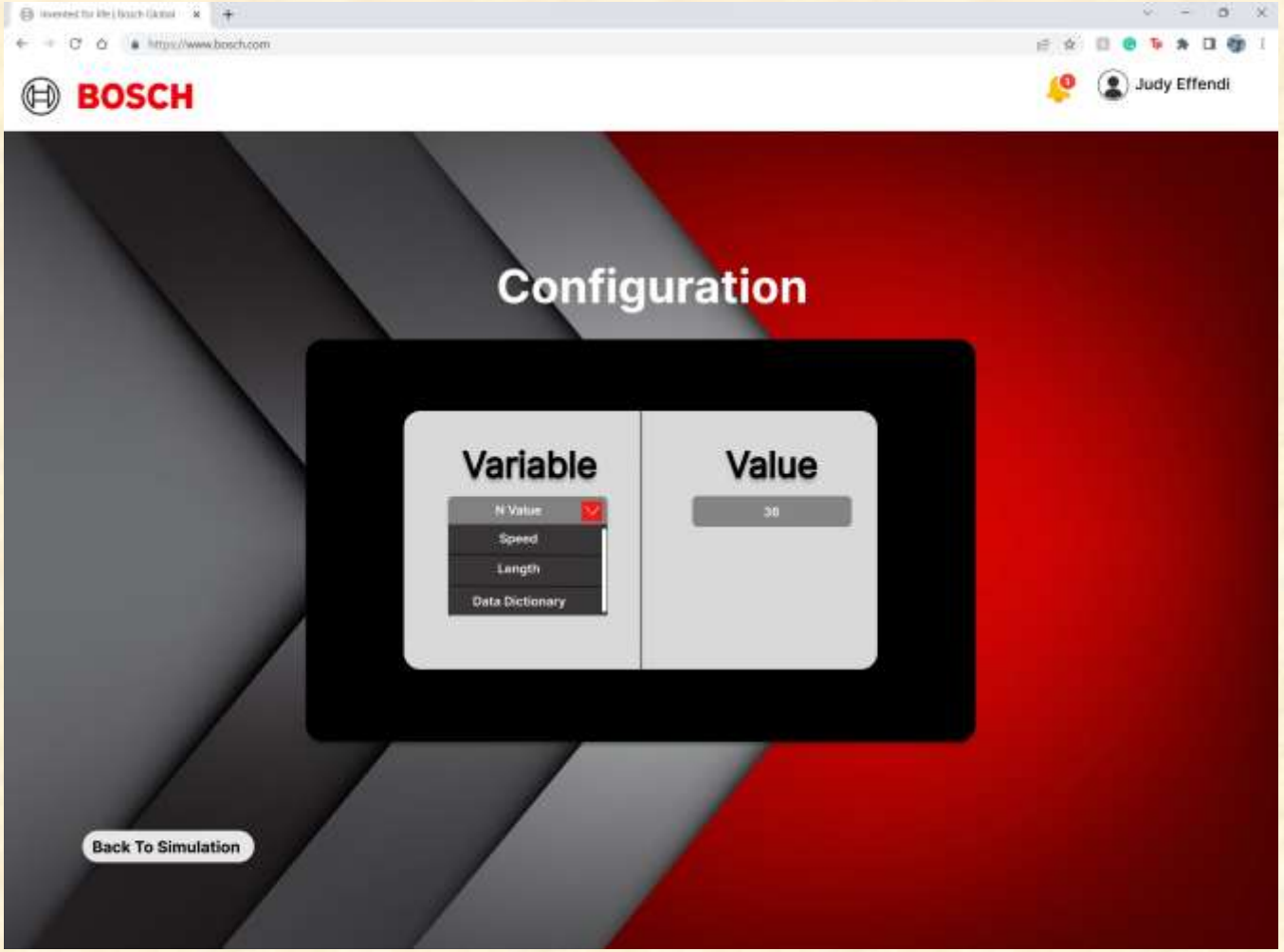


BEAM ID	P_{max} (lbs)	δ (in)	Fracture?	σ_{eq} in bending (psi)
A1	1054	1.08	Yes	475
A2	1702	2.02	No	767
A3	1354	1.75	No	610
A4	1947	2.07	No	878
A5	1104	1.38	No	498
A6	2080	2.89	No	938
A7	3295	2.33	Yes	1485
A8	1430	1.61	Yes	645
A9	1525	1.84	Yes	687
A10	1858	2.84	No	838
A11	2060	2.71	No	929
A12	2430	2.89	No	1095
B1	2123	2.92	No	957
B2	1897	2.30	Yes	855
B3	1601	1.16	Yes	722
B4	1978	2.76	No	892
B5	2033	2.76	No	916
B6	1897	2.85	No	855
B7	1948	2.80	No	878
B8	2088	2.89	No	941
B9	2060	2.94	No	928
B10	3119	2.80	No	1406
B11	2280	2.94	No	1028
B12	2168	2.80	No	977
B13	2174	2.71	No	980
B14	2037	2.71	No	918
B15	1677	1.93	Yes	756
B16	1978	2.76	No	892
B17	1935	2.66	No	872
B18	2431	2.66	No	1096
B19	1965	2.43	Yes	886
B20	1986	2.66	No	895
B21	2064	2.89	No	930

