

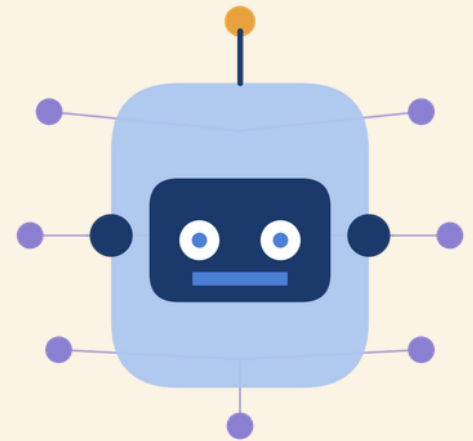


BYTE QUEST

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AGENTIC AI

THE FUTURE OF AUTONOMOUS INTELLIGENCE



Welcome to Volume 189 of Byte Quest.

As the landscape of technology rapidly evolves, so does the nature of machine intelligence. We are transitioning out of the era of simple, prompt-based chatbots and entering the dawn of "digital workers." In this edition, we explore Agentic AI—systems designed not just to converse, but to reason, plan, and autonomously execute complex workflows.



Dive in as we unpack the architecture powering this revolution and what it means for the future of software engineering. Whether you are curious about the underlying algorithms or eager to start building your own autonomous workflows, this issue serves as your practical roadmap.

Moving beyond Large Language Models (LLMs) to
Large Action Models (LAMs)
— exploring the dawn of digital workers.

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OVERVIEW

UNDERSTANDING AGENTIC AI



Have you ever imagined an AI that doesn't just answer questions but actually plans tasks, makes decisions, and completes work on its own? Welcome to the world of Agentic AI.

Unlike traditional AI systems that wait for user instructions, Agentic AI acts like an intelligent assistant capable of understanding goals, breaking them into steps, using tools, and adapting when challenges arise. It observes its environment, plans actions, executes tasks, learns from feedback, and improves future decisions.

The intelligence comes not only from powerful language models but from reasoning, planning, memory, and tool usage — changing how humans interact with technology, from booking travel to writing software.

While traditional AI requires a human to prompt it at every step, Agentic AI utilizes a 'ReAct' (Reasoning + Acting) framework. It breaks down massive goals into sub-tasks autonomously, vastly reducing the need for continuous human prompting.

“AI agents will become the digital workforce of the future.”

— Andrew Ng

Example — “Plan my vacation.”

- Compares flight prices
- Reserves hotels
- Creates a day-by-day itinerary
- Tracks the weather
- Adjusts plans automatically

IMPACT

WHY AGENTIC AI MATTERS

Modern problems are becoming more complex.

Businesses need systems that can think beyond simply answering questions.

Agentic AI offers:

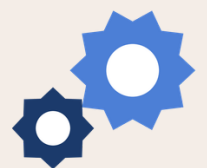
- Autonomous decision making
- Continuous learning Multi-step task execution Better productivity
- Reduced human effort
- Faster business automation

Applications include:

- Healthcare assistants
- Personal AI assistants
- Software development
- Customer support
- Robotics
- Finance
- Smart manufacturing

Instead of replacing humans, Agentic AI works alongside people by handling repetitive and time-consuming tasks.

Current Industry Pioneers: Tools like Devin (the world's first fully autonomous AI software engineer), AutoGPT, and BabyAGI are already proving that agents can write code, debug software, and execute complex marketing campaigns independently.

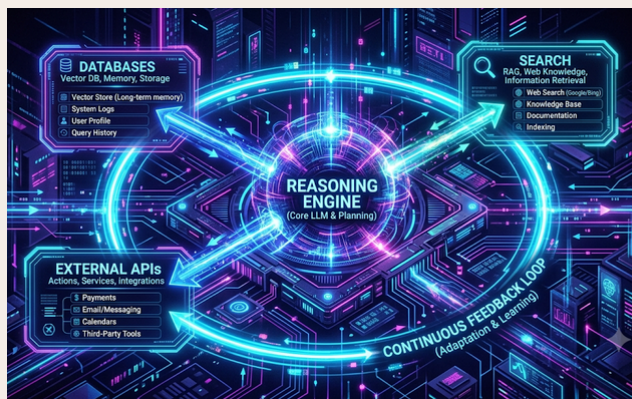


“The future belongs to AI systems that can reason and act.”

