



Department of Computer Science & Engineering

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Vision of the Institute

To be a nationally recognized institution of excellence in technical education and produce competent professionals capable of making a valuable contribution to society.

Mission of the Institute

- ◆ To promote academic growth by offering state-of-the-art undergraduate and postgraduate programs.
- ◆ To undertake collaborative projects which offer opportunities for interaction with academia and industry.
- ◆ To develop intellectually capable human potential who are creative, ethical and gifted leaders

Vision of the Department

To be a center of academic excellence in the field of computer science and engineering education.

Mission of the Department

- ◆ Strive for academic excellence in computer science and engineering through well designed course curriculum, effective classroom pedagogy and in-depth knowledge of Laboratory work
- ◆ Create computing centres of excellence in leading areas of computer science and engineering to provide exposure to the students on latest software tools and computing technologies.
- ◆ Attain these through continuous team work by group of committed faculty, transforming the computer science and engineering department as a leader in imparting computer science and engineering education and research .
- ◆ Transform under graduate engineering students into technically competent, socially responsible and ethical computer science and engineering professionals.
- ◆ Incubate, apply and spread innovative ideas by collaborating with relevant industries and R&D labs through focused research group.

(Generative AI & ChatGPT)

Generative Artificial Intelligence (Generative AI) is a subset of AI that can **create new content** such as:

- Text
- Images
- Audio
- Code
- Videos
- 3D models

It does this by learning patterns from existing data and generating outputs that resemble or extend that data.

Generative Artificial Intelligence (Generative AI) refers to a subset of AI technologies designed to **create new content**, including text, images, audio, video, and even code, by learning patterns from existing data.

Fine-tuning

- The model is refined with **human feedback** to make responses more accurate, safe, and useful.

Prompt-based generation

- When a user types something, ChatGPT analyzes the prompt and generates an answer word-by-word.