Screen Mockup: Documentation



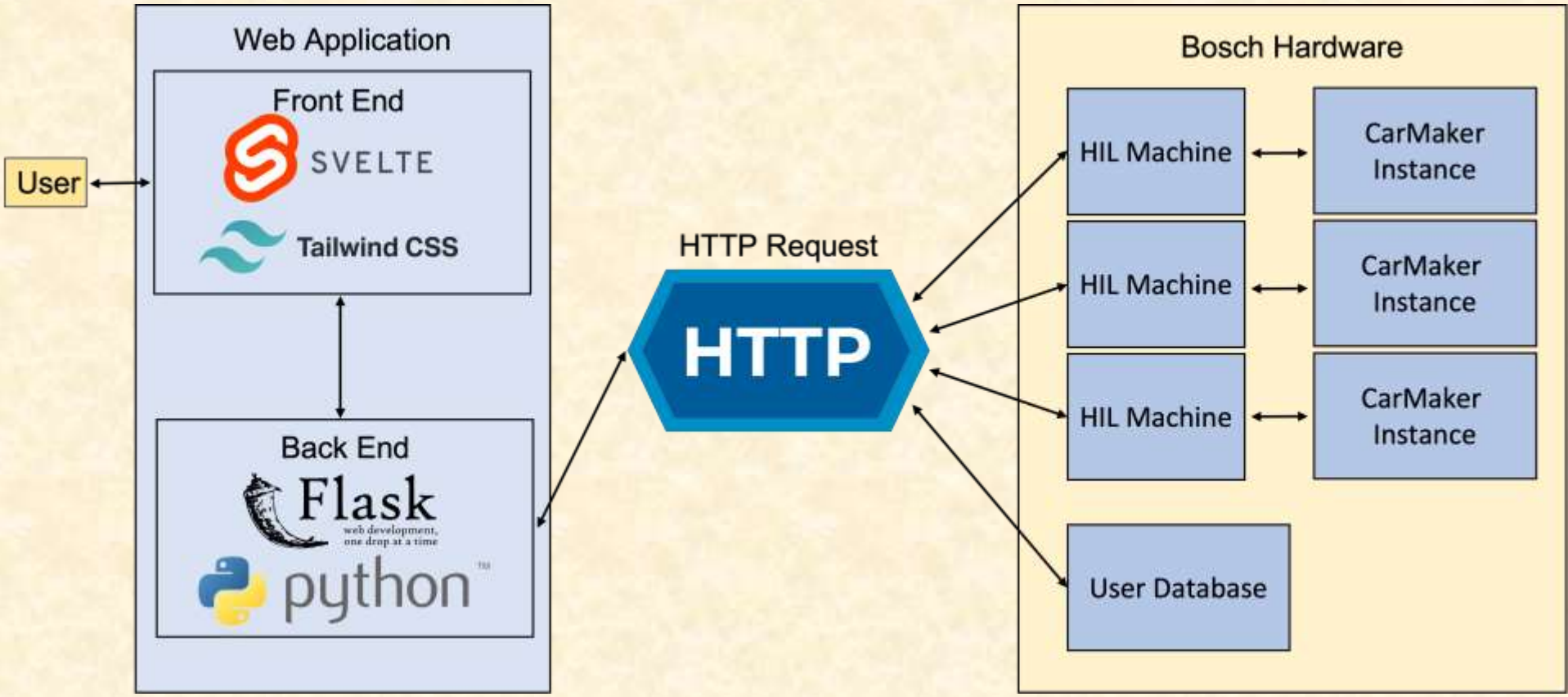
Screen Mockup: Configuration



Project Technical Specifications

- Frontend
  - Svelte
  - Tailwind CSS
- Backend
  - Flask
  - SQLite
- API
  - CarMaker Python API

Project System Architecture



Project System Components

- Hardware Platforms
  - HIL Machines
- Software Platforms / Technologies
  - Svelte
  - Tailwind CSS
  - Flask
  - SQLite
  - CarMaker Python API

Project Risks

Risks

- **How do we communicate with Bosch's HIL machines?**
  - Bosch utilizes local HIL machines that will be running instances of CarMaker
  - Communicate and work closely with Bosch to understand how our software can interact with their hardware as smoothly as possible
- **Real time display of certain parameters during a running simulation**
  - The web interface is expected to display live updates of CarMaker simulations
  - Work closely with the IPG Automotive team and the CarMaker Python API documentation to ensure data can be extracted during a simulation in real time
- **Queueing and/or multitasking of simulations**
  - The web interface will be interacting with a number of Bosch's local HIL machines, with each HIL machine only allowed to run a single instance of CarMaker
  - Research and develop a robust and efficient selection and execution process for CarMaker simulations
- **Real time configuration of data during a running simulation**
  - The web interface is expected to able to configure certain parameters of the simulation instance on the fly during execution
  - Work closely with the IPG Automotive team and the CarMaker Python API documentation to ensure data can be configured during a simulation in real time

Questions?