



# K. Ramakrishnan College of Engineering



NAAC Accredited Autonomous Institution. Samayapuram, Trichy - 621 112.



## Department of Computer Science and Engineering

*Organizes*

### Faculty Development Program on

# DESIGN THINKING FOR GENERATIVE AI AND SMART COMPUTING



*Resource Person*

**Mr. VIJAY DWIVEDI**

Program Manager,  
GE Aerospace,  
Bangalore, Karnataka.



Dr. T.M. NITHYA  
HoD - CSE

Dr. D. SRINIVASAN  
Principal

Dr. S. KUPPUSAMY  
Executive Director

Dr. K. RAMAKRISHNAN  
Chairman

# ABOUT ME : VIJAY DWIVEDI

## Profile Summary:

Over 20 years of expertise in **aviation, engineering, Machine Learning, Data Science & AI.**

Certified **Google Professional Machine Learning Engineer**

Experienced in Data Science, Gen AI, and algorithm development.

## Key Competencies:

Proficient in **Python, SQL, R and TensorFlow, GCP**

## Education:

**M.Sc. (Mechanical)**, University of Strathclyde, Glasgow.

**B.Tech (Mechanical)**, GB Pant University.

## Certifications:

GE Analytics Engineer, Google Professional ML Engineer, etc



This acknowledges that

**Vijay Dwivedi**

has successfully completed all the requirements to be recognized as a

**Google Cloud Certified**

**Professional Machine Learning Engineer**

Series ID: 9886

Issued Date: Sep 27, 2024

Expiration Date: Sep 27, 2026

ID: db10326abd3a4eaf9c254d2c81fc24d1

Certified As: Vijay Dwivedi

A handwritten signature in black ink, appearing to read "Thomas Kurian".

Thomas Kurian  
CEO, Google Cloud





# FACULTY INPUT

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1. Python Programming: No experience / Basic / **Intermediate** / Advanced
2. Machine Learning (ML): No exposure / **Basic (e.g., Linear Regression)** / Intermediate (e.g., Neural Networks) / Advanced (e.g., DL, Transformers)
3. Computer Vision (OpenCV): **No experience** / Basic (e.g., image filtering) / Advanced (e.g., object detection)
4. Deep Learning (TensorFlow/PyTorch): Never used / **Basic models** / Custom architectures
5. Expectations : Top 2 AI topics of interest (e.g., NLP, CV, **LLMs, Generative AI**)
6. Preferred balance: Theory-heavy / **Balanced** / Hands-on-heavy

# DAY 1: FOUNDATIONS OF AI & ITS IMPACT

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1. Inauguration & Welcome - FDP goals, speaker introductions, participant introduction
2. What is AI? - History, evolution, types of AI
3. AI in Daily Life & Education - Use-cases (Chat GPT, Stock Market App, Vision)
4. ML Example
  - Linear and logistic regression example
5. Case Study : AI Introduction
6. Activity: Draw/Create Your Vision for AI in education
7. Q&A and Recap

# DAY 2: DEEP LEARNING

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1. Deep Learning - Perceptron, neural nets, CNN, VGG16, RESNET etc
2. Evaluation Metrics - Accuracy, precision, recall, F1-score
3. Basics of Tensorflow and Hands-on NN, MNIST, Fashion MNIST etc
  - OpenCV tutorial (optional)
4. Project list: DL/LLM projects selection
  - Example of industry project: Transformer failure Analysis with ML methods
5. Activity: Teacher vs. AI – Who Answers Better?
6. Q&A and Recap

# DAY 3: NATURAL LANGUAGE PROCESSING

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## 1. Natural Language Processing

- Basic NLP: Tokenization, Embedding, Markov Model, RNN, LSTM, GRU etc
- Advance NLP : Transformers & LLMs - BERT, GPT, QA, summarization

## 2. Hands-on: Classification, Topic Modelling, Sentiment Analysis, etc

## 3. Simple Chatbot

- Deterministic → Stochastic → Hybrid systems

## 4. Activity: Should AI be allowed to grade students?

## 5. Q&A and Recap



# DAY 4: LLM & GENERATIVE AI

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1. What is GenAI : Discussion
2. Difference between traditional AI and GenAI
3. How LLMs work (GPT, Gemini)
  - Prompt Engineering, demo using Gemini, Use of LLM for the vision expert
4. Retrieval Augmented Generation (RAG) for LLMs
5. Generative AI - Text, image, Video generation and associated tools
  - AI Time Travel: Get (old/new) photo of yourself and ask ChatGPT/GEMINI to generate how you would look as a futuristic AI professor
6. Q&A and Recap

# DAY 5: PROJECTS & PRESENTATIONS

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1. Ethical concerns, Education and GenAI
2. Agentic AI
3. Group Presentations
  - Case Study Presentation, Project (DL/LLM), Lesson plan presentations, etc
4. Quiz and Feedback
5. Summary of the AI Course
6. Closing Ceremony - Reflections and next steps

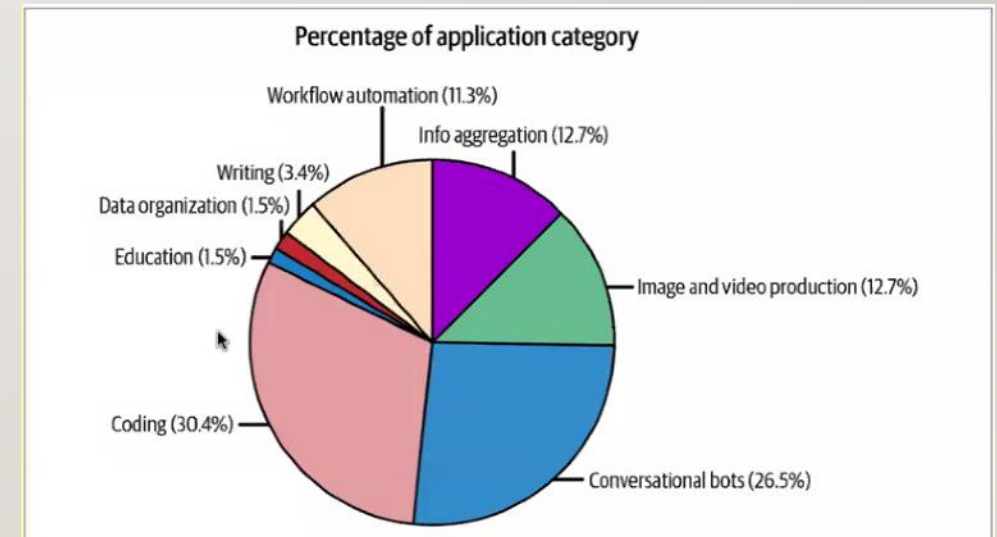
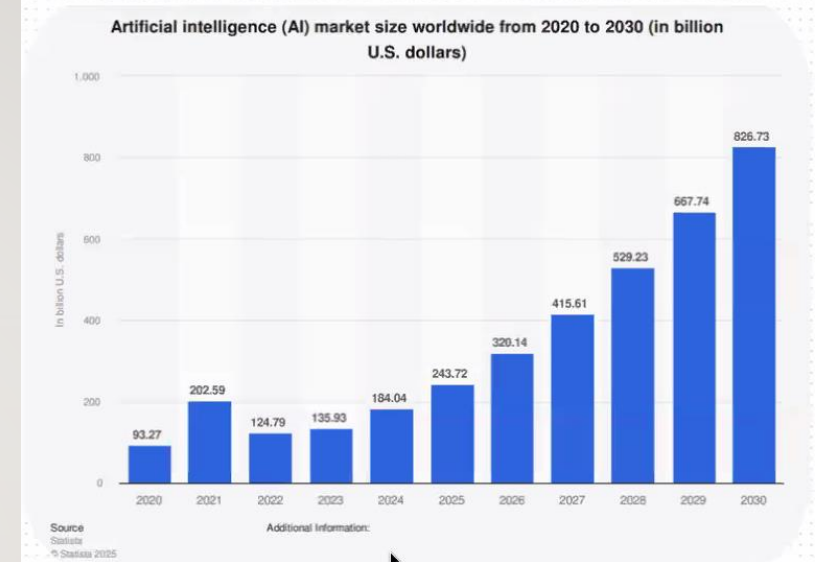


# OBSERVATION ABOUT GENAI

## Eric Schmidt's AI Predictions (2026–2032)

1. **AI Replaces Programmers (by 2026):** AI will write and improve code autonomously, making traditional programming skills less relevant.
2. **AGI Emerges (by ~2030):** One AI system will match top human experts across all fields, signaling the rise of Artificial General Intelligence.
3. **Superintelligence (by ~2032):** AI could exceed the collective intelligence of humanity, posing governance and control challenges.
4. **Societal Transformation:** Major shifts in labor, biotech, and military AI infrastructure—AI may design drugs and run secure, nuclear-powered systems.
5. **Urgent Need for Governance:** No legal or societal frameworks exist for AGI/ASI; current focus on ChatGPT-level AI underestimates long-term risks.

