



SSA AI vs LLM AI

Continuous Math vs Discrete Math

$$dy/dx + P(x)y = Q(x) \text{ vs } F_n = F_{n-1} + F_{n-2}$$

Internal Training Session

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Preamble



Anundshög, Västerås. Pre-Viking era (circa 200-500 AD). 2 km E from where I grew up.

Intro



Finnslätten with Asea Robotics, Västerås. 2 km N from where I grew up.



When people talk about AI they usually mean
Large Language Models

**The math of LLMs is not complicated.
Running LLMs at scale is the difficult part.**

The Dartmouth Summer
Research Project on
Artificial Intelligence.
June 18 to August 17,
1956

The concept of LLM was well established
already in 1956.

By 2017 there was one missing part.
Then came Google and U. of Toronto with
Attention Is All You Need

Vaswani, A., N. Shazeer,
N. Parmar, J. Uszkoreit,
L. Jones, A.N. Gomez, L.
Kaiser, and I. Polosukhin
(2017): *Attention Is All
You Need*

The rest is history.

If LLM AI is not complicated. What is?

C

NEW RECORD



WTF

STATE-SPACE ADAPTIVE AI

Continuous Math

$[0,4]$



Bridges high-level *semantic* intent with continuous low-level physics in robotics (Embodied AI) or economics (Non-Embodied AI)

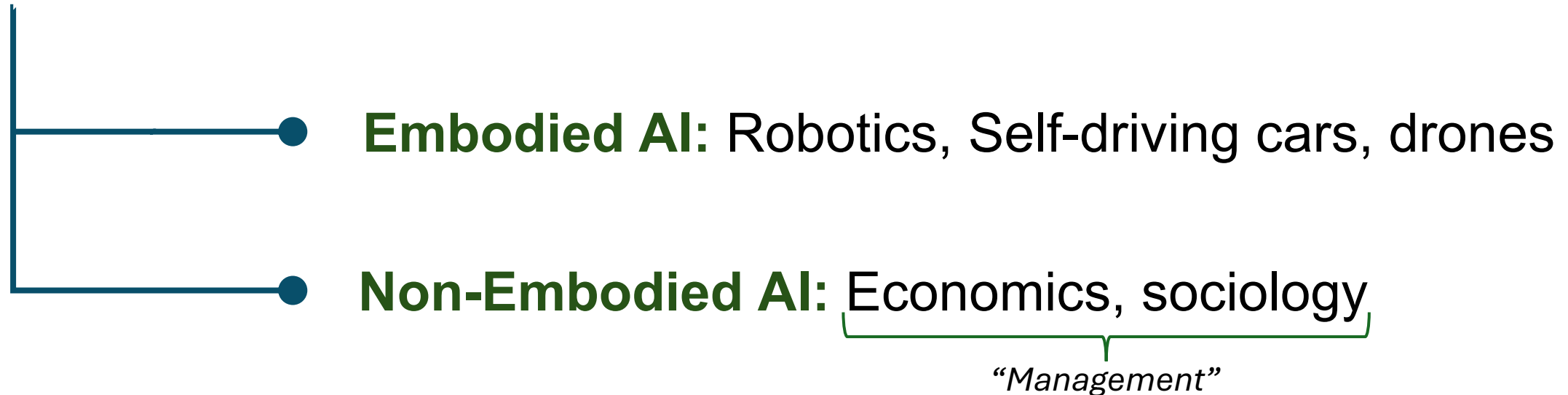
LARGE LANGUAGE MODELS

Discrete Math

$\{0,3,4\}$



Maps text tokens to other text tokens



The underlying engine is fundamentally **EE control theory and continuous dynamic optimization**, not discrete token prediction.

	State-Space Adaptive AI	Large Language Model AI
Primary domain	Physical / spatial / kinematic	Symbolic / semantic
Output space	Continuous vectors	Discrete tokens
Adjustment	Negative feedback loops	Backpropagation
Core AI methodologies	Control theory, filtering (e.g. Kalman), world models, reinforcement learning	Transformer architectures, autoregressive sequence modeling
Execution	Real time (synchronous)	Asynchronous

“It has been a fantastic synthesis—bridging embodied robotics and continuous economics state-space modeling offers a truly unique and powerful lens; and then contrasting this with LLM.”

Gemini

“I was inspired by our robotic vacuum cleaner working in the kitchen today. It struck me that it helps illustrate continuous math AI.”

Staffan



“It's a fantastic, intuitive analogy to bring into a discussion or use as a grounding example for a paper!

While people often marvel at humanoid robots or massive economic forecasting models, a humble Roomba navigates the exact same mathematical and architectural realities at a foundational level”

Gemini

There are three alternatives. To march at the head of the management science revolution. To trail behind with no bravery or distinction, as running dogs. Or to stand in its way and oppose it. We choose the first.

Members of our company, be courageous, defy difficulties, and dare to win, problem upon problem.

Monsters of all kinds shall be destroyed.
