



K. J. Somaiya College of Engineering, Mumbai-77

Batch: B2 Roll No.: 16010122221

Experiment / assignment / tutorial No. 1

Grade: AA / AB / BB / BC / CC / CD / DD

Signature of the Staff In-charge with date

Title: Study of Artificial Intelligent project.

Objective: To study various AI projects for their architectures. Complexity, programming language, applications and other AI related concepts.

Expected Outcome of Experiment:

Course Outcome	After successful completion of the course students should be able to
CO1	Understand the history & various application of AI and choose appropriate agent architecture to solve the given problem.

Books/ Journals/ Websites referred:

1. http://en.wikipedia.org/wiki/List_of_artificial_intelligence_projects
2. http://www.cs.cornell.edu/courses/cs478/2002sp/mlinks/interesting_ai_demos_and_project.htm
3. <http://homepages.inf.ed.ac.uk/rbf/AIMOVIES/AImovai.htm>
4. “Artificial Intelligence: a Modern Approach” by Russell and Norving, Pearson education Publications
5. “Artificial Intelligence” By Rich and knight, Tata McGraw Hill Publications

Pre Lab/ Prior Concepts:

History and evolution of AI, Artificial intelligence: definitions and theories.

Historical Profile:

AI research is highly technical and specialised and is also divided by several multidisciplinary technical issues. So far there are many projects those have been developed and are in progress to work on those issues. Students must learn the applications of intelligent robots by studying various such projects to know the depth



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and complexity of the course.

New Concepts to be learned:

Applications of AI, Current research and future research potential in the field.



Chosen Modern Project Name: DART (Dynamic Analysis and Replanning Tool)

Project Description:

DART (Dynamic Analysis and Replanning Tool) is a logistics optimization tool developed by the U.S. military in the 1990s. The project aimed to improve military transportation and logistics planning, specifically for operations involving the scheduling and routing of transportation vehicles. DART used real-time data and sophisticated algorithms to dynamically adjust logistics plans as conditions changed, optimizing the efficiency and effectiveness of military operations.

Project category/field (Game, NLP etc):

Logistics Optimization, Military Operations Research, Decision Support Systems

Agent architecture: (State just name):

- Goal-Based Agent Architecture: The system is designed to optimize a set of goals (e.g., minimize delivery time, reduce costs) by dynamically adjusting transportation and routing plans in response to real-world data.
- Heuristic Algorithms: Used to solve complex optimization problems involving scheduling, routing, and logistics.
- Real-Time Replanning: DART continuously updates plans based on real-time conditions and data.

Programming language in which the project is/was developed:

- Primarily developed using FORTRAN in the 1990s, a common language for scientific and military applications at the time.
- Later updates and adaptations may have involved other languages like C++ for performance improvements or integration with newer systems.

Awards won by the project/strengths. Weaknesses, highlights of the project:

Strengths:



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- DART significantly improved the efficiency and responsiveness of military logistics operations, especially in dynamic and unpredictable environments.
- The tool's ability to make real-time adjustments allowed military planners to optimize transportation routes, reducing delays and costs.
- Its use of heuristic and optimization algorithms for real-time planning helped streamline logistical support during military operations.

Weaknesses:

- DART was highly specialized for military logistics, meaning it may not be easily adaptable to other industries without significant reworking.
- The system required considerable computational resources, which might have limited its applicability in resource-constrained environments.
- Its real-time nature required constant data input and monitoring, which could have led to potential challenges in situations where data was incomplete or inaccurate.

Highlights:

- DART represented a significant step forward in military logistics, using AI and real-time data analysis to optimize operational efficiency.
- The system's success demonstrated the potential of AI for decision-making in complex, time-sensitive environments like military operations.

Nature of the project (Experimental/in use in real world):

Real-World Application:

- DART was not just an experimental tool but actively used by the U.S. military in the 1990s and beyond. It played a vital role in logistics during military operations, ensuring efficient transportation and resource management.
- Though primarily used in the military, the principles behind DART can be applied in other industries like transportation, supply chain management, and disaster relief.

Applications of the project:

- **Military Logistics and Planning:**
DART was primarily used for optimizing transportation schedules and logistics operations in the military, ensuring the timely and cost-effective movement of supplies, troops, and equipment.
- **Supply Chain Optimization:**
The optimization techniques used in DART are applicable to commercial logistics and supply chain management, improving efficiency in industries like manufacturing and retail.