— Satya Nadella

WORKFLOW

AGENTIC AI IN ACTION



Agentic AI combines several technologies to perform intelligent, multi-step tasks.

Main components:

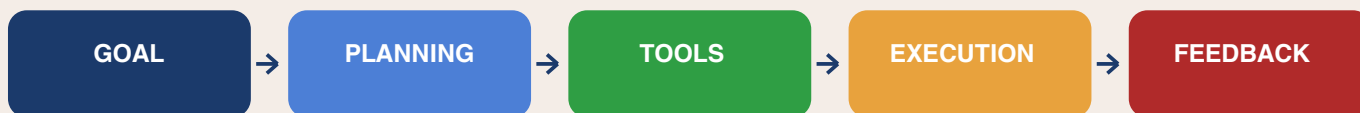
- User Goal
- Engine External
- Planning Module
- Tools Execution
- Memory System
- Feedback Loop
- Reasoning

Memory: "Utilizes Vector Databases (like Pinecone or Milvus) to recall past interactions (Long-term memory) alongside immediate context (Short-term memory)."

Tools: "Connects to external systems via API integrations (e.g., calling a Python compiler, browsing the web, or accessing SQL databases)."

A company asks: "Generate this week's sales report."

The agent connects to the databases, collects sales data, creates graphs, writes the report, and emails it automatically — completing the entire workflow independently instead of performing just one action.



The Architecture of Autonomy

To move from a simple chatbot to an autonomous agent, systems rely on a robust architecture that simulates cognitive processes:

- **Reasoning Frameworks (ReAct):** Instead of generating a single output, agents use paradigms like "Chain-of-Thought" or "Reasoning + Acting" (ReAct). They break massive goals down into a step-by-step logical sequence before taking any action.
- **Advanced Memory Systems:**
 - **Short-Term Memory:** The agent's immediate context window, keeping track of the current active conversation or task loop.
 - **Long-Term Memory:** Powered by Vector Databases (such as Pinecone or Milvus) and Retrieval-Augmented Generation (RAG). This allows the agent to recall past interactions, historical data, and complex documentation instantly.
- **Tool Execution (Function Calling):** Agents are no longer confined to text boxes. They are equipped with API access to interact with the real world—running Python code, querying SQL databases, browsing the live web, or sending emails.
- **Self-Reflection & Correction:** A critical part of the Feedback Loop. If an agent hits a broken link or an API error, it doesn't just crash. It reads the error message, adjusts its plan, and tries an alternative route autonomously.

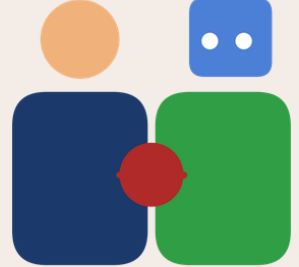
OUTLOOK

WHY IT MATTERS

Agentic AI represents the next generation of artificial intelligence. Instead of acting as a chatbot, it behaves like a capable digital assistant that plans, reasons, and executes tasks with minimal human intervention.

As industries increasingly adopt autonomous AI systems, professionals who understand Agentic AI will find valuable opportunities in software engineering, automation, robotics, cybersecurity, healthcare, finance, and research.

Challenges Ahead: While promising, Agentic AI faces hurdles like 'hallucination loops' (where agents get stuck in incorrect reasoning), high computational costs, and security risks (preventing agents from taking harmful actions in external systems).



“The future of AI is not just about answering questions — it’s about achieving goals. Agentic AI is a major step toward that future.”

Challenges & Ethical Considerations

While Agentic AI holds massive potential, deploying it comes with significant engineering hurdles:

- **Infinite Loops:** Agents can sometimes get stuck in "hallucination loops," repeatedly trying the same failed action without making progress.
- **Security & Guardrails:** Giving AI access to databases and financial tools requires strict "Human-in-the-Loop" (HITL) authorization to prevent unintended or harmful actions.
- **Computational Cost:** Running continuous, multi-step reasoning engines requires immense processing power and API resources.

DEPARTMENT VISION

To be a center for academic excellence in Computer Science and Engineering education, enabling graduates to become ethical and competent professionals.

Faculty Co-ordinator: Dr. Bhargavi
Peddireddy (Asc. Prof.)

DEPARTMENT MISSION

To enable students to develop logical thinking and problem-solving skills that help build successful careers in computing while creating innovative solutions for society.

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