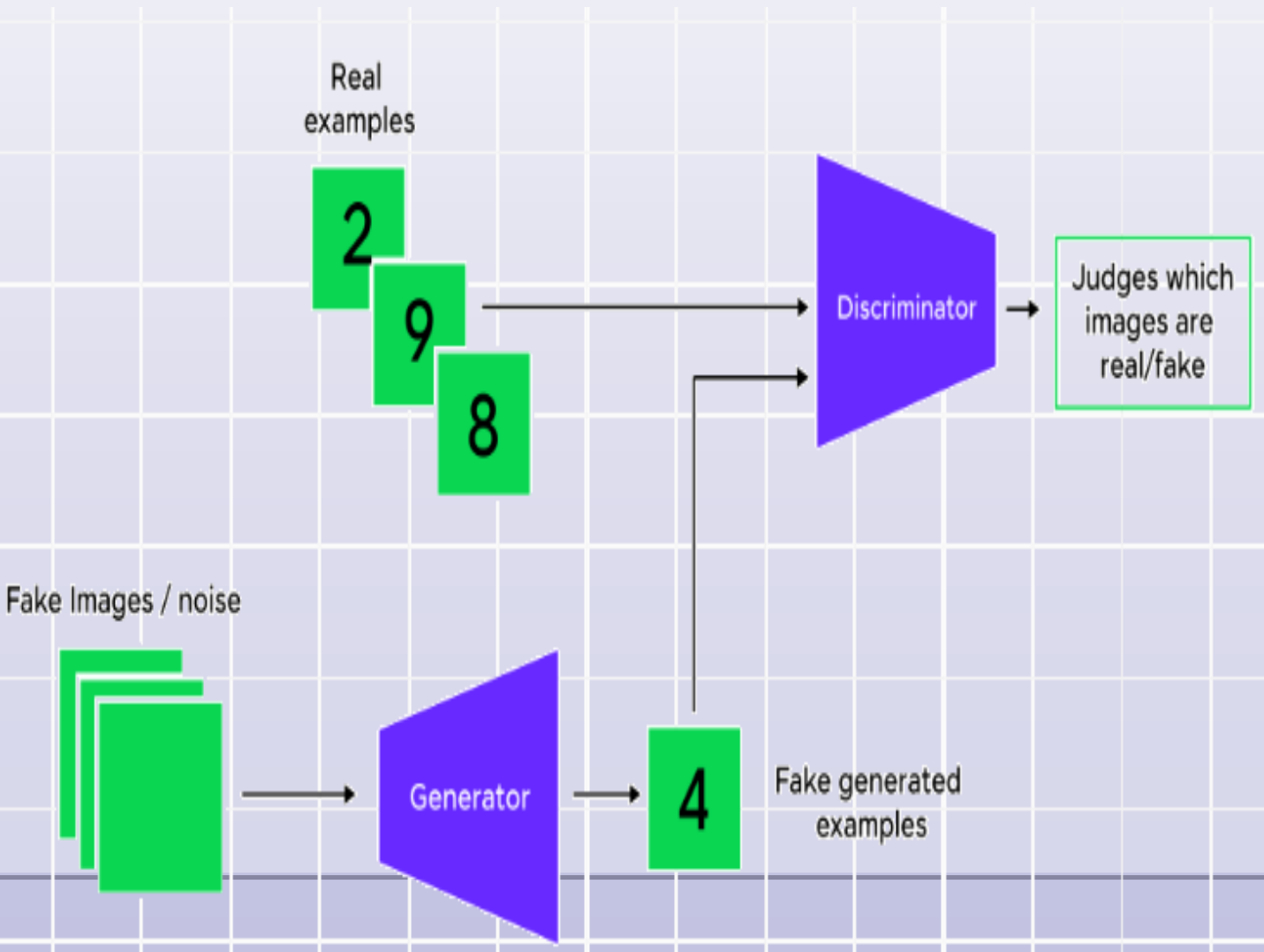
Strengths of Generative AI

- Efficiency:** Saves time in content creation.
- Creativity:** Offers new ideas and perspectives.
- Personalization:** Can tailor responses to specific user needs.
- 24/7 Availability:** Chatbots and assistants never sleep.
- Multimodal:** Can handle text, images, and more in some models.

Advanced System Architecture of ChatGPT (GPT Models)

1. Transformer Architecture

- Introduced in the paper “Attention Is All You Need” (2017).
- Core concept: **Self-attention mechanism**—it allows the model to weigh the importance of different words in a sentence, regardless of their position.
- Composed of:
 - Encoder-Decoder blocks** (GPT uses decoder-only for generation)
 - Multi-head attention layers**
 - Feed-forward neural network**
 - Positional encoding**



2. Training Process

a. Pre-training

- Model is trained on massive unlabeled text datasets (books, web pages, Wikipedia).
- Objective: **Next Word Prediction** (language modeling).
- Learns **syntax, grammar, factual info, and patterns in language**.

The Future of Generative AI

- **Multimodal AI**: Combine text, images, voice, and video in one model.
- **Better Reasoning**: Models that think through problems more logically.
- **Explainable AI**: Transparent models that justify their answers.
- **Secure & Ethical AI**: Built-in safeguards to prevent misuse.
- **Human-AI Collaboration**: AI as a co-pilot, not a replacement.

Custom GPTs (ChatGPT Plugins & GPTs)

- **Custom GPTs** allow users to build a chatbot with custom instructions, files, and behaviors.
- **ChatGPT Plugins** connect AI to external tools (like code execution, web browsing, or APIs).

6. Limitations (In Simple Terms)

- May give **wrong answers** confidently.
- Doesn't **understand meaning** like humans (it predicts text, not "think").
- Can be **biased** if trained on biased data.
- Not always **up-to-date** (e.g., GPT-4's training data cuts off in 2023 unless web browsing is enabled).

Conclusion

Generative Artificial Intelligence (Generative AI) and models such as ChatGPT transcend conventional computational tools; they constitute a **novel, intelligent interface bridging humans and the digital cosmos**. These systems leverage advanced **deep learning architectures, transformer models, and natural language understanding** to perform a spectrum of complex cognitive tasks, ranging from **automated code synthesis and algorithmic composition** to **scientific problem-solving, data analysis, and creative content generation**.

Their integration into contemporary workflows is catalyzing a **paradigm shift across industries, education, research, and professional ecosystems**, redefining traditional notions of productivity, creativity, and human-computer collaboration. .