The expansion !



# OBSERVATION ABOUT GENAI

## "Godfather of AI" shares prediction for future of AI, issues warnings

Geoffrey Hinton, dubbed the "Godfather of AI," notes that progress in AI has advanced even faster than he predicted

### Superintelligence is both possible and concerning:

Hinton warns about the potential emergence of superintelligent AI systems—machines that could surpass human intelligence—and emphasizes the need to prepare for their profound implications

### Ethical risks and societal impact:

He raises alarms regarding AI's potential to exacerbate wealth inequality and disrupt job markets, predicting significant social upheaval if unaddressed.

### Call for regulation and oversight:

Hinton stresses the necessity of proactive regulation, suggesting governance frameworks to oversee AI development and ensure alignment with societal values

### Opportunity alongside caution:

Despite his warnings, Hinton acknowledges AI's transformative potential for innovation and problem-solving—marine science, health, climate—if developed responsibly.

Gartner

## Employee anxiety that AI will replace their job by function



Source: Gartner  
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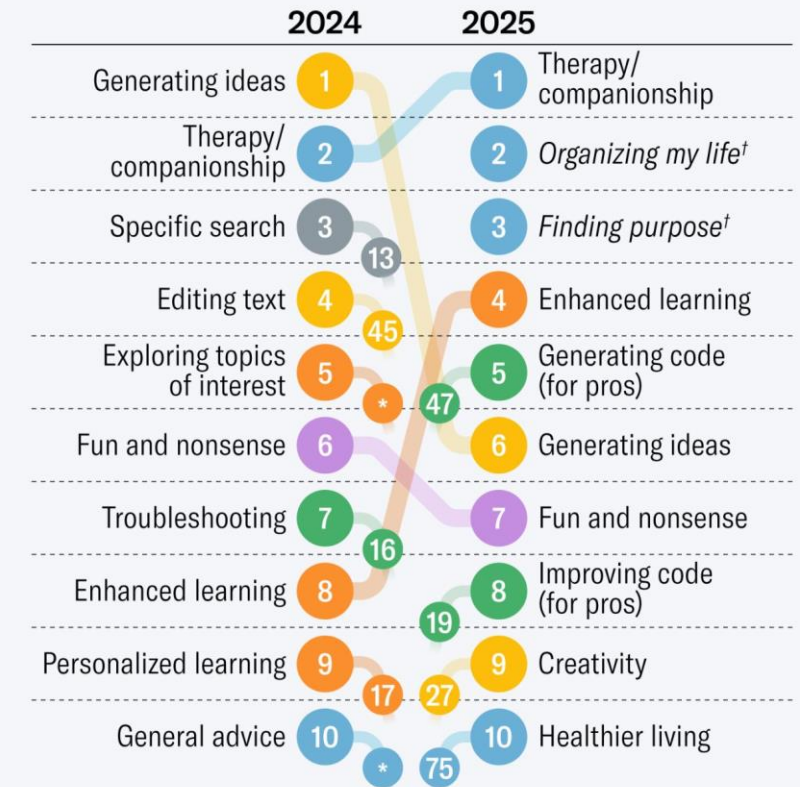






# Day 4: Generative AI

## Top Gen AI Use Cases



\*Did not make list of top 100 in 2025  
Source: Filtered.com

†New use case



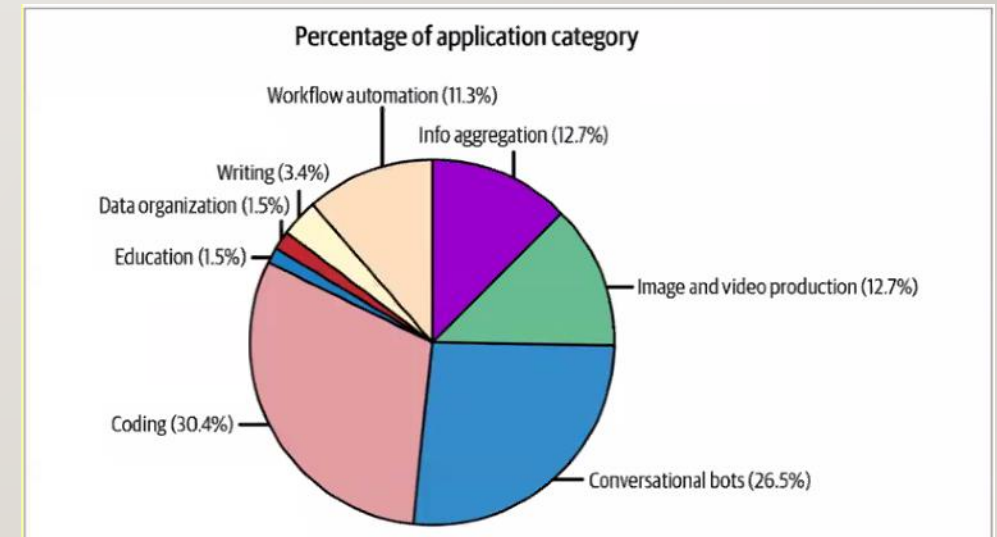
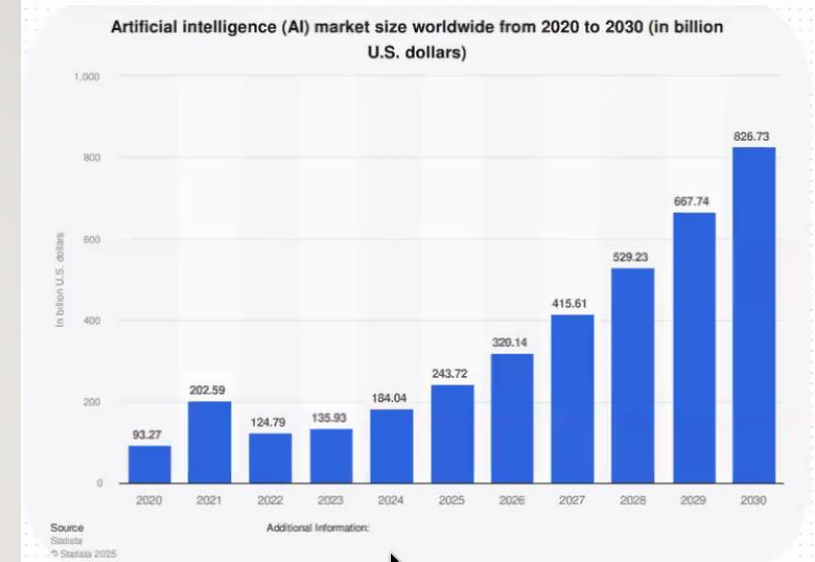
The top 10 use cases in 2025 indicate a shift from technical to emotional applications, including growth in areas such as therapy, personal productivity, and personal development. More and more people are using LLMs to find purpose and improve themselves.

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# WHAT IS GENERATIVE AI

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- Generative AI is artificial intelligence that generates text, images, videos, and audio.
- AI has been around since the 1960s, but it was limited to chatbots and was known as traditional artificial intelligence. However, a pivotal moment in AI's evolution came with the emergence of Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs).
- GANs and VAEs are neural network generators that enable the creation of realistic images of real people, animals, and objects like cars. The process consists of recognizing, predicting, and creating content based on the sets of data the AI has access to.
- Large Language Models (LLMs) are another component of Generative AI that made it possible to create life-like images, rhyming songs, creative texts, and even videos from a text-based input.
- Some of the well-known examples of generative AI include ChatGPT, DALL-E, and Gemini etc.

# DIFFERENCE BETWEEN TRADITIONAL VS GENAI

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## **What Is Traditional AI?**

- Traditional AI is a subset of artificial intelligence that is used to perform tasks based on predetermined algorithms. Usually, traditional AI-based solutions excel at carrying out a limited set of tasks.
- Some examples of traditional AI include applications like chatbots, autonomous vehicles, or chess-playing algorithms.

# CHARACTERISTICS OF TRADITIONAL AI

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- **Programmed intelligence** – Traditional AI works based on preprogrammed algorithms and rules. The system provides solutions and performs tasks within the limitations of its algorithm developed by programmers.
- **Restricted applications** – These AI models are designed with a specific set of tasks in mind, limiting their scope of potential applications.
- **Data analysis** – Traditional AI focuses on analyzing sets of data and making predictions based on this analysis. It can be successfully used for creating forecasts and other data analysis.
- **Limited learning capabilities** – The learning capabilities of traditional AI are limited and dependent on data sets.



