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**“ANALYZE AND PRESENT THE CONTRIBUTION OF
ALAN TURING TO AI”**

AN GROUP TASK

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Fundamentals of AI and ML**

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Introduction

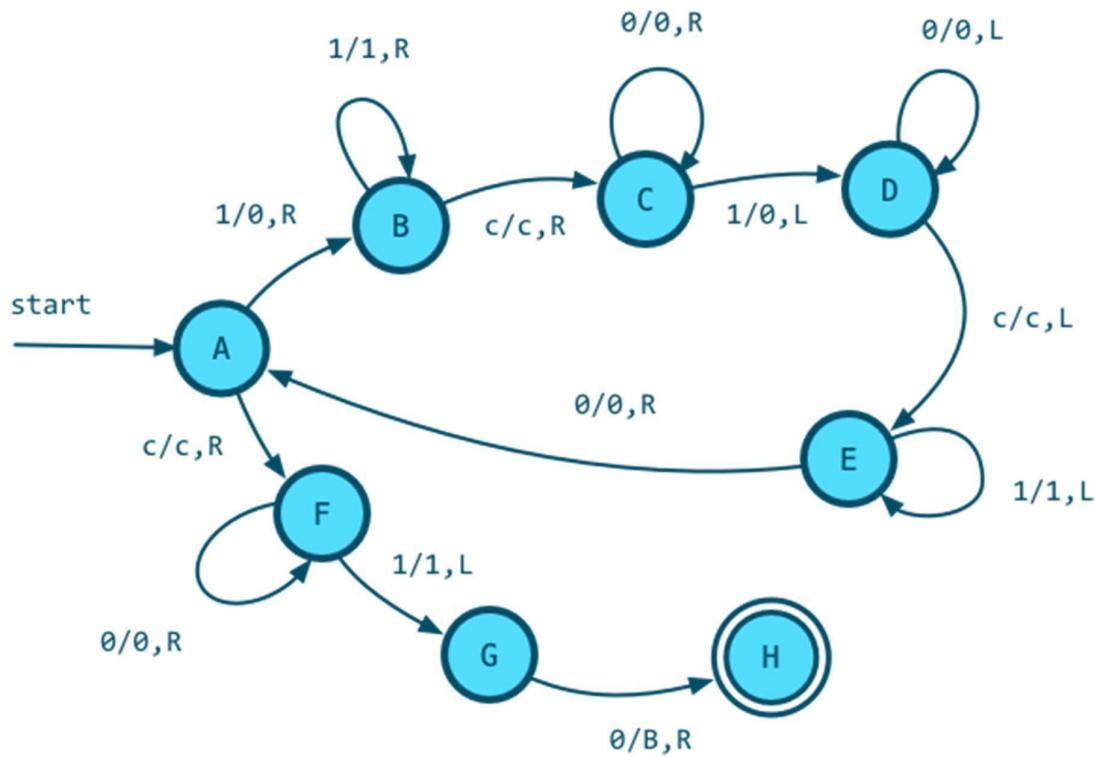
- Alan Turing was a British mathematician, logician, and cryptanalyst.
- He is widely regarded as the father of theoretical computer science and a pioneer of Artificial Intelligence (AI).
- Turing developed the concept of a theoretical computing machine, which became the foundation of modern computers.
- He was one of the first scientists to seriously explore the question: “Can machines think?”
- In 1950, he proposed a practical method to evaluate machine intelligence, now known as the Turing Test.
- His ideas transformed AI from a philosophical concept into a scientific field of study.
- During World War II, he worked at Bletchley Park, where he helped break encrypted German communications.
- His work in cryptography accelerated the development of early computing machines.
- Today, modern AI technologies such as machine learning, natural language processing, and robotics are built upon Turing’s foundational ideas.
- Understanding Turing’s contributions is essential to understanding the origin and growth of Artificial Intelligence.

Historical Background

- In the early 20th century, mathematics and logic were rapidly developing fields.
- Scientists were exploring whether all mathematical problems could be solved using systematic procedures (algorithms).
- At this time, electronic computers did not yet exist.
- Alan Turing studied mathematics at University of Cambridge, where he focused on mathematical logic and computation.
- In 1936, he introduced the concept of the Turing Machine, a theoretical model that defined how machines could perform computations.
- His work provided a solution to the “Entscheidungsproblem” (decision problem), which asked whether a universal method could solve all mathematical questions.
- During World War II, Turing worked at Bletchley Park, the British codebreaking center.