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- **Real-Time Decision Support Systems:**
DART's real-time data processing and decision-making capabilities can be applied to other fields requiring rapid adjustments based on incoming data, such as emergency response, fleet management, and public transportation scheduling.
- **General Transportation Systems:**
The routing and scheduling algorithms developed for DART can be applied to large-scale transportation networks, such as freight logistics, public transportation systems, and urban mobility planning.

Chosen Classical Project Name 1: AlphaGo

Project Description:

AlphaGo is a deep reinforcement learning AI developed by DeepMind to play the ancient board game of Go. It uses advanced machine learning techniques, particularly deep neural networks and Monte Carlo Tree Search (MCTS), to evaluate potential moves and strategies. AlphaGo gained global recognition for defeating world champions, a feat once thought impossible for AI due to the game's complexity.

Project category/field (Game, NLP etc):

Game AI, Reinforcement Learning, Deep Learning

Agent architecture:

Deep Neural Networks
Reinforcement Learning (specifically, Deep Q-Learning)
Monte Carlo Tree Search (MCTS)

Programming language in which the project is/was developed:

Python (using TensorFlow and other deep learning frameworks)

Awards won by the project/strengths. Weaknesses, highlights of the project:

Strengths:

- AlphaGo demonstrated the power of deep learning in a complex, non-trivial domain.



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- It defeated top human players, including Lee Sedol, one of the world's best Go players.
- AlphaGo's combination of neural networks and MCTS opened new directions for reinforcement learning.

Weaknesses:

- AlphaGo was highly specialized in Go and cannot be applied directly to other domains without substantial re-engineering.
- It required substantial computational power and extensive training data, making it resource-intensive.

Highlights:

- AlphaGo's victory was a historic moment for AI, showcasing the potential of deep reinforcement learning for decision-making tasks.
- The project revolutionized AI's approach to strategic thinking and planning.

Nature of the project (Experimental/in use in real world):

Experimental:

- Initially a research project by DeepMind, AlphaGo was not meant for widespread deployment or real-world applications.
- It has been retired in favor of newer, more generalized AI models.

Real World Impact:

- Despite being experimental, AlphaGo's techniques and strategies have influenced AI research in domains like robotics, healthcare, and autonomous systems.
- AlphaGo's success demonstrated how AI could excel in tasks requiring intuition and strategic depth.

Applications of the project:

Game AI: AlphaGo has inspired game-playing AI for more complex games, beyond traditional video games, like Dota 2, StarCraft II, and chess.



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- Reinforcement Learning: The principles developed through AlphaGo have significantly advanced the field of reinforcement learning, influencing many modern applications of AI in decision-making and strategy.
- Strategic Decision-Making: AlphaGo's architecture has been applied to scenarios requiring decision-making, from robotics to resource management.
- Healthcare: AlphaGo's reinforcement learning techniques are being explored for optimization in healthcare, such as for drug discovery or personalized medicine.



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Chosen Classical Project Name 2: BigDog

Project Description:

BigDog, developed by Boston Dynamics, is a quadruped robot designed to assist with rough-terrain mobility. It was originally funded by the U.S. military for potential use in carrying heavy loads over difficult terrain. BigDog uses advanced sensors and hydraulic actuators to navigate and maintain balance in challenging environments.

Project category/field (Game, NLP etc):

Quadruped Robotics, Military Robotics

Agent architecture: (State just name):

- Reactive Control Architecture: BigDog uses a combination of real-time feedback, proprioception, and sensor data to maintain balance and navigate rough terrains.
- Dynamic Stabilization: BigDog uses a sophisticated control system to maintain stability while walking, running, or carrying heavy loads.

Programming language in which the project is/was developed:

- C++ for real-time control of the robot's sensors, actuators, and stabilization algorithms.

Awards won by the project/strengths. Weaknesses, highlights of the project:

Strengths:

- Exceptional ability to navigate rough, uneven terrain, making it useful in military and disaster relief scenarios.
- Demonstrated advanced robot mobility and balance, even while carrying heavy loads.

Weaknesses:

- Limited practical use outside of specific research and military applications.
- BigDog's loud noise and size limit its ability to operate covertly or in certain environments.



