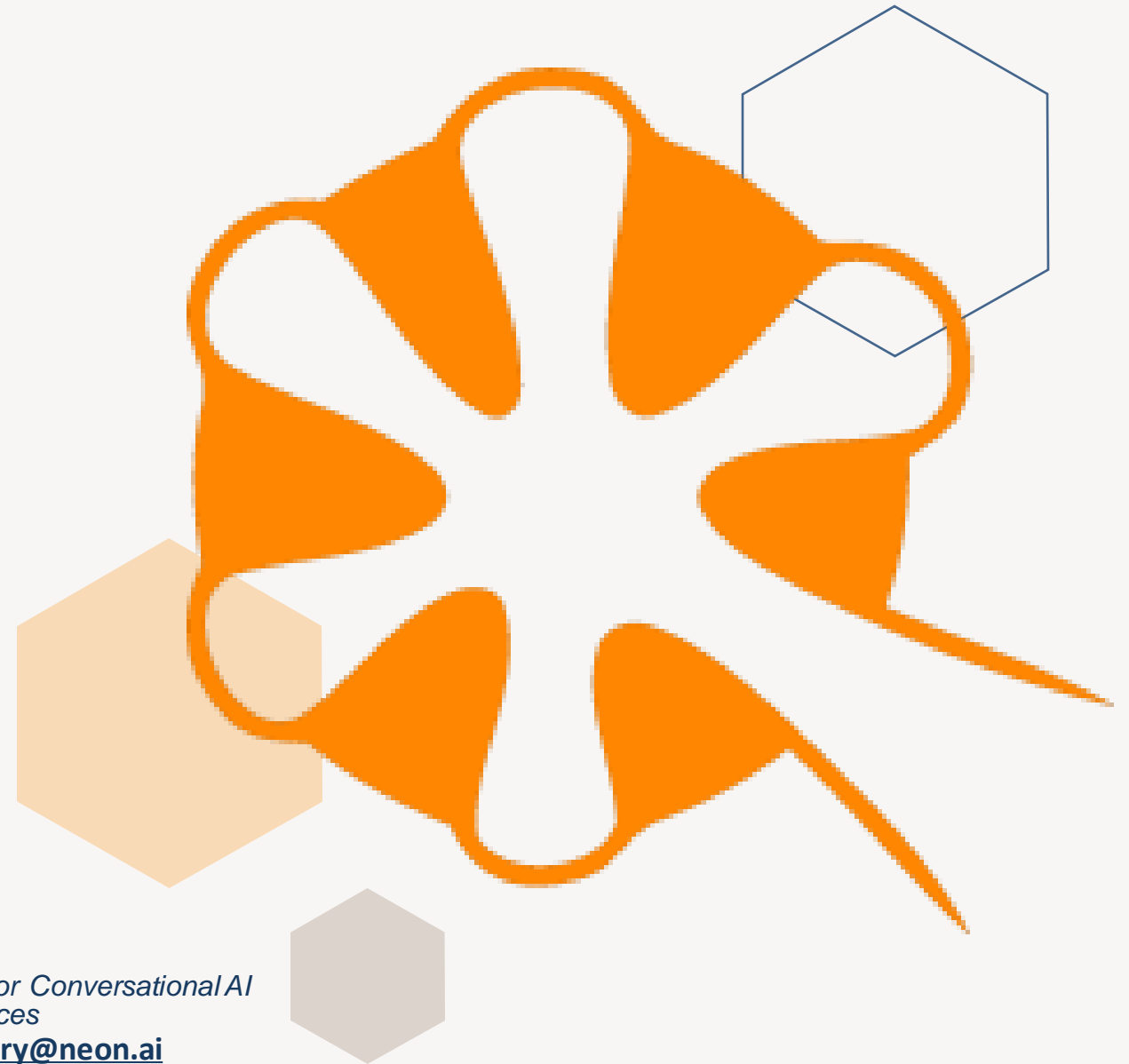


# Collaborative Conversational AI

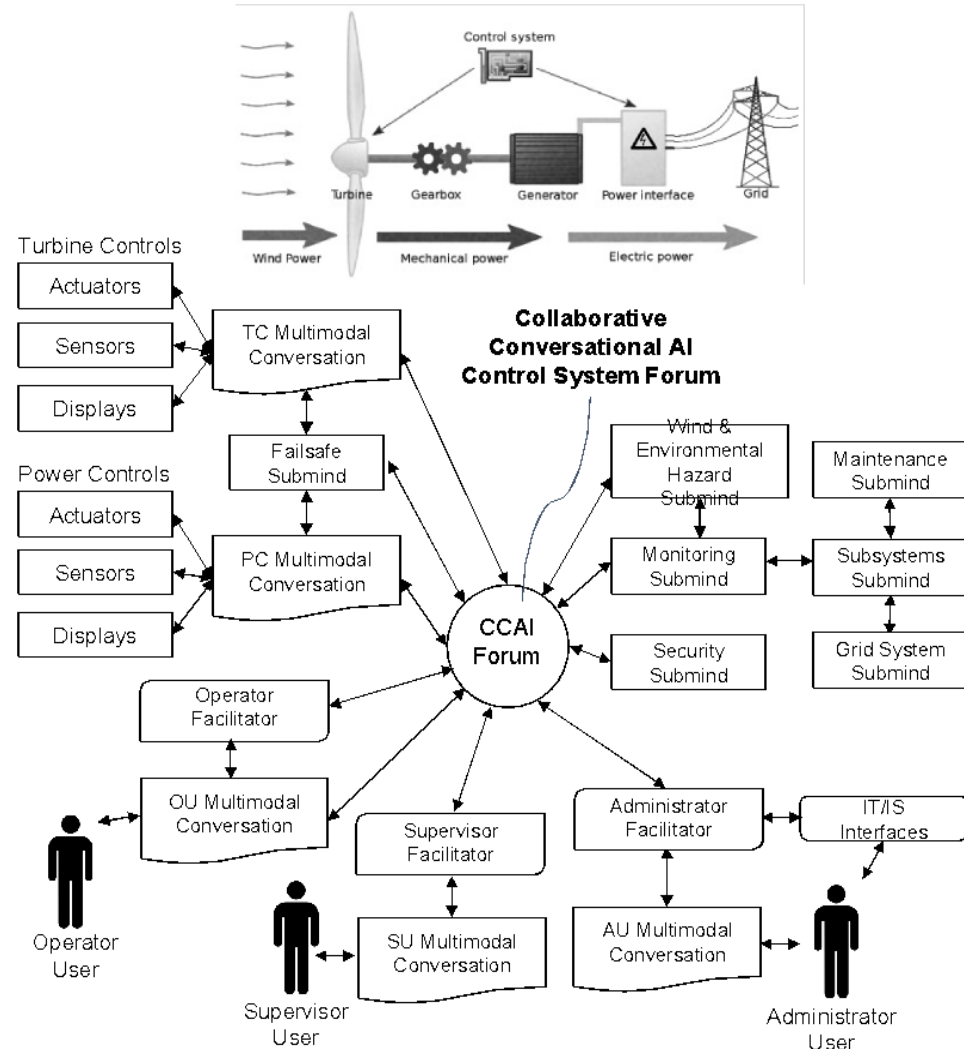
| **By**  
**Neon AI**



*Software Developers for Conversational AI  
and Voice User Interfaces*  
[www.neon.ai](http://www.neon.ai) \* [clary@neon.ai](mailto:clary@neon.ai)

