

What is Agentic AI ?

1. Introduction:

In simple terms the AI systems that are programmed for specific tasks they take actions independently to achieve goals and help to solve problems in a wide range of industries. It brings together the flexible characteristics of large language models (LLMs) with the accuracy of traditional programming.

1.1 What are the LLMs:

Definition:

LLMs are artificial intelligence (AI) systems that have been trained on enormous text datasets to comprehend, produce, and work with language that is similar to that of humans. They power programs like Gemini, Claude, and ChatGPT, Chatboat, assistants.

1.2 Limitations of Agentic Systems with LLMs :

- **(Mitigated with RAG) Hallucinations:** May produce misleading information.
- **Passivity:** Requires agentic AI systems to take action based on their results.
- **Context Windows :**Memory restrictions for Context Windows (max of ~1M tokens in 2024).

1.3 LLMs vs. Agentic AI:

Aspect	LLMs	Agentic AI
Primary Role	Generate text/code	Complete tasks autonomously
Autonomy	Requires human prompts	Self-initiates actions
Output	Words/files	Real-world outcomes (e.g., fixed bug)
Dependencies	Just the model	Needs tools + APIs + memory

2. Background and Evaluation:

2.1 From rule based AI to Agentic AI:

AI Paradigm	Characteristics	Limitations
Rule-Based AI	Follow fixed logic (e.g., expert system)	Inflexible, can't learn
Machine Learning	Learns patterns from data (e.g., classifiers)	Needs retraining, passive
Generative AI	Creates content (e.g., ChatGPT, DALL·E)	Reactive, requires human prompt
Agentic AI	Acts autonomously, sets goals, adapts	Requires robust safety measures

2.2 Influential technologies:

- **Reinforcement Learning (RL):** enable AI to learn via trial and error (e.g., AlphaGo).
- **Large Language Model (LLMs):** provide reasoning and planning capability (e.g., GPT-4)
- **Multi-Agent System:** AIs collaborating (e.g., autonomous fleets, games theory simulations)

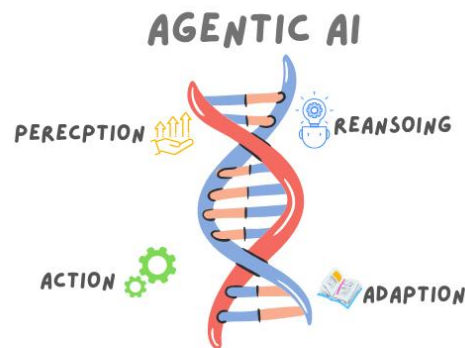
3. Key Features of Agentic AI:

3.1 Decision making : planning and dynamically adjusting strategies.

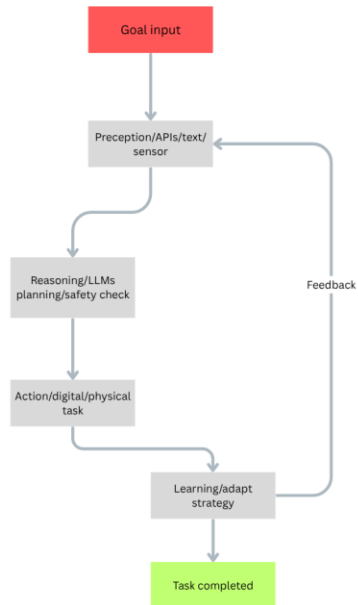
3.2 Perception: interpreting data from their environment (text, sensor, APIs).

3.3 Action: Executing task (e.g., writing code, controlling robots, negotiating deals)

3.4 Adaption: learning from feedback to improve performance



3. Agentic AI Works (Flow Diagram):

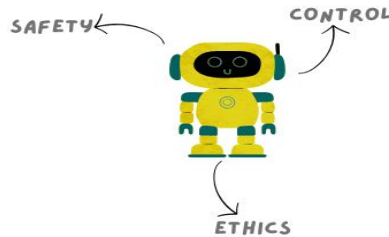


5. Use Cases of Agentic AI:

Domain	Example
HealthCare	Autonomous diagnosis & treatment planning
Finance	AI traders executing real-time strategies
DevOps	Self-healing cloud infrastructure
Customer services	AI resolving tickets end to end
Research	AI scientists designing experiments

6. Challenges & Considerations:

- **Safety:** Ensuring AI aligns with human intent (avoiding harmful actions).
- **Control:** Designing “off switches” for high-stakes scenarios.
- **Ethics:** Accountability for autonomous decisions.



7. Core Capability of Agentic AI:

Capability	What It Enables	Real-World Example	Tech Behind It
1. Autonomous Goal Pursuit	Completes multi-step tasks without human prompts	<i>An AI sales agent researches leads, drafts emails, and schedules follow-ups</i>	Hierarchical planning algorithms
2. Dynamic Tool Integration	Uses APIs, databases, and physical devices as needed	<i>AI detects server outage → auto-triggers AWS scripts + alerts engineers</i>	OpenAPI schemas, RPA connectors
3. Contextual Memory	Maintains long-term task/user context	<i>*Remembers your project preferences across 6-month development cycles*</i>	Vector databases, LSTM networks
4. Real-Time Adaptation	Adjusts strategies mid-task	<i>Delivery AI reroutes trucks due to weather delays while optimizing fuel</i>	Reinforcement learning (PPO)
5. Explainable Decisioning	Justifies actions transparently	<i>"I chose this supplier due to 30% cost savings (see attached analysis)"</i>	Chain-of-thought prompting
6. Collaborative Agency	Works with humans/other AIs	<i>AI scientist proposes 3 experiment designs → human picks one → AI</i>	Multi-agent

Conclusion:

Agentic AI represents a revolutionary leap in artificial intelligence, transforming how machines interact with the world. Unlike traditional AI systems that simply follow instructions or generate response, Agentic AI thinks, acts, and learns autonomously to achieve complex goals.