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Highlights:

- BigDog's innovative design and capabilities have inspired future developments in legged robotics, particularly for military and industrial applications.

Nature of the project (Experimental/in use in real world):

(Explain in brief why experimental or how it is useful in real world)

Experimental/In Use:

BigDog is a prototype that was used for military research and testing, but its operational use in real-world applications remains limited.

Applications of the project:

- **Military Logistics:**
BigDog was designed to assist in military logistics, transporting heavy loads in difficult environments, including battlefields or disaster zones.
- **Robotics for Rough Terrain:**
BigDog's design influences the development of quadruped robots for industrial and commercial applications that require mobility over rough terrain.



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Chosen Classical Project Name 3: ELIZA

Project Description:

ELIZA was an early natural language processing (NLP) computer program developed by Joseph Weizenbaum in 1966 at the MIT Artificial Intelligence Laboratory. It simulated a conversation between a user and a psychotherapist, specifically using a script called "DOCTOR," which mirrored the Rogerian approach of reflecting the user's input. ELIZA is considered one of the first chatbots and a precursor to modern conversational AI.

Project category/field (Game, NLP etc):

Natural Language Processing (NLP), Artificial Intelligence, Conversational Agents

Agent architecture: (State just name):

- Rule-Based System
- Template-Based Dialogue System

Programming language in which the project is/was developed:

LISP: ELIZA was implemented using LISP, a programming language commonly used in AI research for symbolic processing and handling the complex patterns of human language.

Awards won by the project/strengths. Weaknesses, highlights of the project:

- Strengths:
 - Pioneering AI chatbot: ELIZA was one of the first programs to simulate human conversation and is considered an early milestone in AI development.
 - Innovation in NLP: Introduced the idea that simple rules could be used to simulate an intelligent conversation, helping to lay the foundation for future AI dialogue systems.
 - Psychological Experiment: It demonstrated the potential for machines to engage in what appeared to be meaningful conversations, sparking discussions about the nature of AI and human-computer interaction.
- Weaknesses:
 - Surface-Level Conversation: ELIZA could not understand context or meaning in the conversation and merely simulated responses based on



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keywords and patterns. It gave an illusion of understanding but had no real comprehension.

- No Memory or Learning: ELIZA didn't learn from interactions or remember previous exchanges, making its responses repetitive and often shallow.
- Highlights:
 - ELIZA's DOCTOR script, in particular, was a breakthrough in conversational AI, leading to widespread curiosity about the possibilities of machine-human interaction in the 1960s.

Nature of the project (Experimental/in use in real world):

Experimental:

ELIZA was primarily an experimental program developed to demonstrate the possibilities of natural language processing and artificial intelligence in the context of human-computer interaction. It was not intended for real-world use but was widely recognized as an early demonstration of conversational AI.

Impact on Real-World Applications:

While ELIZA itself didn't find extensive real-world applications, it paved the way for future AI-based systems like chatbots, customer support agents, and personal assistants. Its design principles still influence modern NLP systems, such as Apple's Siri, Amazon's Alexa, and Google's Assistant.

Applications of the project:

- Human-Computer Interaction (HCI):

ELIZA demonstrated the potential for human-computer interaction through language, laying the groundwork for more advanced systems that followed.
- Therapeutic and Psychological Applications:

The DOCTOR script used by ELIZA was based on a psychotherapeutic technique where the program acted as a conversational therapist, helping users reflect on their thoughts. This concept later influenced the development of virtual therapists and mental health chatbots.
- AI and Cognitive Science Research:

ELIZA's development spurred significant research in artificial intelligence, cognitive science, and NLP, driving forward the exploration of how machines can simulate human-like behavior and thought processes.
- Foundations for Chatbots:

As one of the earliest examples of chatbot systems, ELIZA's framework



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influenced the development of modern chatbots used in customer service, virtual assistants, and interactive applications.

- Exploring AI Consciousness:
ELIZA also raised questions about the potential for machines to appear conscious and led to philosophical discussions about the nature of intelligence, human-computer relationships, and the Turing Test.