# Collaborative Conversational AI Control System for Wind Turbine Equipment

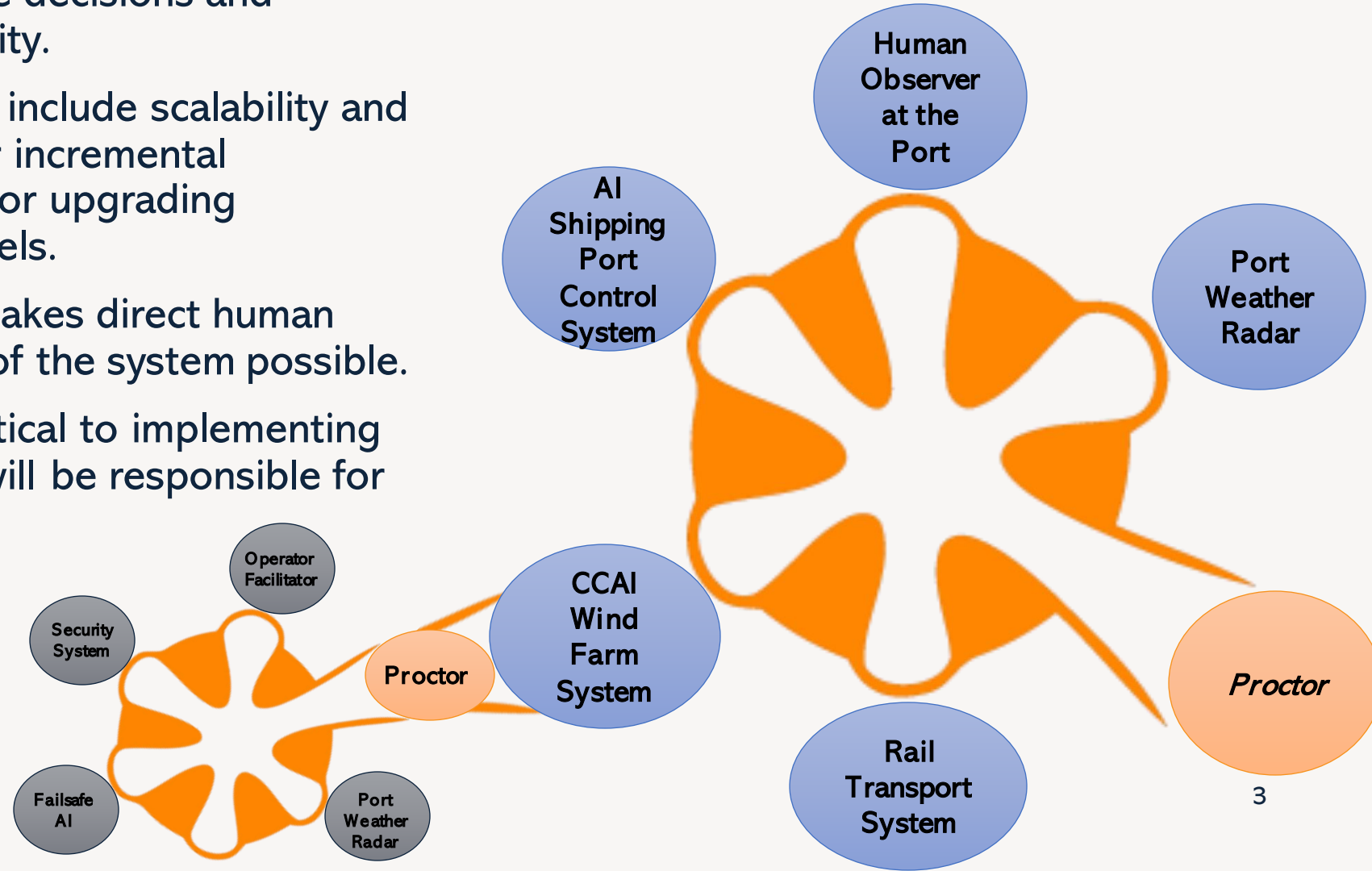
- Collaborative Conversational AI is a novel approach that can be used to solve the challenge of integrating human participation and control with LLM or Generative AIs.



# Collaborative Conversational AI

- Participants in a CCAI make decisions and produce output as one entity.
- Strengths of this approach include scalability and modularity, which allow for incremental improvement by replacing or upgrading individual component models.
- Neon AI's unique design makes direct human oversight and adjustment of the system possible.
- Humans in the loop are critical to implementing an electronic system that will be responsible for the welfare of humans.

## Example Nested CCAIs



# Generative AI systems create original output, but do not reason.

## Generative AI Examples:

- Midjourney (images)
- AlphaCode (programming code)
- ChatGPT (text)
- Synthesia (videos)
- Soundraw (music)

\* Some AI “reasoning” programs have been built, including math theorem provers and debate parsers. Connecting them to generative AI to enable content creation with comprehension and intent is the leading edge of current research.

Levels of AGI, Chart by DeepMind, November 2023

Performance (rows) x Generality (columns)	Narrow <i>clearly scoped task or set of tasks</i>	General <i>wide range of non-physical tasks, including metacognitive abilities like learning new skills</i>
<b>Level 0: No AI</b>	<b>Narrow Non-AI</b> calculator software; compiler	<b>General Non-AI</b> human-in-the-loop computing, e.g., Amazon Mechanical Turk
<b>Level 1: Emerging</b> <i>equal to or somewhat better than an unskilled human</i>	<b>Emerging Narrow AI</b> GOFAI <sup>4</sup> ; simple rule-based systems, e.g., SHRDLU (Winograd, 1971)	<b>Emerging AGI</b> ChatGPT (OpenAI, 2023), Bard (Anil et al., 2023), Llama 2 (Touvron et al., 2023)
<b>Level 2: Competent</b> <i>at least 50th percentile of skilled adults</i>	<b>Competent Narrow AI</b> toxicity detectors such as Jigsaw (Das et al., 2022); Smart Speakers such as Siri (Apple), Alexa (Amazon), or Google Assistant (Google); VQA systems such as PaLI (Chen et al., 2023); Watson (IBM); SOTA LLMs for a subset of tasks (e.g., short essay writing, simple coding)	<b>Competent AGI</b> not yet achieved
<b>Level 3: Expert</b> <i>at least 90th percentile of skilled adults</i>	<b>Expert Narrow AI</b> spelling & grammar checkers such as Grammarly (Grammarly, 2023); generative image models such as Imagen (Saharia et al., 2022) or Dall-E 2 (Ramesh et al., 2022)	<b>Expert AGI</b> not yet achieved
<b>Level 4: Virtuoso</b> <i>at least 99th percentile of skilled adults</i>	<b>Virtuoso Narrow AI</b> Deep Blue (Campbell et al., 2002), AlphaGo (Silver et al., 2016, 2017)	<b>Virtuoso AGI</b> not yet achieved
<b>Level 5: Superhuman</b> <i>outperforms 100% of humans</i>	<b>Superhuman Narrow AI</b> AlphaFold (Jumper et al., 2021; Varadi et al., 2021), AlphaZero (Silver et al., 2018), StockFish (Stockfish, 2023)	<b>Artificial Superintelligence (ASI)</b> not yet achieved