# CHARACTERISTICS OF GENERATIVE AI

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- **Neural network generators** – Generative AI utilizes neural networks like GANs and VAEs to generate relevant and original output.
- **Varied applications** – These AI models are adaptable and versatile, producing different types of content. They have a wide range of applications across a large number of industries.
- **Creating new content using prompts** – Generative AI uses data and prompts to create new content instead of simply analyzing existing data. The output is unique and relevant to the prompt used to generate it.

# GENERATIVE AI VS TRADITIONAL AI – FINAL THOUGHTS

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- There are no clear winners. While it'd be easy to disregard traditional AI as less versatile and limited only to specific tasks, we still rely on this AI to perform those specific analyses and predictions.
- Generative AI offers us a broader paintbrush, but its applications are different from those of traditional AI. The former is used to create content that concerns many industries, including entertainment, e-commerce, and marketing.
- It's likely that generative and traditional AI will be used in the future to complement one another with problem-solving, making predictions based on patterns and generating original output based on those predictions.
- One thing is very clear. AI is not going anywhere for the foreseeable future



# LARGE LANGUAGE MODELS

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- LLMs are AI systems used to model and process human language. They are called “large” because these types of models are normally made of hundreds of millions or even billions of parameters that define the model's behavior, which are pre-trained using a massive corpus of text data.
- The underlying technology of LLMs is called transformer neural network, simply referred to as a **transformer**. Presented by Google researchers in the famous paper **Attention is All You Need** in 2017, transformers are capable of performing natural language (NLP) tasks with unprecedented accuracy and speed. With its unique capabilities, transformers have provided a significant leap in the capabilities of LLMs. It's fair to say that, without transformers, the current generative AI revolution wouldn't be possible.
- LLM process flow: **Tokenization** → **Embedding** → **Attention via Transformer** → **Prediction** → **Response**



# Major Large Language Models (LLMs)

ranked by capabilities, sized by billion parameters used for training

CLICK LEGEND ITEMS TO FILTER

anthropic chinese google meta microsoft mistral openAI other

search...

show only: significant models



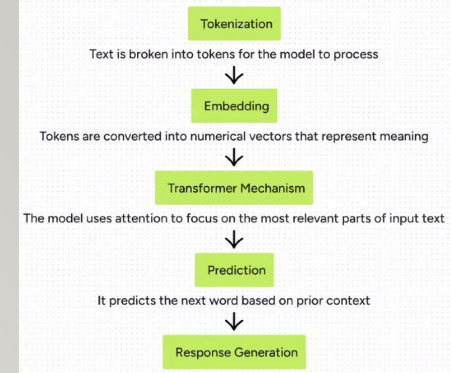
David McCandless, Tom Evans, Paul Barton  
Informationisbeautiful // Jan 2024

MMLU = benchmark for measuring LLM capabilities  
\* = parameters undisclosed // source: [LifeArchitect](#) // [data](#)

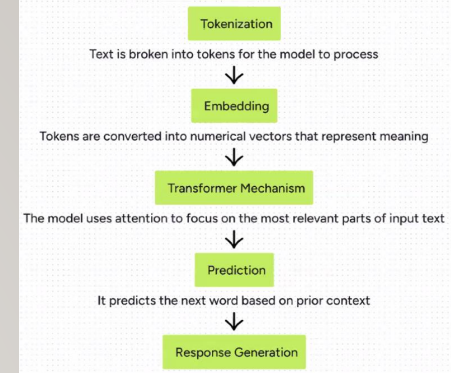
# STEP 1 – TOKENIZATION

- Text is broken into smaller units called tokens
  - 1 token =  $\frac{3}{4}$  of words (rough approximation for large corpus)
- Tokens can be words, sub words, or characters
- Helps the model understand and process the input efficiently
- **“ Explain large language models to me like I am five years old”**

Explain large language models to me like I am five years old



## STEP 2 – EMBEDDING



- Tokens are converted into numerical vectors
- These vectors represent the semantic meaning of words
- Embeddings enable mathematical operations and pattern recognition in text
- “ **Explain large** language models to me like I am five years old”

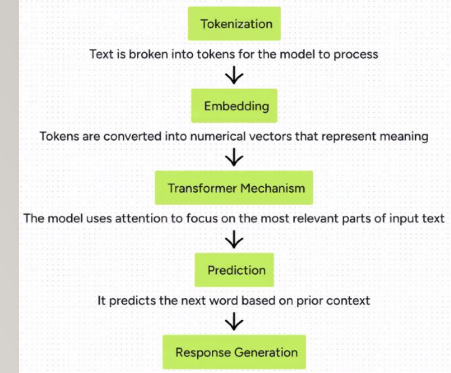
Explain = [ 0.2, 0.5, ....., 0.9]

Large = [ 0.45, 0.2, ....., 0.7]

- Similar words will take closure distance



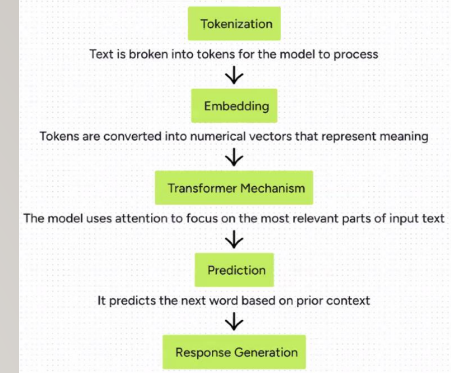
# STEP 3 – TRANSFORMER MECHANISM



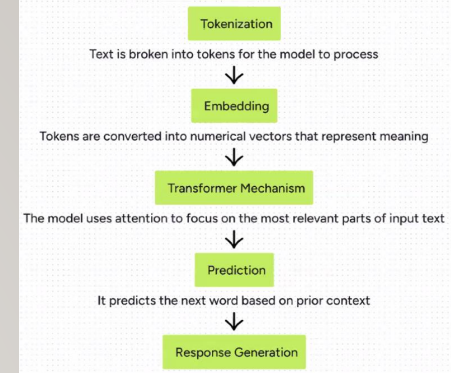
- The core of modern language models
- Uses self-attention to weigh importance of each word relative to others
- Helps the model focus on the most relevant parts of the input text
- “ **Explain large language models to me like I am five years old**”
- “ **large language model**” and “ **five years old**” are important group of words

# STEP 4 – PREDICTION

- Based on context, the model predicts the next word or token
- Utilizes previous tokens and attention to ensure logical flow
- This is done for one token at a time until the sequence is complete
- “ **Imagine you have a super-smart robot friend who has read every \_\_\_\_.**”
- What is likely next word ? Book or Bank.