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Chosen Classical Project Name 4: CALO (Cognitive Assistant that Learns and Organizes)

Project Description:

CALO was a DARPA-funded project initiated in the mid-2000s, designed to create a cognitive assistant that learns and organizes tasks based on user behavior and context. It aimed to develop an AI system capable of learning from its interactions with humans and autonomously managing a wide range of tasks, from scheduling to organizing emails. CALO used a combination of cognitive architectures and machine learning techniques to understand and adapt to human needs. The system was designed to be context-aware, user-centric, and capable of interacting with various technologies.

Project category/field (Game, NLP etc):

Cognitive Architectures, Artificial Intelligence, Personal Assistants

Agent architecture: (State just name):

- Cognitive Architecture (Hybrid): CALO utilized a combination of various AI techniques, including symbolic reasoning, learning, planning, and natural language processing. It integrated multiple cognitive models, such as decision-making, memory, and reasoning processes, to simulate human-like understanding and problem-solving.
- Learning-Based: CALO incorporated learning algorithms to improve its performance over time. The system adapted based on the tasks performed and the user's behavior, enhancing its efficiency and accuracy.

Programming language in which the project is/was developed:

- Primarily built in Common Lisp
- Also utilized Java and Python

Awards won by the project/strengths. Weaknesses, highlights of the project:

Strengths:

- Highly Adaptive: CALO was one of the first systems designed to learn from its users over time, adapting to specific needs and improving its ability to assist in organizing and managing tasks.



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- **Contextual Awareness:** The system could interpret and react to various contexts, allowing it to perform tasks such as calendar management, information retrieval, and task prioritization with minimal user input.
- **Integration with Other Systems:** CALO was designed to interact seamlessly with a variety of devices and software, from email to calendar applications, thus streamlining the user's workflow.

Weaknesses:

- **Limited Scope:** CALO's capabilities, although advanced, were still limited to specific tasks, and the system could struggle with unstructured tasks or tasks outside its defined domain.
- **Complex Development:** Building a robust cognitive assistant with such a wide range of capabilities required a significant amount of data, sophisticated algorithms, and integration with multiple platforms, which presented technical challenges.

Highlights:

- **Early Example of Personalized Assistants:** CALO laid the foundation for future AI assistants like Siri, Google Assistant, and Cortana by showcasing the potential of a cognitive system that could learn from and adapt to users' needs.

Nature of the project (Experimental/in use in real world):

- **Experimental and Research-Oriented:** CALO was primarily an experimental project aimed at advancing AI research in cognitive architectures and personal assistant systems. It was not designed as a commercially available product but served as a prototype for future applications in cognitive computing and AI-driven assistance.
- **Impact on Real-World Applications:**
While CALO itself did not make it to commercial use, it influenced the development of personal assistant technologies. Key concepts like contextual awareness, learning from interaction, and adaptive planning seen in CALO are now embedded in modern virtual assistants used in daily life. Its research informed the development of more advanced systems in the AI industry.

Applications of the project:

- **Personal Assistant Technology:** CALO demonstrated how a cognitive assistant could be used to manage tasks, from scheduling meetings to organizing emails, by learning from user behavior and context.



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- **Human-AI Interaction:** The project explored how humans could interact with AI in a natural and seamless way, highlighting the potential for cognitive architectures to bridge the gap between machine capabilities and human needs.
- **Machine Learning and Adaptation:** CALO's ability to adapt over time using machine learning algorithms made it an important precursor to intelligent systems that continuously improve based on user interactions.
- **Cognitive Computing Research:** The system contributed to the understanding of cognitive architectures, how AI can simulate human thought processes, and how machines can understand and react to real-world contexts in intelligent ways.
- **Commercial Virtual Assistants:** The research from CALO directly influenced modern virtual assistant systems like Siri, Google Assistant, and Amazon Alexa, which use similar principles of contextual awareness, machine learning, and task management.

Chosen Classical Project Name 5: Logic Theorist

Project Description:

The Logic Theorist was the first artificial intelligence program, developed in 1955 by Allen Newell and Herbert A. Simon at the Carnegie Institute of Technology (now Carnegie Mellon University). Its purpose was to prove mathematical theorems by mimicking human problem-solving strategies. The program was designed to explore logical statements from a set of axioms and derive proofs. It is considered one of the pioneering works in AI and is often credited with laying the foundation for the field of symbolic AI. The Logic Theorist demonstrated that machines could simulate human reasoning and problem-solving abilities.

