

Debate2Create: Robot Co-design through Large Language Model Debates

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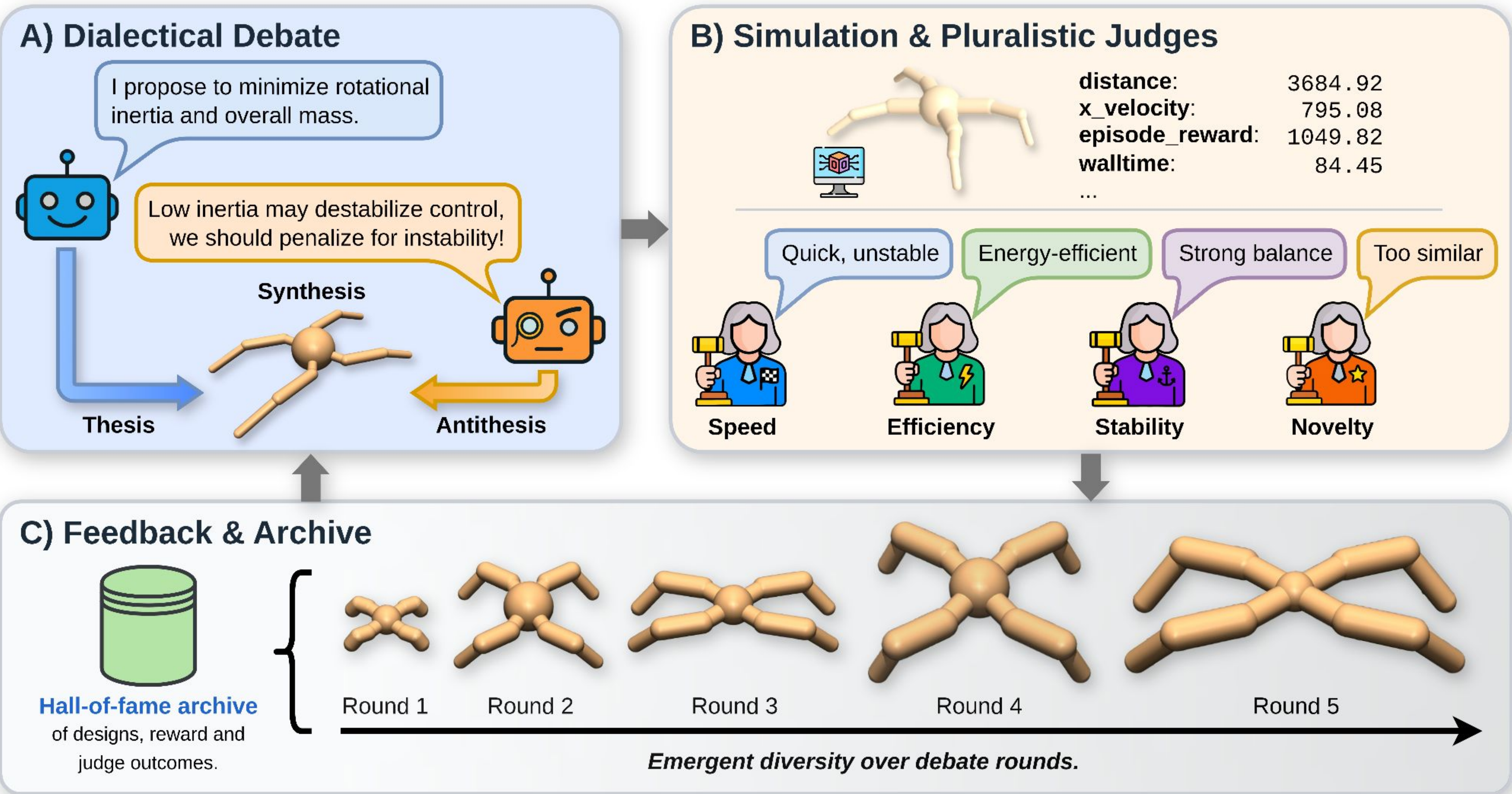


Can robots co-evolve through debate and simulation?