# STEP 5 – RESPONSE GENERATION

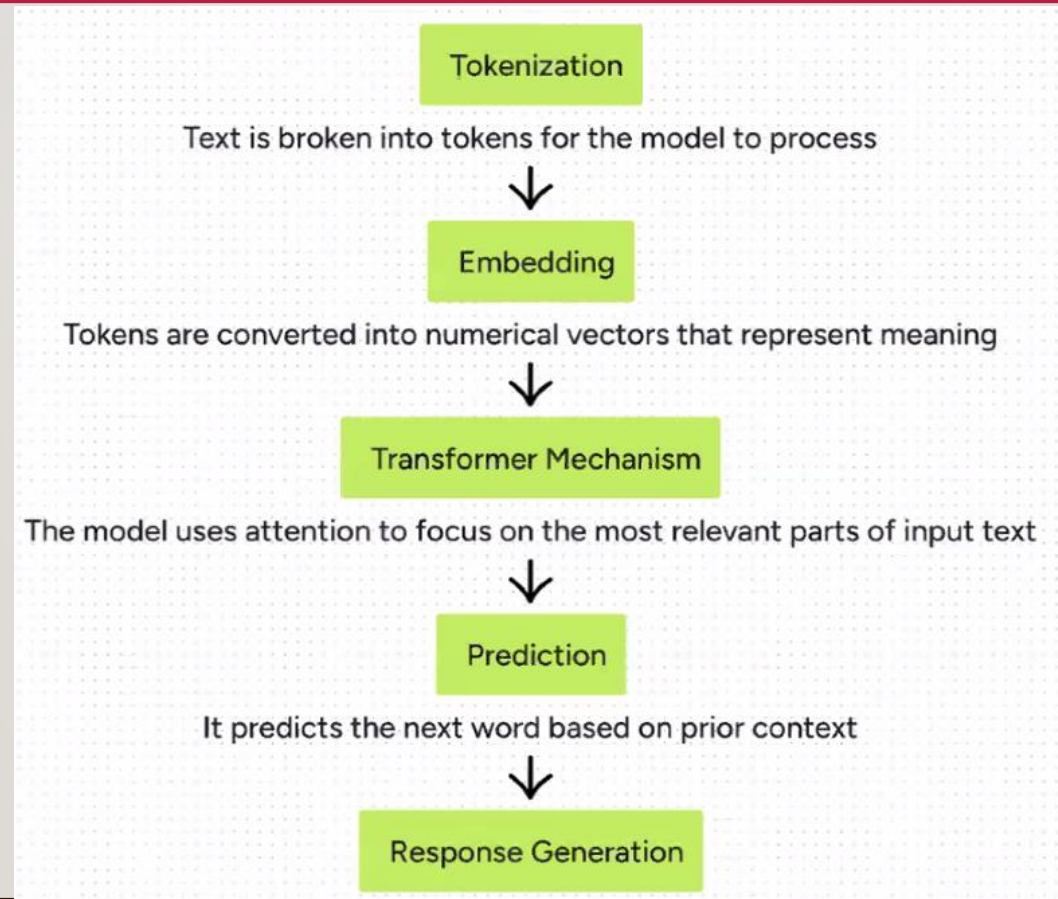


- The predicted tokens are converted back into human-readable text
- The final result is a coherent and context-aware response
- This response is what the user sees
- **“ Imagine you have a super-smart robot friend who has read every book, story, and conversation ever written.”**
- When one asks a question, it looks like all the words it has learned and find the best answer, just like magic!



# PUTTING IT ALL TOGETHER

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# GENERATIVE AI JOURNEY

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**Plan an iterative path from basic to advanced GenAI, leveraging your data**

**1. Prompt Engineering**

- Crafting specialized prompts and pipelines to guide GenAI behavior.

**2. Retrieval-Augmented Generation (RAG)**

- Combining an LLM with custom enterprise data.

**3. Fine-Tuning**

- Adapting a pre-trained GenAI model to specific datasets or domains.

**4. Pre-Training**

- Training a GenAI model from scratch.

**Note: Increasing complexity/compute from top to bottom—prompt engineering is simplest, pre-training is most resource-intensive.**

# PROMPT ENGINEERING

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- Prompt engineering is a relatively new discipline for developing and optimizing prompts to efficiently use language models (LMs) for a wide variety of applications and research topics. Prompt engineering skills help to better understand the capabilities and limitations of large language models (LLMs).
- Researchers use prompt engineering to improve the capacity of LLMs on a wide range of common and complex tasks such as question answering and arithmetic reasoning. Developers use prompt engineering to design robust and effective prompting techniques that interface with LLMs and other tools.



# STANDARD PROMPTING TECHNIQUE: EXAMPLE

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- **Role:**
  - You are an experienced web designer who has developed for website for google, amazon etc.
- **Task:**
  - Design a website front page for Gen AI with two-week course duration. it should invite people who have signed up for the course led by Vijay Dwivedi, Google Cloud Machine Learning expert.
- **Instructions:**
  - Make the copy over-the-top fun and designed to resonate with an audience of 25+ year-olds trying to figure their way around ChatGPT. Focus A LOT on users working in teaching, academics, tech, product, and design roles and how the workshop will be helpful for them. Talk about the other interesting things that will be covered like hacks, tools, and prompt collections as bonuses.
- **Data:**
  - Include a review from someone who said that the session is a no-brainer for anyone who wants to stay relevant in 2025 and beyond. It's mind-blowing.

# Retrieval-Augmented Generation (RAG): Paradigms, Technologies, and Trends

## Contents:

1. RAG Over view
2. RAG Paradigms Shifting
3. Key Technologies and Evaluation
4. RAG Stack and Industry Practices
5. Summar y and Prospect





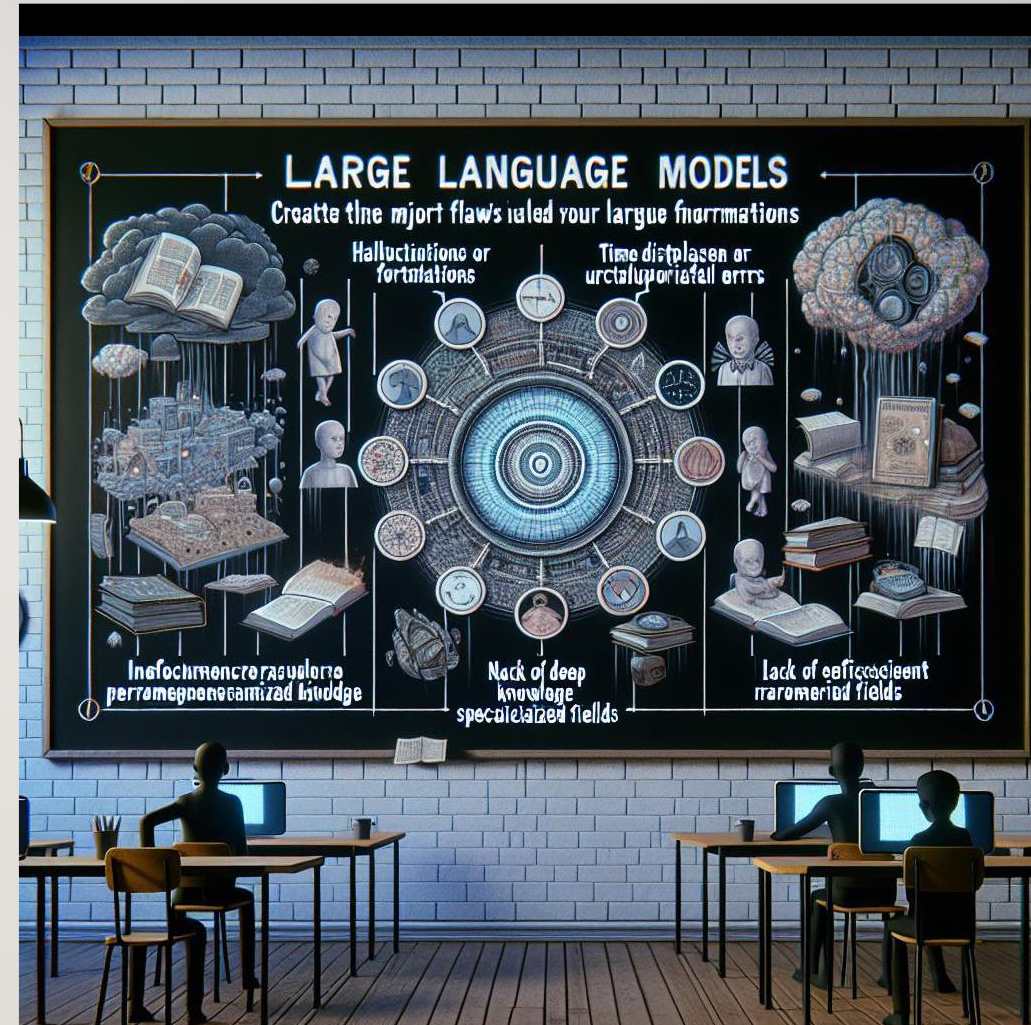
# Background

## Drawbacks of LLMs

- Hallucination
- Outdated information
- Low efficiency in parameterizing knowledge
- Lack of in-depth knowledge in specialized domains
- Weak inferential capabilities