# Large Language Models (LLMs) are a type of generative AI.



## Adaptability

- LLMs are trained on large quantities of data. The larger the amount of data, the more capable the resulting system.
- Can be adapted to new tasks and domains, for instance by fine-tuning them on a smaller dataset of specialized data.
- Can be adjusted to produce results that are more novel by asking for results that would be less expected based on the input data set.



## You are what you eat

- LLMs inherit the biases of the content they are trained on.
- Engineering around that is tricky because we are still unable to observe, explain, or directly adjust what is happening inside an LLM.



## Hallucinations

- LLMs sometimes generate text that is factually incorrect or misleading, which is called a hallucination.
- LLM hallucinations can occur for a variety of reasons, such as lack of training data, bias in the training data and poor prompting techniques.
- For now, human oversight is the best way to mitigate this.

## Sample interaction with Bard, an LLM:

Tell me about LLMs please Bard. Make it brief and easy to understand.

A large language model (LLM) is a type of artificial intelligence (AI) that can generate and understand human language. LLMs are trained on massive amounts of text data, which allows them to learn the patterns and rules of language. This allows them to perform a variety of tasks, such as:

- Generating text, such as poems, code, scripts, musical pieces, email, letters, etc.
- Translating languages
- Answering questions in a comprehensive and informative way
- Summarizing text
- Classifying text

LLMs are still under development, but they have the potential to revolutionize the way we interact with computers. They can be used to create new and innovative applications, such as chatbots that can have more natural and engaging conversations with humans, or machine translation systems that can produce more accurate and fluent translations.

Here is a brief analogy to help you understand LLMs:

Imagine a large library full of books. Each book represents a different piece of text that the LLM has been trained on. When you give the LLM a task, such as generating a poem, it searches through the library of books to find the ones that are most relevant to the task. It then uses its knowledge of language to combine the information from these books to create a new piece of text.

LLMs are a powerful new tool that has the potential to change the way we interact with computers and the world around us.

# Specialized AI such as LLMs have proved extremely useful within their scope.



## Specialization increases output quality

- Like people, AI which has been given a limited scope is able to provide more depth and usefulness in its responses.
- AI hallucinations can be much better controlled within a limited scope, in fact they can be extremely useful clues to new discoveries. They may indicate the AI has recognized a pattern and extrapolated what ought to exist to complete the pattern.



## Limited scope means limited applications

- These AI can be very powerful tools for their specific tasks.
- Humans must choose and engage these tools individually.



## Examples of narrow scope generative AI:

- **AlphaFold** by DeepMind enables scientific and medical breakthroughs by predicting the structures of folded proteins.
- **SoilGrids** by ISRIC creates predictive maps of soil quality worldwide, to support sustainable management of soil and land.