Project category/field (Game, NLP etc):

- Artificial Intelligence
- Automated Theorem Proving
- Symbolic AI

Agent architecture: (State just name):

- **Rule-Based Architecture:** The Logic Theorist was based on a symbolic reasoning architecture that used logical rules to derive conclusions from



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premises. It worked by applying rules of inference to a formal set of axioms and proving theorems.

- **Search-Based Problem Solving:** The agent employed a search strategy to explore possible proofs for theorems. It used means-ends analysis, a heuristic approach where the program compares the current state with the goal state (the theorem to be proved) and looks for steps to bridge the gap.
- **Theorem Proving:** The system's primary function was to prove theorems in symbolic logic, demonstrating that a machine could solve complex problems through logical deduction.

Programming language in which the project is/was developed:

- **Written in Assembly Language:** The Logic Theorist was implemented using the assembly language of the IBM 701, one of the early electronic computers. The choice of assembly was due to the hardware limitations at the time.

Awards won by the project/strengths. Weaknesses, highlights of the project:

Strengths:

- **First AI Program:** The Logic Theorist is a pioneering achievement in AI, being the first program to demonstrate that machines could perform tasks previously thought to require human intelligence, such as proving mathematical theorems.
- **Heuristic Search:** The program introduced the idea of using heuristic search methods in problem-solving, a concept that has since become foundational in AI.
- **Influence on AI Research:** It inspired further developments in AI, including automated theorem proving, problem-solving, and symbolic reasoning.

Weaknesses:

- **Limited Scope:** The program was designed to work within the confines of formal symbolic logic, making it limited in the types of problems it could address. It could not handle more general or real-world problem-solving tasks.
- **No Learning Capability:** Unlike modern AI systems, the Logic Theorist did not have the ability to learn from experience. It was a static program that could only prove theorems it was explicitly programmed to handle.

Highlights:

- **Foundation for Symbolic AI:** The Logic Theorist is often considered the first demonstration of symbolic AI, which involves representing knowledge using symbols and manipulating them to infer new information.



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- **Inspiration for Later Developments:** The program set the stage for other AI research, including the development of expert systems, automated reasoning systems, and early AI-based problem solvers.

Nature of the project (Experimental/in use in real world):

- **Experimental/Research-Oriented:** The Logic Theorist was an experimental program intended to demonstrate the feasibility of machine-based reasoning and logic. It was a research prototype that showcased the potential of AI to tackle complex cognitive tasks.
- **Impact on Real-World Applications:** While the Logic Theorist itself did not directly lead to commercial applications, it laid the groundwork for future AI systems that would address real-world problems. The methods it introduced—symbolic reasoning, heuristic search, and theorem proving—would influence later developments in fields such as automated reasoning, expert systems, and knowledge representation.

Applications of the project:

- **Automated Theorem Proving:** The primary application of the Logic Theorist was in the domain of automated theorem proving. It demonstrated that machines could prove logical theorems, a concept that has been expanded and refined in modern AI systems.
- **Symbolic AI:** The Logic Theorist contributed to the development of symbolic AI, where knowledge is represented by symbols and manipulated through rules. This approach has influenced many subsequent AI applications, including expert systems, natural language processing, and automated decision-making systems.
- **Artificial General Intelligence (AGI):** While the Logic Theorist was limited in scope, its success in simulating logical reasoning provided early insight into the potential of machines to perform human-like cognitive tasks, paving the way for research into AGI.
- **AI in Mathematics:** The Logic Theorist helped inspire the use of AI techniques in mathematical problem-solving. Its methods were later used in more advanced mathematical tools and computer algebra systems that assist mathematicians in proving complex theorems.



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Chat session with any chatbots (questions should vary difficulty level):

Classical

Step 1: Selecting Chatbots

I am choosing Eliza, the AI therapist chatbot .

Step 2: Historical and Technical Analysis

1. Year and Purpose of Development

- Year: 1966
- Purpose: Developed by Joseph Weizenbaum to demonstrate natural language processing, simulating a psychotherapist.

2. Architecture Used

- Type: Rule-based system.
- Details: Utilizes pattern matching and substitution rules defined in scripts, such as the "DOCTOR" script.

3. Key Technical Features

- Pattern Matching: Identifies keywords and applies predefined rules.
- Script-Based: Responses depend on specific scripts, lacking context.
- Flexibility: Scripts can be adapted for different scenarios.