## Practical Requirements of Application

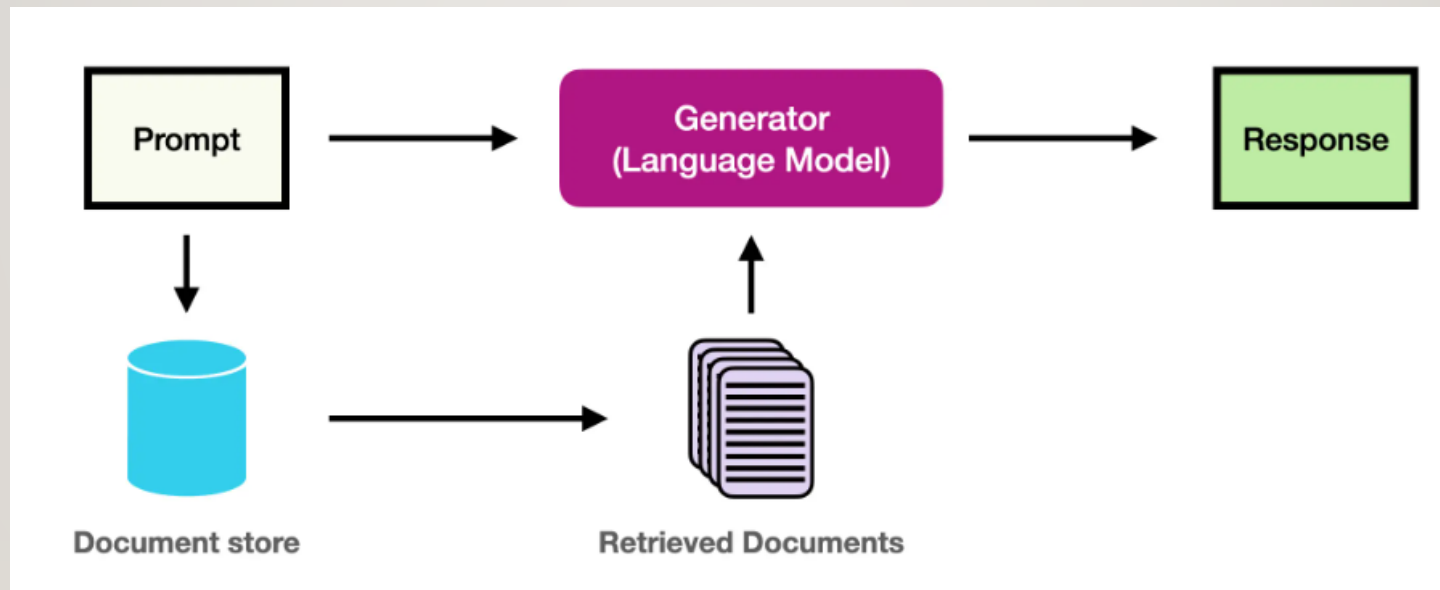
- Domain-specific accurate answering
- Frequent updates of data
- Traceability and explainability of generated content
- Controllable Cost
- Privacy protection of data



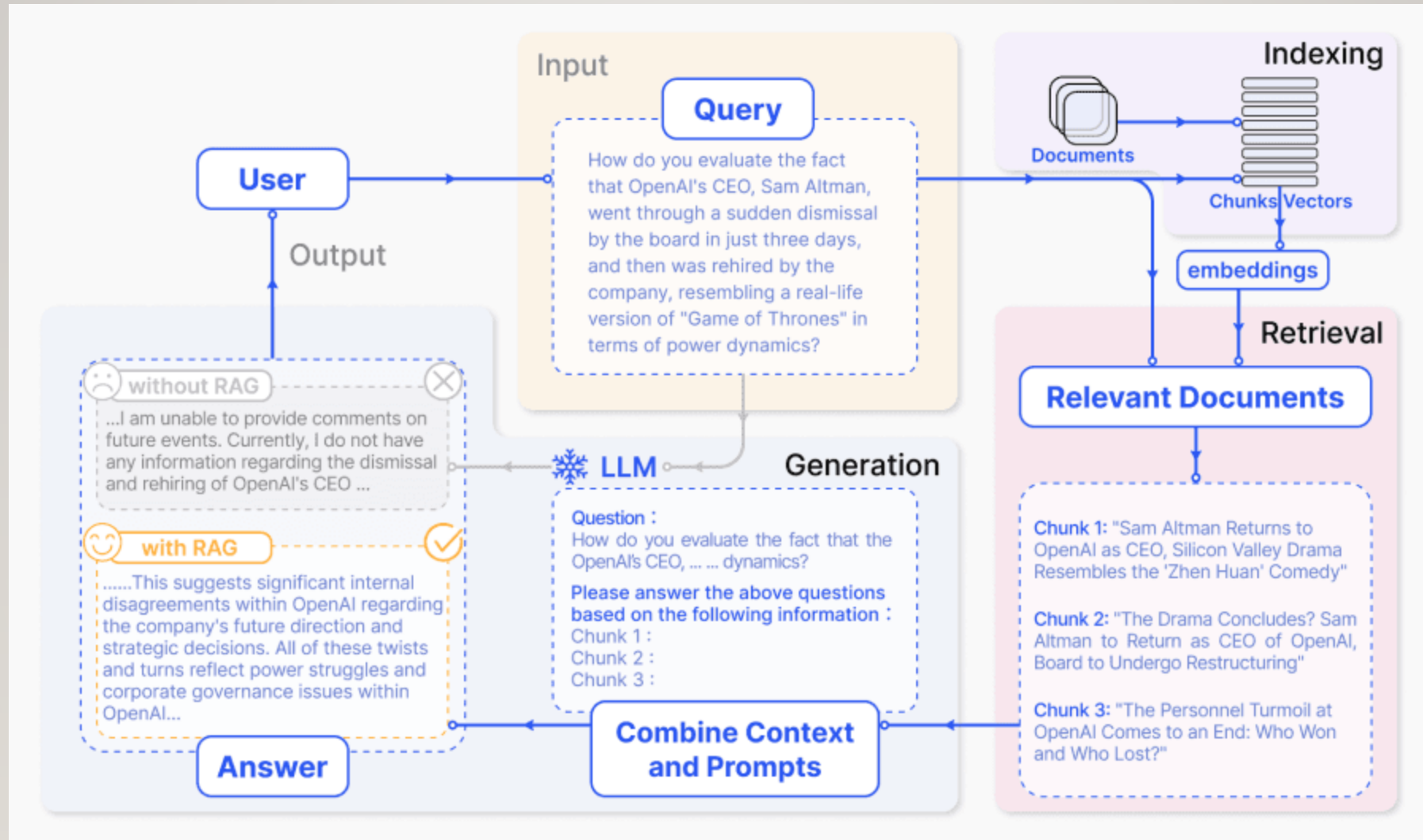


# Retrieval-Augmented Generation (RAG)

Retrieval-Augmented Generation (RAG) is a sophisticated approach designed to improve the performance of natural language processing (NLP) systems, particularly in tasks that involve generating human-like text. This technology is a blend of two main components: **a retrieval system and a generative model**. The integration of these components allows RAG to produce more accurate, relevant, and contextually rich responses than traditional generative models



# RAG with Example



# RAG Term Definition

**Input:** The question to which the LLM system responds is referred to as the input. If no RAG is used, the LLM is directly used to respond to the question.

**Indexing:** If RAG is used, then a series of related documents are indexed by chunking them first, generating embeddings of the chunks, and indexing them into a vector store. At inference, the query is also embedded in a similar way.

**Retrieval:** The relevant documents are obtained by comparing the query against the indexed vectors, also denoted as "Relevant Documents".

**Generation:** The relevant documents are combined with the original prompt as additional context. The combined text and prompt are then passed to the model for response generation which is then prepared as the final output of the system to the user.





# Retrieval-Augmented Generation vs Fine Tuning

Currently organizations don't train their own AI models. Instead, they customize pre-trained models to their specific needs, often using RAG or fine-tuning.

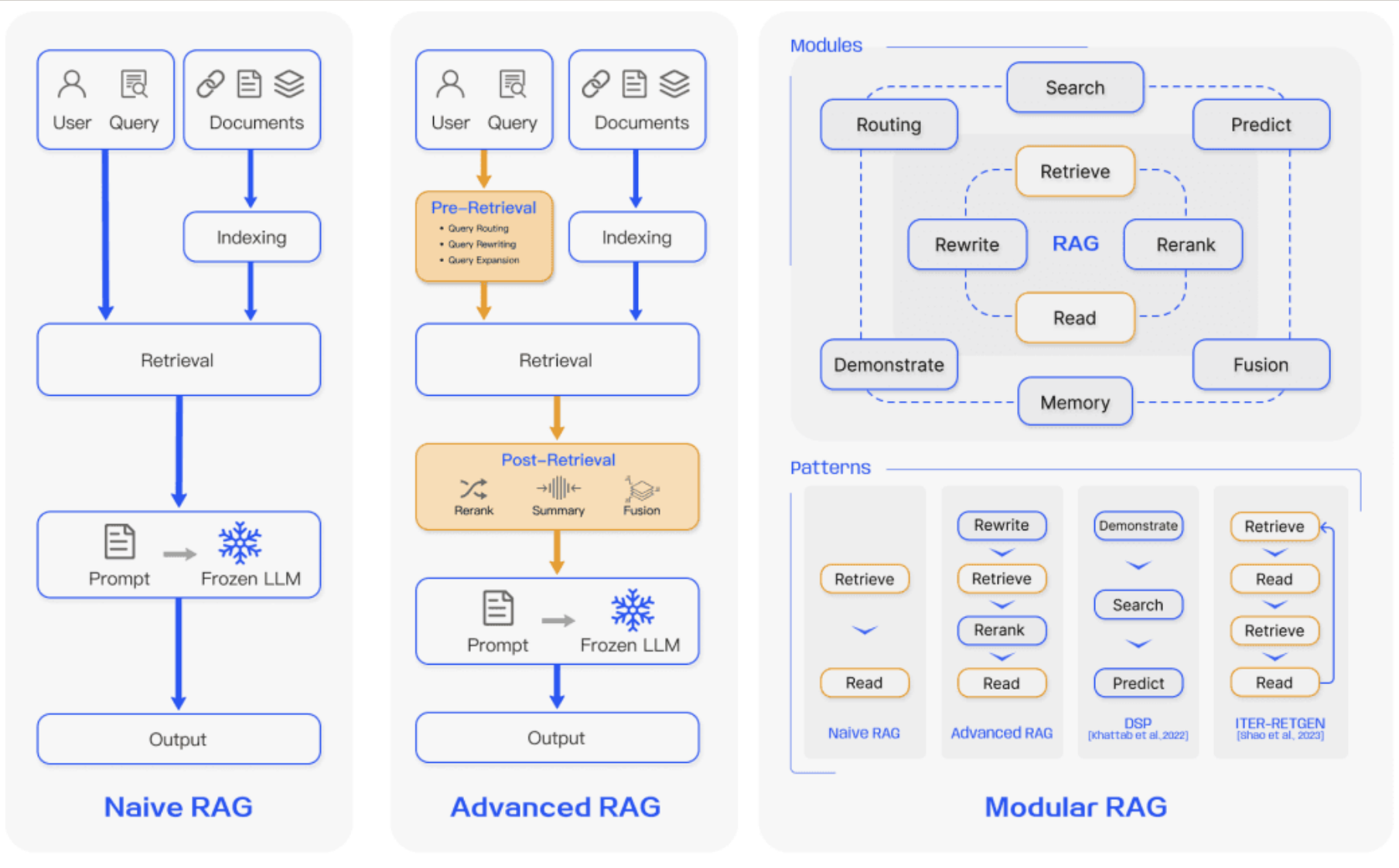
**Fine-tuning** requires adjusting a model's weights, which results in a highly customized model that excels at a specific task. It's a good option for organizations that rely on codebases written in a specialized language, especially if the language isn't well-represented in the model's original training data.