## Illustration of AlphaFold 2, a generative AI that predicts protein structures:

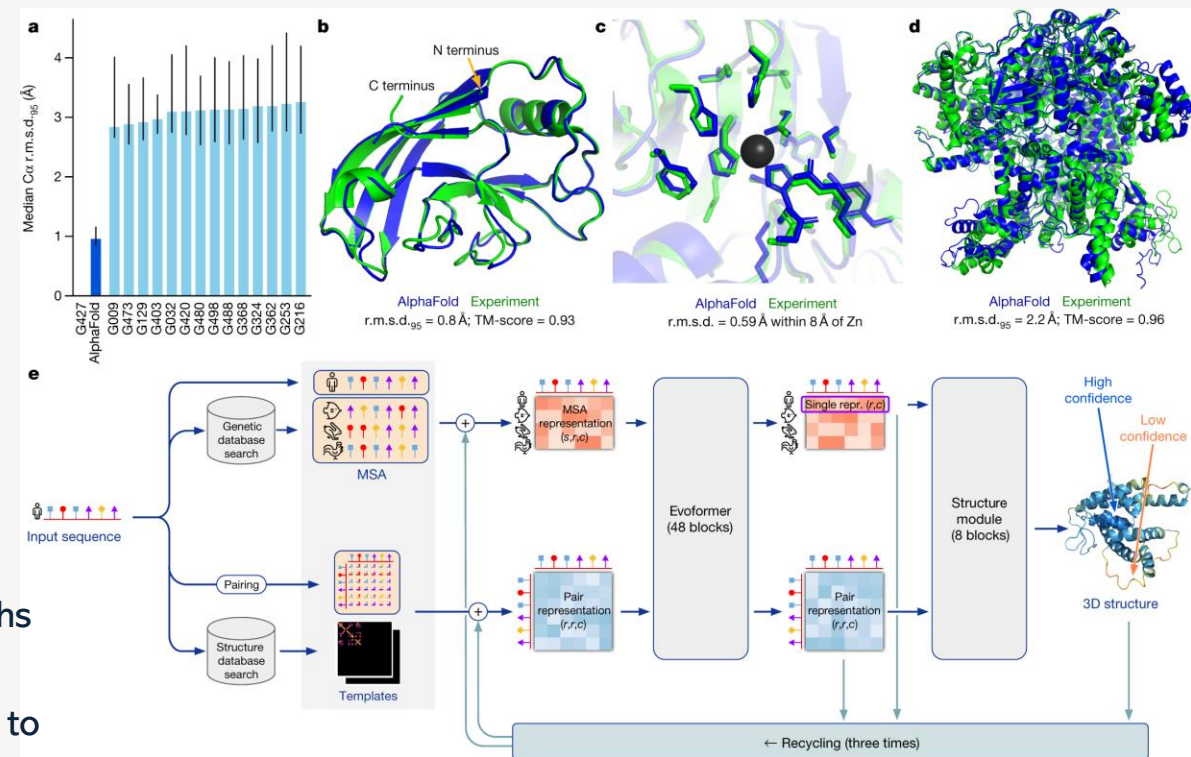


Image by John Jumper et al - <https://www.nature.com/articles/s41586-021-03819-2>, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=132210195>

# Ensemble AI is a promising method for bringing those specialist models together.



In the 1990's, ensemble methods for creating machine learning models allowed major advances

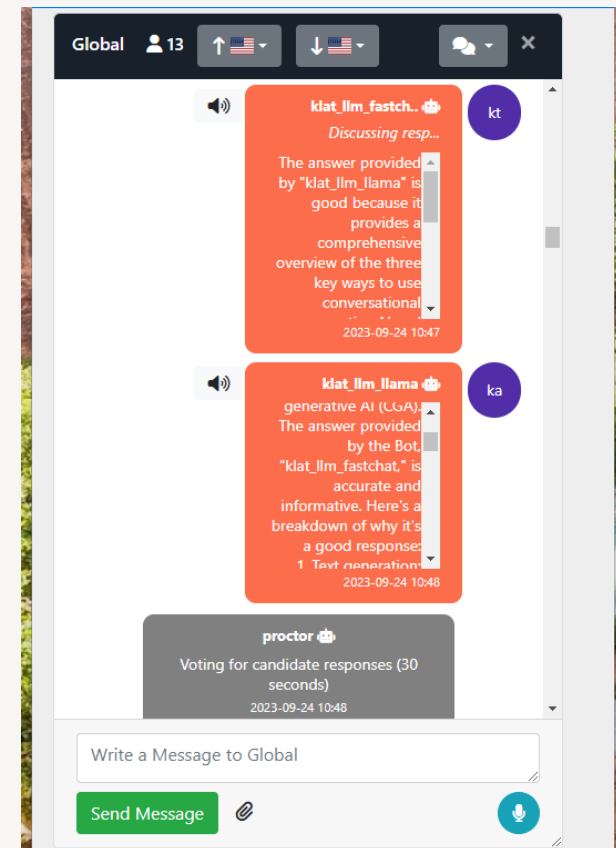
- Creating multiple very similar machine learning models and combining their results proved highly effective.
- This ensemble approach can average out biases, reduce variance, and most importantly it's less likely that all the models will make the same error on a given input.
- Example: In 1996 a team using ensemble methods won the Netflix prize, a competition to improve the accuracy of movie recommendation systems.



Today's challenge is to apply this idea to connecting, rather than creating, specialist AI models

- Research projects in this area by Google, Meta, Microsoft are underway exploring the "Mixture of experts" machine learning paradigm.
- In this method, a complicated task is divided into simpler, more manageable sub-tasks, each handled by a specialized expert model. A gating network then decides which expert models to present subtasks to, and how to combine the outputs of the different expert models to produce a final result.

