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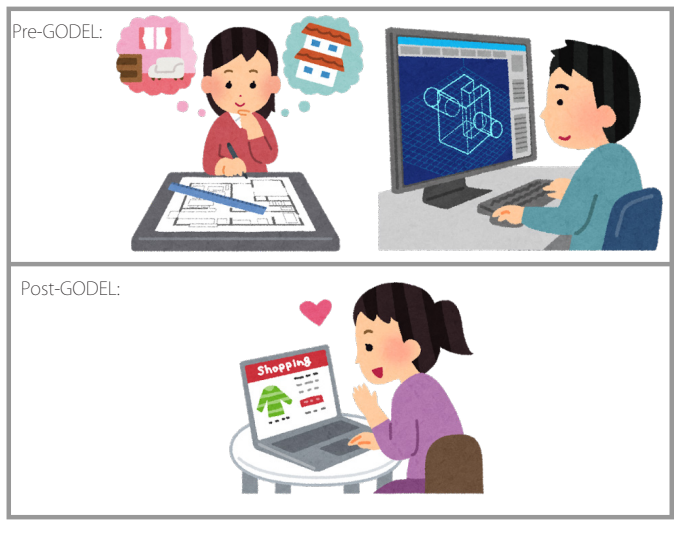
E14-140

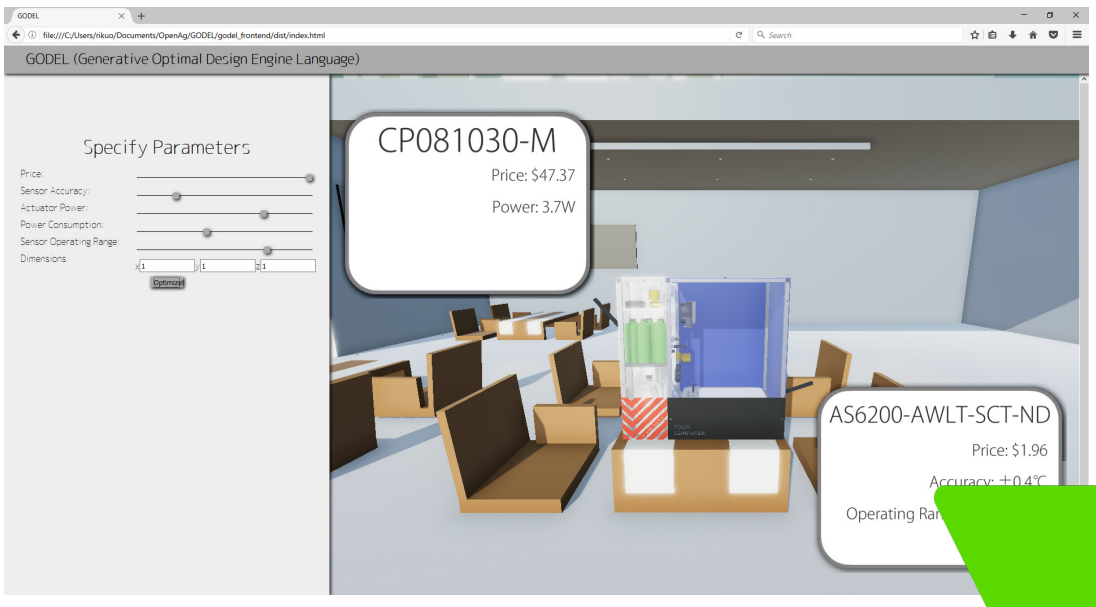
GODEL: Generative Optimal Design Engine Language

Concept

GODEL(Generative Optimal Design Engine Language) is a concept for a next generation hardware design toolkit.

Traditionally, designers will often have to make compromises based on the percieved problem space. By delegating design decisions to GODEL, end-users will be able to design their own hardware.

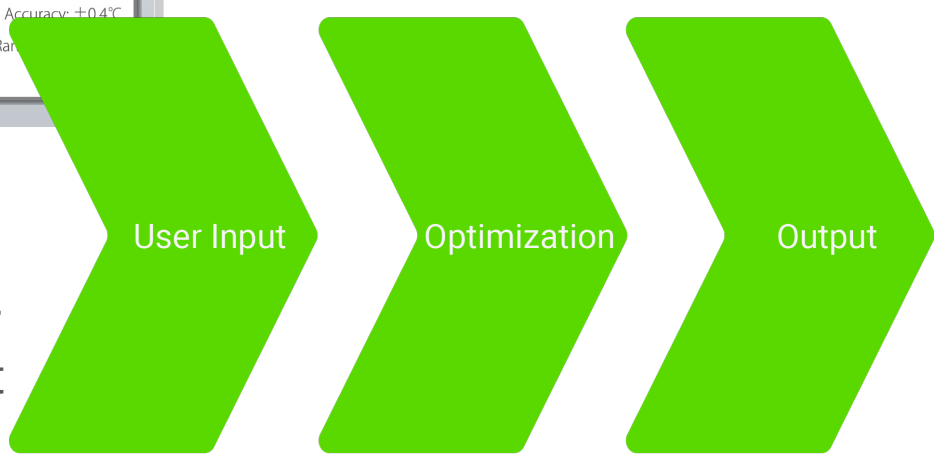




Constrained Problem

We began realizing this concept by focusing on solving a subset of the entire GODEL problem: Component Selection.
We call this tool G/Select.

The user will indicate his/her preferences regarding some parameters and G/Select will suggest a set of components from over 860,000 different combinations which most closely resembles the user's preferences.



Implementation

The approach taken in developing G/Select was to use web scraping tools to scrape component data from e-commerce sites(e.g., Mouser, DigiKey), and conduct a multi-objective optimization based on the user input. We implemented a multiobjective optimization algorithm based on the following equation.

$$X(t+1) = X(t) + V(t+1)$$
$$V(t+1) = WV(t) + c_1 r_1 (g_{best} - X(t)) + c_2 r_2 (l_{best} - X(t)) + c_3 r_3 (p_{best} - X(t))$$