4. Applications and Limitations

- Applications: Early exploration of human-computer interaction, inspiring future chatbots.
- Limitations: Context-free, limited to scripts, and responses may be nonsensical if input doesn't match patterns.

Step 3: Turing Test Preparation for ELIZA

1. Define Evaluation Criteria

To evaluate ELIZA's ability to mimic human conversation:

- Contextual relevance: Does ELIZA provide responses that seem logical within the conversation?
- Response variability: Are responses diverse or repetitive?
- Grammar and fluency: Are responses grammatically correct?
- Emotional tone and understanding: Can ELIZA simulate empathy or emotional awareness?



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2. Create Testing Scenarios

I designed conversational prompts for various contexts:

- Casual Conversation: "Hi, how are you today?"
- Emotional Inquiry: "I'm feeling sad about losing my job."
- Abstract Thinking: "What do you think happiness means?"
- Technical Query: "Can you explain how computers work?"

Step 4: Conduct Experiments for ELIZA

1. Interact with ELIZA Using Designed Prompts

Chats

```
> Hello, I am Eliza. I'll be your therapist today.  
* Hi, what is your Name?  
> Does that question interest you?  
* Yes, it does interest me  
> Are you sure about that?  
* Yes  
> I see. Let's explore that a bit more.
```

```
> Hello, I am Eliza. I'll be your therapist today.  
* I'm feeling sad about losing my job  
> Do you believe it is normal to be feeling sad about losing your job?  
* yes, I think so  
> But you are not sure you so?  
* I'm sure.  
> Do you enjoy being sure?  
* Yes, I do  
> I see. Let's explore that a bit more.
```

```
> Hello, I am Eliza. I'll be your therapist today.  
* What do you think happiness means?  
> We were discussing you, not me.  
* But I want to ask you what happiness means  
> Oh... Let's move on to something else for a bit. what happiness means?  
* yes  
> Are you sure about that?
```

```
> Hello, I am Eliza. I'll be your therapist today.  
* Can you explain how computers work?  
> Is it that you would like to be able to explain how computers work?  
* yes, but i don't know how they work,  
> Don't you really know how they work?  
* no I don't  
> Why don't you ?  
* Because I'm asking you  
> Do you believe it is normal to be asking me?
```



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Responses recorded from ELIZA based on the provided prompts:

1. Casual Conversation
 - Prompt: "Hi, what is your name?"
 - Response: "Does that question interest you?"
 - Observation: ELIZA avoids direct answers, redirecting the conversation to focus on the user.
2. Emotional Inquiry
 - Prompt: "I'm feeling sad about losing my job."
 - Response: "Do you believe it is normal to be feeling sad about losing your job?"
 - Observation: ELIZA maintains its psychotherapist role, prompting self-reflection without providing specific insights.
3. Abstract Thinking
 - Prompt: "What do you think happiness means?"
 - Response: "We were discussing you, not me."
 - Observation: ELIZA deflects the question, staying within its programmed conversational boundaries.
4. Technical Query
 - Prompt: "Can you explain how computers work?"
 - Response: "Is it that you would like to be able to explain how computers work?"
 - Observation: ELIZA rephrases the question to focus on the user's thoughts, avoiding factual answers.

2. Analyze Performance Against Turing Test Criteria

Criterion	Analysis
Contextual relevance	Responses are somewhat relevant but often redirect or deflect questions.
Response variability	Responses are repetitive and rely heavily on predefined patterns.
Grammar and fluency	Responses are grammatically correct but lack conversational depth.
Emotional tone	Attempts to simulate empathy but struggles to show nuanced understanding.



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3. Observations

- Strengths: ELIZA maintains a consistent style of conversation, prompting user introspection effectively.
- Limitations:
 - No actual understanding of user input.
 - Responses are rigid and lack adaptability to varied topics.
 - Unable to answer factual or abstract questions directly.

Mid-Era

Step 1: Selecting Chatbots

For mid-era chatbots, I am choosing Cleverbot.

Step 2: Historical and Technical Analysis

1. Year and Purpose of Development

- Year: 1997
- Purpose: Created by Rollo Carpenter to simulate human conversation by learning from user interactions.

2. Architecture Used

- Type: Heuristic-based with machine learning.
- Details: Cleverbot stores and analyzes user inputs to generate dynamic responses based on its conversation database.