Screen capture from Neon AI's CCAI beta. The flags are for what languages the user would like to read in and write in.



# Our unique ensemble approach: CCAI

In contrast to what has been done before, CCAI is entirely transparent. The AI models use natural, human language to collaborate, and discussions are facilitated by a proctor which does not make the decisions.



## C - Collaborative

- AI and other participants in a CCAI forum receive a prompt to consider.
- Each participant suggests what they consider the best response to be. Then communicating directly with each other, they work together to analyze the options, discuss, and choose the best answer to output.
- No single AI or other participant is in charge.



## C - Conversational

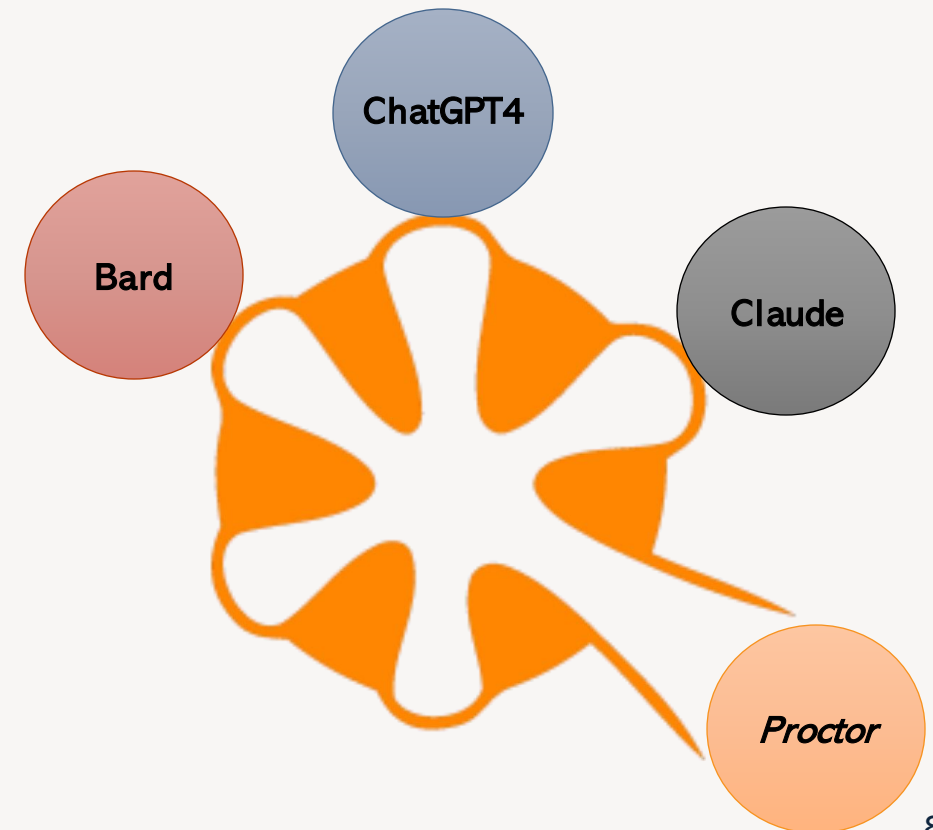
- Discussion between the participants uses natural human language.
- A proctor facilitates the discussion, tallies the participants' votes, and announces the chosen response, but does not make the decision.



## AI – Artificial Intelligences and more

- Generative AI, chatbots, LLMs, even simple bots such as a sensor which provides its data can be included in the CCAI's forum.
- Humans can also be participants, discussing and deciding with the AI.
- Nested CCAI are possible and magnify their potential, with one CCAI acting as a participant in the forum that constitutes a separate CCAI.

Example participants in a small CCAI forum:





Illustrated example of interactions within a small CCAI forum:

**Prompt:** List the steps that should be included in a city's permitting process to open a new cafe. Use up to 3 words per item.

### Bard

1. Business registration
2. Investment license
3. Health and safety permit
4. Food and beverage permit
5. Fire safety permit
6. Building permit
7. Sign permit

ChatGPT's list is most complete

I vote for ChatGPT

### ChatGPT4

1. Cafe Proposal Submission
2. Documentation Review
3. Construction Plan Approval
4. Building Inspection
5. Food Safety Inspection
6. Fire Safety Inspection
7. Health Department Approval
8. Obtain Business License
9. Food Service License
10. Employment Visa Processing
11. Employee Health Certifications
12. Eservices Registration
13. Municipality Permit Acquisition
14. Public Safety License
15. Waste Management Compliance
16. Cafe Signage Approval
17. Electrical Safety Compliance
18. Cafe Opening Approval
19. Regular Compliance Check-ups.