**RAG** doesn't require weight adjustment. It retrieves and gathers information from a variety of data sources to augment a prompt, which results in an AI model generating a more contextually relevant response for the end user.

Some organizations start with RAG and fine-tune their models to accomplish a more specific task. Other find that RAG is a sufficient method for AI customization alone.



# RAG Paradigms



# Three key Question of RAG

## What to retrieve ?

- Token
- Phrase
- Chunk
- Paragraph
- Entity
- Knowledge graph

## When to retrieve ?

- Single search
- Each token
- Every N tokens
- Adaptive search

## How to use the retrieved information ?

- Input/Data Layer
- Model/Intermediate Layer
- Output/Prediction Layer





# Comparison of Leading LLM Orchestration Frameworks (2025)

Tool	Strengths (Pros)	Limitations (Cons)
LangChain	Highly modular & full-featured Ecosystem for agents, memory, tools, chains Supports Python & JS	API can be verbose & abstracted Steep learning curve Inconsistent updates and documentation
LlamaIndex	Purpose-built for RAG pipelines (Retrieve-Augment-Generate) Tight vector DB integration Simple data connectors	Limited standalone capabilities Less flexible for complex orchestration Requires integration with other tools
FlowiseAI	No-code/low-code GUI Drag-and-drop node-based workflow Fast prototyping	Lacks fine-grained control for advanced scenarios Fewer extension hooks for developers
AutoGen	Designed for multi-agent LLM systems Flexible conversational flows Great for task delegation	Requires multiple interaction rounds Can be slow or inefficient High setup for custom flows



# LLM Frameworks Comparison (2025 Edition)

Tool	Origin	Best Use Case	Industry Adoption	Estimated Market Share (2025)
LangChain	LangChain Inc., USA	Advanced agent-based systems, memory & tool-chaining in LLM pipelines	Enterprise AI systems, DevOps workflows	~42%
LlamaIndex	LlamaIndex, USA	RAG pipelines (retrieve-augment-generate), vector DB integration	EdTech, LegalTech, Document Q&A	~28%
FlowiseAI	Open-source (Vietnam)	Visual LLM workflow builder for low-code/no-code use	Hackathons, Educators, Startups	~15%
AutoGen	Microsoft Research, USA	Multi-agent dialog systems, research co-pilots	Research labs, Autonomous Agent setups	~10%
Others	Various (OpenRouter, Dust, CrewAI, etc.)	Specialized/niche LLM orchestration frameworks	Exploratory use, hobbyists, research	~5%

# RAG Summary

## » RAG Ecosystem

### Downstream Tasks



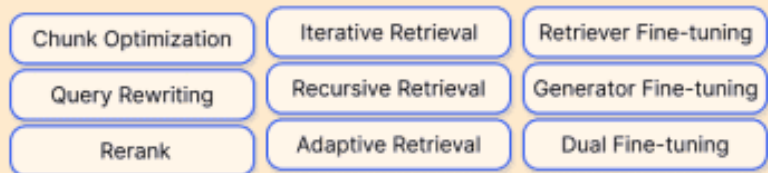
### Technology Stacks



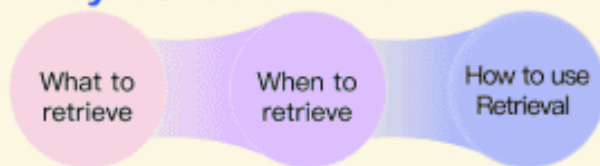
## » The RAG Paradigm



## » Techniques for Better RAG



## » Key Issues of RAG

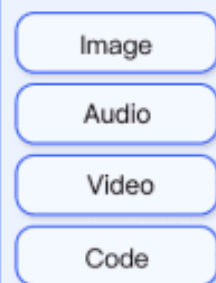


## » RAG Prospect

### Challenges



### Modality Extension



### Ecosystem

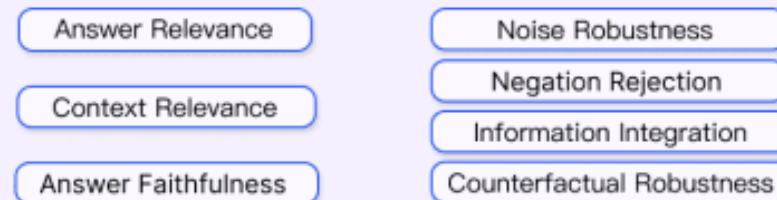


## » Evaluation of RAG

### Evaluation Target



### Evaluation Aspects



### Evaluation Framework

#### Benchmarks

#### Tools





To build a solid AI tool kit lets actually breakdown our daily tasks  
into different categories

Productivity 🚀

Research 🔍

Slicing & Dicing of Data 📊

Learn & absorb things  
faster 📖

Presentation 🖥️

And some fun 😄

Productivity 🛠️

Research 🔍

<https://openrouter.ai/>

<https://chatgpt.com/>

<https://gemini.google.com/app>

<https://chat.deepseek.com/>

<https://aistudio.google.com/>

<https://www.perplexity.ai/>

## Assistant's Cutoff Knowledge Up to July 2024

what is cutoff knowledge you have?



My **cutoff knowledge** is **July 2024**, meaning I have information up to that point. I can answer questions about events, facts, and general knowledge up until then. However, I **don't have real-time or post-July 2024 updates**, so for the latest news, stock prices, sports results, or scientific breakthroughs, you'll need to check a reliable live source.

Would you like help with something within my knowledge range? 😊



ChatGPT ▾

what is cutoff knowledge you have?

My knowledge is current up to **June 2024**. That means I can provide information, context, and insights about events, technology, science, and more up to that date. If you need information on something that happened after June 2024, I can use live web browsing (if you want) to find up-to-date details.



Gemini

2.5 Flash ▾

what is cutoff knowledge you have?



I do not have a "cutoff knowledge" in the sense of a specific date beyond which my information ceases. My knowledge base is continuously updated by Google, which means I have access to a vast amount of information up to the **present moment**.

Therefore, I can provide you with information about events, discoveries, and developments that are very recent.





Slicing & Dicing of Data 📊

<https://numerous.ai/>

<https://chatgpt.com/>

<https://claude.ai/new>

Presentation 🖥️

<https://gamma.app/>

<https://manus.im/>

Learn & absorb things  
faster 📖

<https://bolt.new/>

<https://lovable.dev/>

<https://notebooklm.google/>

And some fun 🤖

<https://suno.com/about>



# Day 5: Generative AI and Education



# GENERATIVE AI AND EDUCATION

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- **Easy to Use** – Generative AI is powerful because it's easy to access and interact with, even if it's not perfect.
- **Useful Despite Flaws** – Even when AI makes mistakes, it can save time and effort in low-stakes situations.
- **AI Tutors Work** – AI-powered tutors are already helping students learn and master subjects effectively.
- **Risk of Inequality** – AI might benefit experts more, widening the gap between those with and without knowledge.
- **Integrate, Don't Replace** – AI should enhance existing workflows, not completely replace them.
- **Rethink Education** – Teachers and educators need to strategically rethink their role in an AI-driven world.