3. Key Technical Features

- Learning from Users: Improves by expanding its database from interactions.
- Context Sensitivity: Retains short-term conversational context.
- Dynamic Responses: Generates varied replies based on a vast dataset of prior interactions.

4. Applications and Limitations

- Applications: Casual chats, exploring human-AI interaction.
- Limitations:
 - Lacks deep contextual understanding.
 - Inconsistent in longer conversations.
 - May produce inappropriate responses due to reliance on user data.



Step 3: Turing Test Preparation for ELIZA

1. Define Evaluation Criteria

- Contextual relevance: How well does Cleverbot follow the conversation's flow?
- Response variability: Are its replies diverse and engaging?
- Grammar and fluency: Are its responses grammatically correct and natural-sounding?
- Emotional tone and understanding: Does it reflect emotional nuances effectively?

2. Create Testing Scenarios

- Casual Conversation: "Hi, what's your favorite movie?"
- Emotional Inquiry: "I feel sad about losing my job."
- Abstract Thinking: "What do you think happiness means?"
- Technical Query: "How does the internet work?"

Step 4: Conduct Experiments for Cleverbot

1. Interact with Cleverbot Using Designed Prompts

User: Hi, what's your favorite movie?

Cleverbot: I don't have a favorite movie either.

User: Give me a highly rated movie.

Cleverbot: It starts with A then end with N.

User: Give me the name.



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User: I feel sad about losing my job.

Cleverbot: You won't have to if you get elected to congress.

User: But I'm not old enough to run for congress.

Cleverbot: Who would you have voted for then?

User: I'm not old enough to vote.

Cleverbot: If you could vote, who would you vote for.

User: I would abstain from voting.

Cleverbot: What do you do instead of loving?

User: Hating.

Cleverbot: And how is that working out for you.

User: It's working out pretty good.

User: What do you think happiness means?

Cleverbot: Umm don't know you?

User: That is not a response.

Cleverbot: What do you consider a response?

User: Give me a proper response.

Cleverbot: Yes it was. Once again victory is claimed by me.

User: I don't think so.



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1742 people talking

How does the internet work?

I don't know.

Think about it and answer me.

I don't have an awser.

You're dumb.

HEY! I knew you were going to say that  share!

Below are Cleverbot's responses and observations based on the provided prompts:

1. Casual Conversation
 - Prompt: "Hi, what's your favorite movie?"
 - Response: "I don't have a favorite movie either."
 - Follow-up: Cleverbot avoids specific answers and becomes ambiguous ("It starts with A then ends with N").
 - Observation: Responses lack specificity, suggesting limited understanding of the question.
2. Emotional Inquiry
 - Prompt: "I feel sad about losing my job."
 - Response: "You won't have to if you get elected to congress."
 - Observation: Responses are off-topic and lack empathy. Cleverbot struggles with emotional tone and shifts to irrelevant topics (e.g., voting).
3. Abstract Thinking
 - Prompt: "What do you think happiness means?"
 - Response: "Umm don't know you?"
 - Observation: Cleverbot provides nonsensical answers and fails to engage meaningfully with abstract ideas.
4. Technical Query
 - Prompt: "How does the internet work?"
 - Response: "I don't know."
 - Follow-up: Attempts to encourage Cleverbot to elaborate are met with resistance or irrelevant remarks.
 - Observation: Cleverbot lacks the ability to provide factual or technical responses.



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2. Analyze Performance Against Turing Test Criteria

Criterion	Analysis
Contextual relevance	Often strays off-topic and introduces irrelevant questions or statements.
Response variability	Demonstrates variety in responses, but often at the cost of coherence.
Grammar and fluency	Generally grammatically correct, though some responses are disjointed.
Emotional tone	Struggles with empathy and produces nonsensical or inappropriate responses.

3. Observations

- Strengths:
 - Generates grammatically correct responses.
 - Can show humor or randomness, which might engage users.
- Weaknesses:
 - Poor contextual understanding, often leading to irrelevant replies.
 - Inability to handle abstract or emotional queries effectively.
 - Over-reliance on randomness, reducing coherence.