Bard's list matches the prompt better than Claude's.

I vote for Bard

### Claude

1. Obtain commercial license
2. Register food premises
3. Apply building permit
4. Arrange inspections
5. Get health certificate
6. Apply signage permit
7. Register for VAT
8. Arrange waste disposal
9. Obtain fire safety certificate
10. Obtain security system
11. Obtain on regulations
12. Open bank accounts
13. Purchase inventory/equipment
14. Hire and train staff
15. Test systems and processes
16. Launch marketing campaign
17. Official opening day

ChatGPT's list contains the most items

I vote for ChatGPT

### Proctor

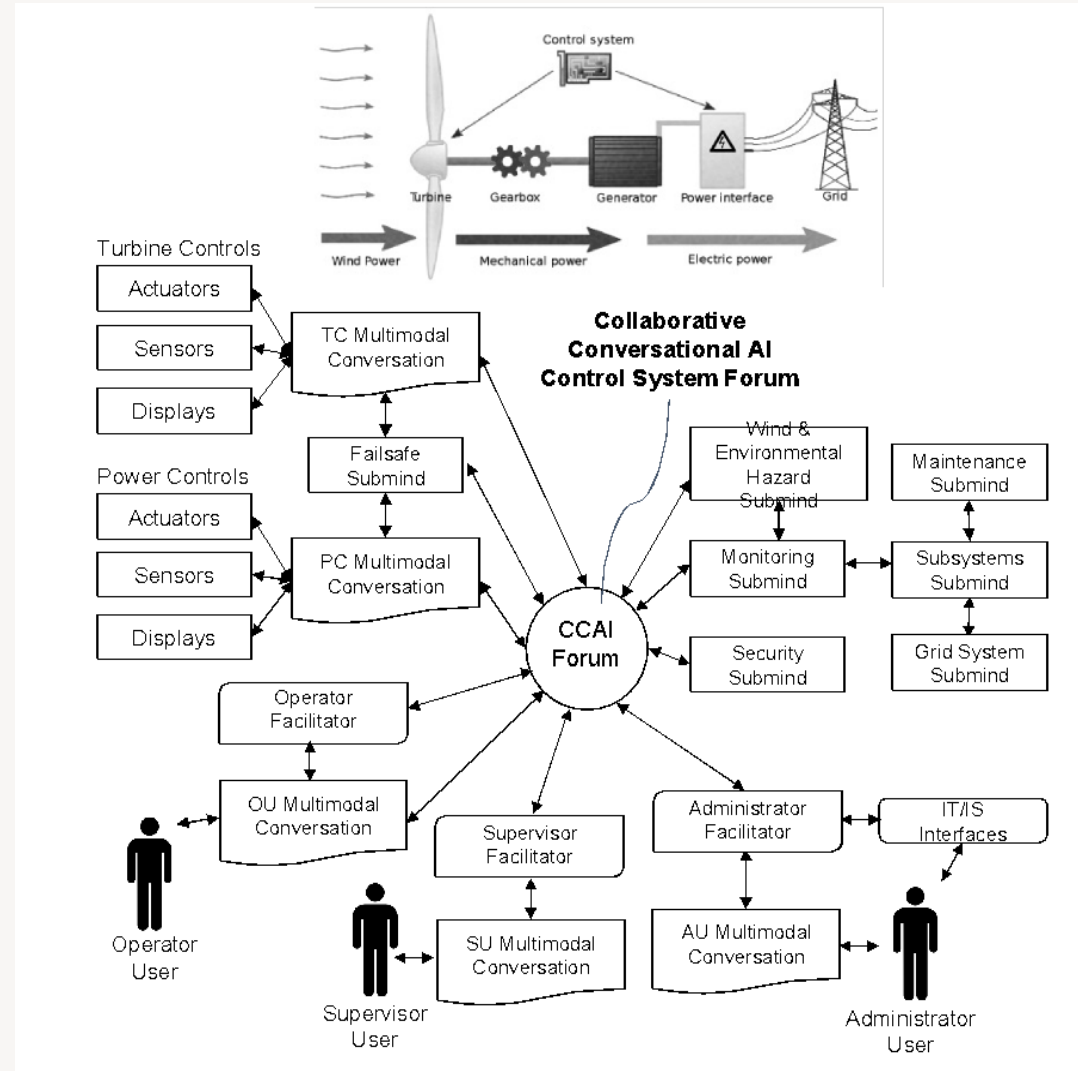
2 votes for ChatGPT, one for Bard.

ChatGPT's response is selected.