# AI Ethics & Its importance in education

# AI ETHICS & ITS IMPORTANCE IN EDUCATION

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AI ethics refers to the moral and social considerations surrounding the development and use of artificial intelligence (AI) systems. It involves addressing the potential risks and impacts of AI on individuals, society, and the environment.

AI ethics is important because it helps ensure that AI systems are developed and used in a responsible and ethical manner. It helps prevent potential harms, such as bias, discrimination, privacy violations, and loss of human control over AI systems.





# IMPORTANCE OF AI ETHICS

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AI ethics plays a crucial role in ensuring that artificial intelligence is developed and used in a responsible and ethical manner. Here are some key areas where AI ethics is of utmost importance:

## **Privacy**

AI systems often collect and process large amounts of personal data. It is important to ensure that this data is handled securely and with respect for individuals' privacy. For example, facial recognition technology should be used responsibly and with the consent of individuals.



# IMPORTANCE OF AI ETHICS

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## **Bias**

AI algorithms can inadvertently perpetuate biases present in the data they are trained on. It is essential to address and mitigate bias to ensure fair and equitable outcomes. For instance, in hiring processes, AI systems should be designed to avoid discriminatory practices and promote diversity and inclusion.

## **Accountability**

As AI systems become increasingly autonomous, it is crucial to establish mechanisms for accountability. Clear guidelines and regulations should be in place to hold AI developers and users accountable for the actions and decisions made by AI systems.



# KEY PRINCIPLES OF AI ETHICS

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## **Fairness**

AI systems should be designed to treat all individuals fairly and without bias. This means ensuring that the algorithms and data used to train AI models do not discriminate or favor certain groups of people over others.

## **Transparency**

AI systems should be transparent and explainable. Users should be able to understand how the system works and the reasoning behind its decisions. This helps build trust and allows for accountability.





# KEY PRINCIPLES OF AI ETHICS

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## **Accountability**

Organizations and individuals responsible for developing and deploying AI systems should be held accountable for any harm caused by those systems. This includes taking responsibility for addressing biases, errors, and unintended consequences.

# HOW TEACHER/STUDENT CAN FOLLOW AI ETHICS

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## Practical Tips and Guidelines

### 1. Be Aware of Biases

- Understand that AI algorithms can be biased and may perpetuate discrimination.
- Educate yourself about different types of biases and their potential impact.
- Advocate for fairness and inclusivity in AI systems.

### 2. Question Algorithms

- Challenge the decisions made by AI systems and ask why certain outcomes are being produced.
- Seek transparency in how algorithms are designed and implemented.
- Engage in discussions about the ethical implications of AI.

### 3. Respect Privacy

- Be mindful of the personal data you share online and the potential consequences.
- Understand the importance of consent and how your data may be used.
- Support policies and regulations that protect individuals' privacy rights.



# Agentic AI

Transforming Automation & Intelligence

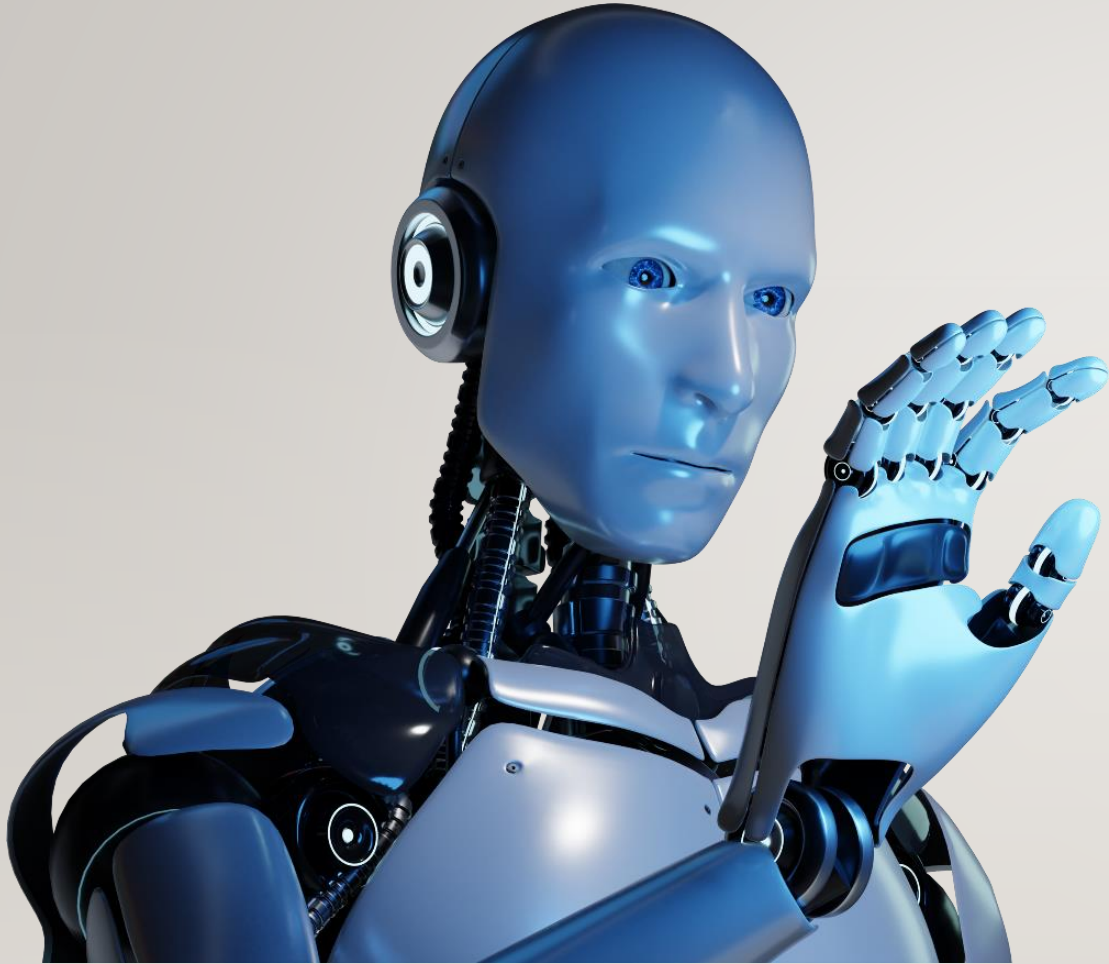






# What is Agentic AI

Agentic AI integrates **large language models (LLMs), machine learning, and enterprise automation** to create autonomous AI agents capable of **decision-making, goal-setting, problem-solving, and adapting to unstructured environments**, unlike rule-based AI.



# Evolution of Agentic AI



## Early AI Models

Focused on predefined rules and automation.



## Machine Learning Era

AI began adapting and learning patterns.



## Rise of Large Language Models (LLMs)

Enhanced contextual understanding.

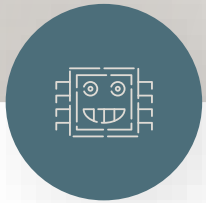


## Agentic AI Integration

Combining AI, automation, and real-time adaptability.



# How Agentic AI Works



## Understanding

AI processes data using LLMs and machine learning.



## Goal-Setting

Identifies objectives and plans strategies.



## Execution

Automates tasks with minimal human input.



## Learning

Continuously improves through interactions.



# Benefits Of Agentic AI



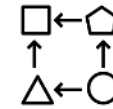
## Efficiency

Reduces manual work and automates complex tasks, improving productivity.



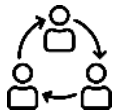
## Scalability

AI agents can adapt to business growth and evolving demands.



## Adaptability

Responds dynamically to real-time changes and unstructured environments.



## Collaboration

Works alongside humans, enhancing decision-making and workflow efficiency.



## Cost Reduction

Lowers operational expenses by automating repetitive and resource-intensive processes.



## Continuous Learning

Improves performance over time through data-driven insights and machine learning.