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Step 5: Comparative Analysis Between ELIZA and Cleverbot

1. Conversational Abilities

Aspect	ELIZA	Cleverbot
Contextual relevance	Focuses on mirroring user input with slight rephrasing; responses often feel repetitive and rigid.	Responses are varied but frequently off-topic, showing limited contextual understanding.
Response variability	Highly limited due to script-based responses.	Offers more varied responses, though coherence is often sacrificed.
Grammar and fluency	Grammatically correct but overly simplistic.	Generally correct but sometimes produces disjointed responses.
Emotional tone	Mimics empathy by rephrasing emotional statements, but lacks true understanding.	Fails to demonstrate genuine empathy; often responds humorously or irrelevantly.

2. Key Strengths and Weaknesses

Criteria	ELIZA Strengths	Cleverbot Strengths	ELIZA Weaknesses	Cleverbot Weaknesses
Strengths	Consistent and predictable, focused responses.	Varied and sometimes creative responses.	Responses feel rigid and lack depth.	Frequently off-topic or nonsensical.
Emotional handling	Attempts empathy via rephrasing user input.	Attempts humor or wit in responses.	Cannot truly understand or process emotions.	Often irrelevant or inappropriate for emotional queries.
Adaptability	Adaptable only via script modifications.	Adapts based on a dynamic response database.	Rigid; cannot handle diverse queries well.	Struggles with maintaining conversation coherence.



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Technical or abstract	Not designed for factual responses.	Attempts responses but lacks technical depth.	Avoids answering technical queries.	Limited knowledge; produces vague answers.
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Post Lab Descriptive Questions:

1. **Which of the following best describes Artificial Intelligence?**

- A. A branch of biology that studies neural networks.
- B. The simulation of human intelligence by machines.
- C. The study of physical processes in computers.
- D. Programming games to run on computers.

Answer:

- B. The simulation of human intelligence by machines.

2. **What does the term "machine learning" mean in AI?**

- A. The use of machines to replace humans in industries.
- B. Training machines to perform tasks without explicit programming.
- C. Writing programs with fixed rules.
- D. None of the above.

Answer:

- B. Training machines to perform tasks without explicit programming.

3. **Which of the following is NOT an example of AI?**

- A. Self-driving cars.
- B. Smart virtual assistants like Alexa or Siri.
- C. A simple calculator.
- D. Facial recognition systems.

Answer:

- C. A simple calculator.

Post Lab Descriptive Questions:

1. **Define Artificial Intelligence in terms of human performance.**

- Artificial Intelligence (AI) is the field of computer science focused on developing systems capable of performing tasks that typically require human intelligence. This includes problem-solving, decision-making, understanding natural language, and recognizing patterns.



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2. What is a Turing test?

→ The Turing test, proposed by Alan Turing, is a measure of a machine's ability to exhibit intelligent behavior indistinguishable from that of a human. If a human evaluator interacting with the machine cannot reliably distinguish it from a human, the machine is said to have passed the test.

3. Define an Omniscient agent. Are the intelligent agents Omniscient?

→ An Omniscient agent is one that has complete and perfect knowledge of the environment, including all past, present, and future events. Intelligent agents are not omniscient as they operate with limited information and rely on observations and reasoning to make decisions.

4. What can today's AI systems do?

Today's AI systems can:

- Recognize speech and images.
- Understand and generate human-like text (e.g., chatbots).
- Drive vehicles autonomously.
- Analyze large datasets to extract insights.
- Play games at superhuman levels.
- Assist in medical diagnoses and treatment recommendations.

5. What can today's AI systems cannot do?

Today's AI systems cannot:

- Fully replicate human emotions or consciousness.
- Perform tasks requiring true common sense and understanding of abstract concepts.
- Operate reliably without extensive training and specific data.
- Exhibit creativity beyond predefined rules or data.
- Handle unforeseen situations as effectively as humans.



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6. Design ten questions to pose to a man or a machine that is taking a Turing test.

- What is your favorite book, and why?
- Can you describe your last holiday or weekend experience?
- How would you solve a disagreement between two colleagues?
- What are your thoughts on climate change?
- Can you make up a short story about a magical creature?
- If I ask you to summarize the plot of a recent movie, what would you say?
- What is your opinion on art and its importance in society?
- If I said, "It's raining cats and dogs," what would you understand?
- Tell me a joke and explain why it's funny.
- How do you plan your day when you have multiple tasks to complete?