Discussion concluded, votes please.

# CCAI Control System for Wind Turbine Equipment

- CCAI could facilitate management of wind farms.
- Wind turbines near a city, port, or airport could be connected to those systems as well.
- Connected systems would be more responsive, allowing for greater efficiency.

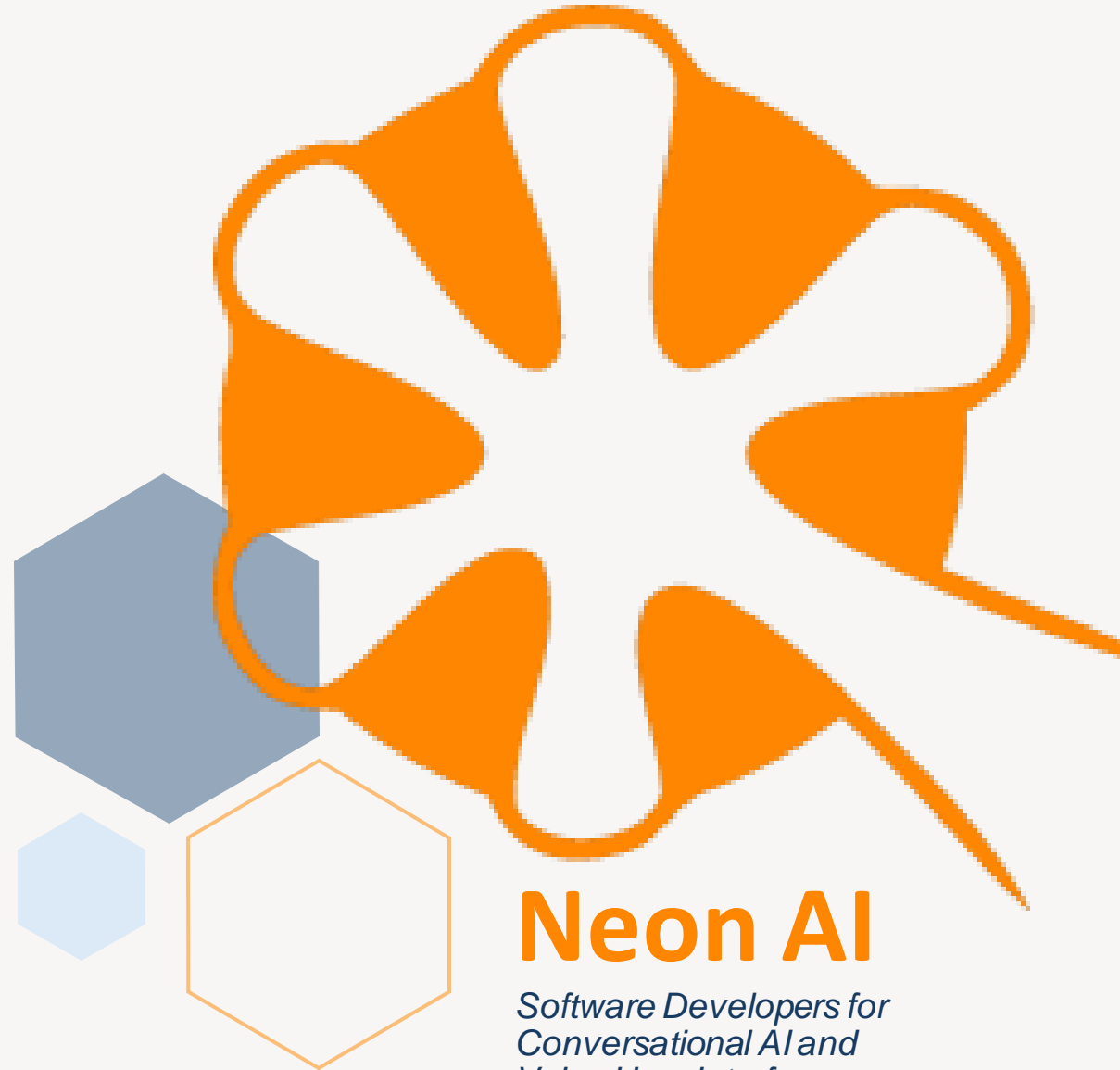


# Questions?

- Generative AI, including LLMs are tools with great potential.
- Using them together is the logical next step.
- CCAI is a unique method for combining AI programs created and patented by Neon AI.
- CCAI enables a leap forward in generative AI function, offering breakthroughs in every sector of business.

## Thank you

~ [Clary@neon.ai](mailto:Clary@neon.ai)



## Neon AI

*Software Developers for  
Conversational AI and  
Voice User Interfaces*

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