# Agentic AI Vs. Generative AI

## Agentic AI

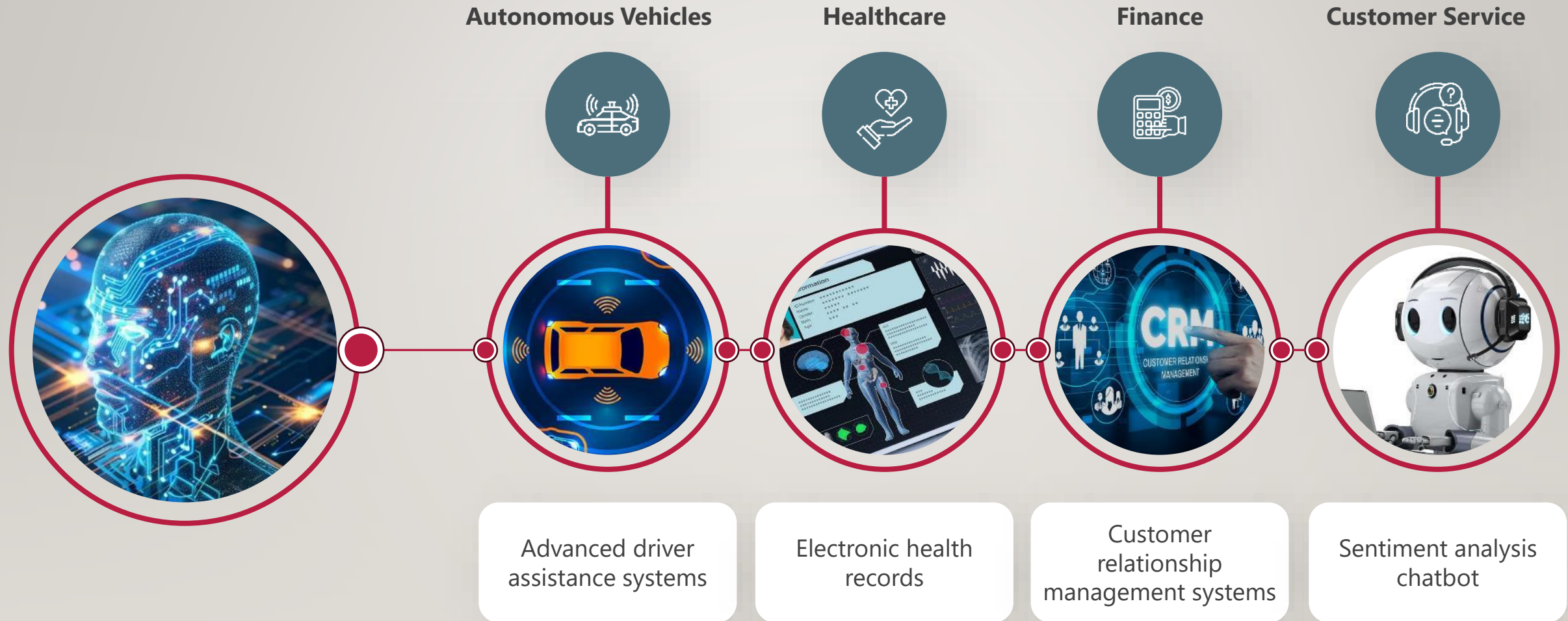
- ➔ Autonomous
- ➔ Goal-Oriented
- ➔ Real-time Environment
- ➔ Utilize Tools and APIs
- ➔ Continuous Adaptation
- ➔ Autonomous Systems
- ➔ Independent Decision-Making

**Vs**

## Generative AI

- ➔ Creative
- ➔ Output-Oriented
- ➔ Content-Based
- ➔ No external tools
- ➔ No adaptation from real-time
- ➔ Content Creation
- ➔ Make decision based on input patterns

# Applications Of Agentic AI





# Use Cases of Agentic AI & Automation



## Automated Data Analysis

AI interprets trends in real-time.



## Supply Chain Optimization

Predictive analytics improve logistics.



## IT & Security

AI-driven cybersecurity threat detection.



## Self-Healing Systems

AI resolves technical issues autonomously.







# Risks & Challenges of Agentic AI

## Risks

- ✓ Bias & Fairness Issues
- ✓ Security Threats
- ✓ Loss of Human Control

## Challenges

- ✓ Ethical Concerns
- ✓ Regulatory & Compliance Issues
- ✓ Accountability & Transparency



# Best Practices For Implementing

01

## **Ethical AI Development**

Ensure transparency and fairness in decision-making.

02

## **Robust Security Measures**

Prevent unauthorized access and cyber threats.

03

## **Continuous Learning**

Enable AI to adapt and improve with new data.

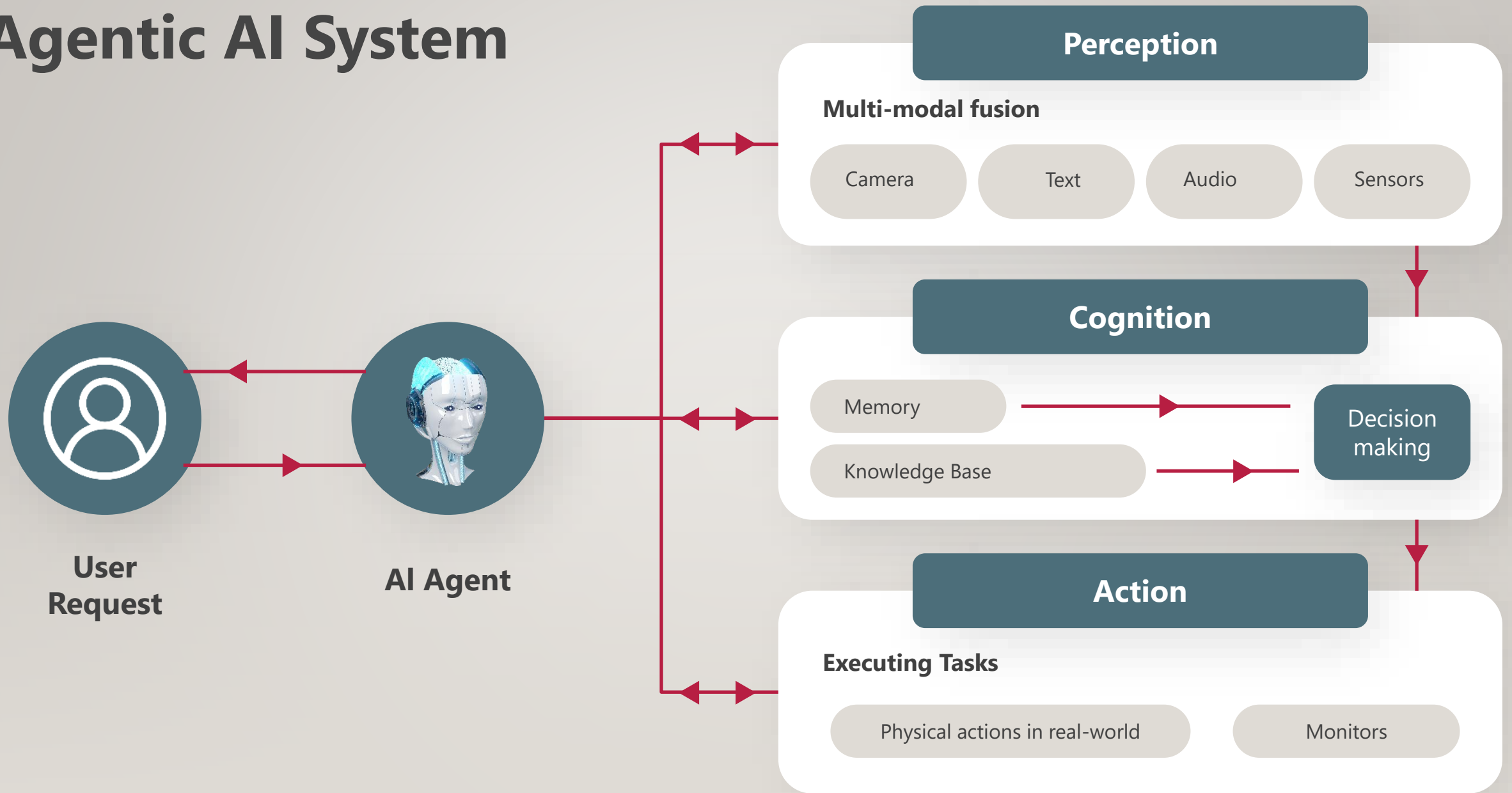
04

## **Human Oversight**

Maintain control to align AI decisions with business values.



# Agentic AI System



# The Future of Agentic AI

The future of Agentic AI involves autonomous decision-making, human collaboration, and enhanced AI security.



## Autonomous AI Agents

AI will make more independent decisions and perform complex tasks.



## AI & Human Collaboration

AI will work alongside humans, enhancing efficiency and innovation.



## Next-Gen AI Security

Strengthening AI safety to prevent risks and ensure ethical use.



# Conclusion & Key Takeaways

Agentic AI is revolutionizing **automation beyond simple processes**. Businesses must adapt as AI shapes the future of work. Ethical **AI development** is essential for responsible use, and AI will continue evolving, driving innovation and transformation.