- He played a key role in breaking the codes produced by the German Enigma machine.
- His wartime work accelerated the development of programmable electronic machines.
- These early computational developments later became the foundation for artificial intelligence research.

The Turing Machine (Foundation of AI)

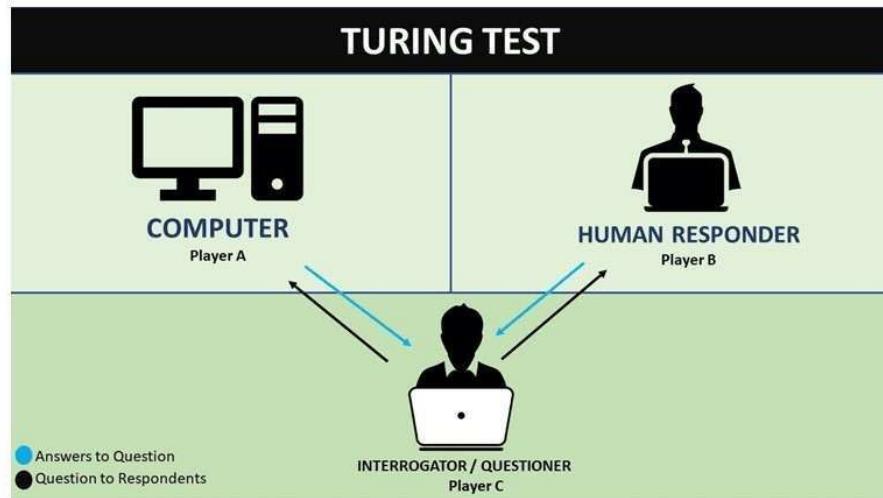


The Turing Test (Major Contribution to AI)

- In 1950, Alan Turing published a research paper titled “Computing Machinery and Intelligence.”
- The paper was published in the philosophy journal Mind.
- In this paper, Turing asked the famous question: “Can machines think?”
- Instead of defining “thinking,” he proposed a practical experiment called the Turing Test.

- The test is also known as the Imitation Game.

How the Turing Test Works



- There are three participants:
 - A human judge (interrogator)
 - A human participant
 - A machine (computer program)
- The judge communicates with both the human and the machine through text messages.
- If the judge cannot reliably distinguish the machine from the human, the machine is said to have passed the test.
- The test measures a machine's ability to imitate intelligent human behavior.

Importance of the Turing Test in AI

- Shifted the focus from “Can machines think?” to “Can machines behave intelligently?”
- Provided a measurable criterion for machine intelligence.
- Influenced research in:
 - Natural Language Processing (NLP)
 - Chatbots
 - Conversational AI
- Sparked philosophical debates about consciousness and intelligence.
- Remains one of the most discussed concepts in Artificial Intelligence today.

Turing and Machine Learning (Early Ideas About Learning Machines)

- Alan Turing envisioned machines that could learn from experience, similar to how humans do.
- In his 1948 report, he proposed the concept of a “child machine”:
 - Start with a simple machine (like a child’s mind) ◦ Train it gradually to learn more complex tasks
- This idea anticipated modern machine learning and artificial neural networks.
- Suggested that machines could improve performance through:
 - Feedback from the environment ◦ Trial-and-error learning
- Predicted the possibility of adaptive and intelligent systems long before the term “AI” existed.
- His work influenced:
 - Early reinforcement learning concepts ◦ Development of AI algorithms ◦ Cognitive modeling and simulation of intelligence

Conclusion

- Alan Turing laid the foundations of computer science and artificial intelligence.
- Introduced the Turing Machine, defining the principles of computation.
- Proposed the Turing Test, providing a practical way to evaluate machine intelligence.
- Envisioned learning machines, anticipating modern machine learning and adaptive AI systems.
- Contributed to WWII codebreaking at Bletchley Park, advancing practical computing technology.
- His ideas continue to influence modern AI research, from natural language processing to robotics.
- Turing’s work transformed AI from a philosophical question into a scientific and engineering discipline.

Key takeaway: Turing's vision and innovations created the intellectual framework that allows machines today to learn, reason, and simulate intelligent behavior.