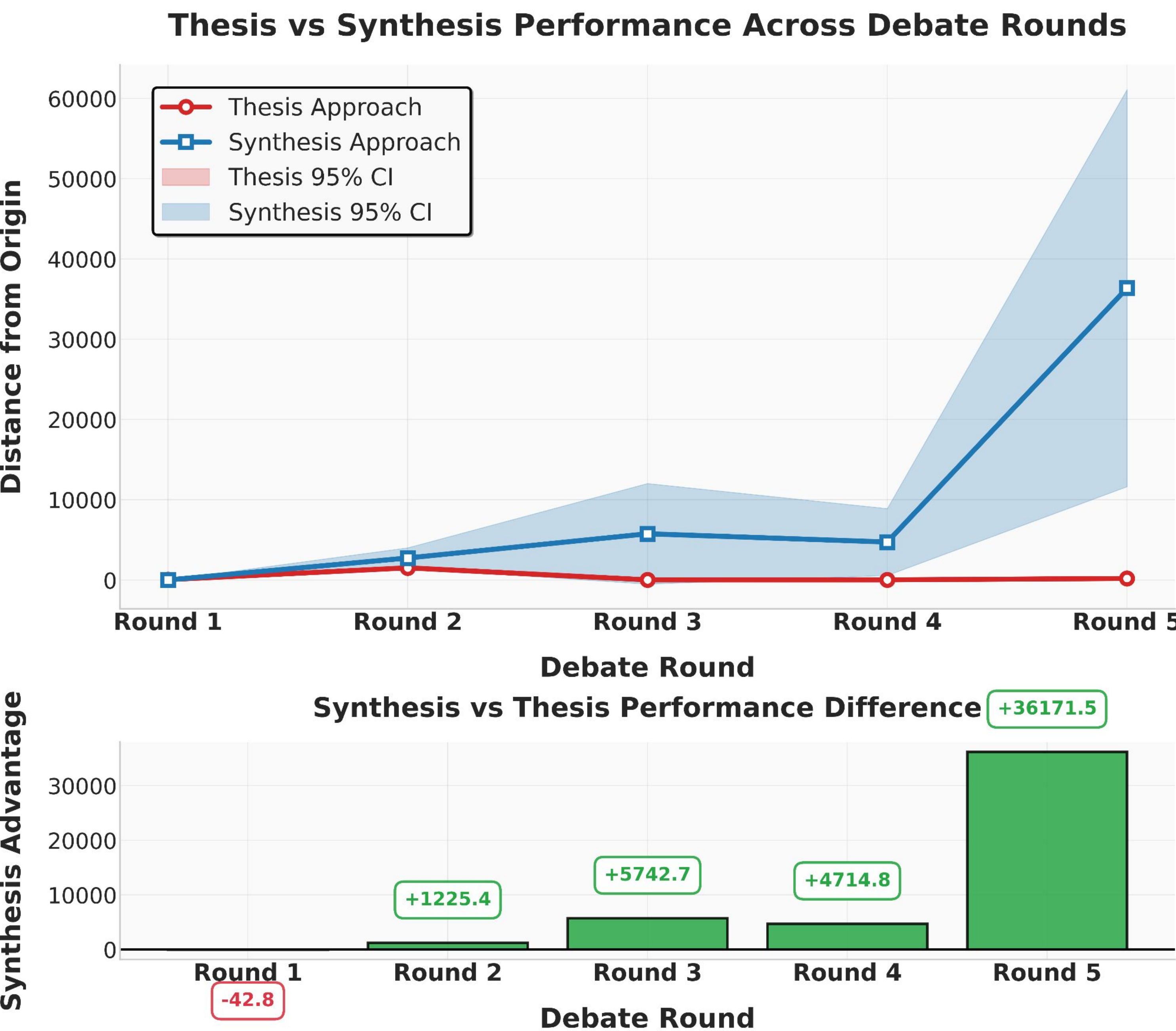
Overview

- 1. **LLM debates:** A design and control agent co-design robot morphologies via structured debate.
- 2. **Sim-as-a-judge:** Physics simulation scores each design–reward pair and guides evolution.
- 3. **Emergent diversity:** Repeated debates yield faster, more stable, and diverse robot morphologies.

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Results



Winning design + reward!

Original Ant

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$$\text{reward} = \underbrace{22v_x}_{\text{speed}} + \underbrace{4e^{-\frac{(h-0.7)^2}{0.04}}}_{\text{height}} + \underbrace{6e^{-\frac{(p-0.6)^2}{0.02}}}_{\text{pitch}} - \underbrace{0.025\|a\|^2}_{\text{control}} - \underbrace{0.04\|a - a_{\text{prev}}\|^2}_{\text{smoothness}} + \underbrace{30(\phi^2 + \psi^2)}_{\text{roll / yaw}} + \underbrace{1.0}_{\text{alive}}$$

Interested in learning more?

We will release our preprint shortly :)

Get in touch!

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