ARTIFICIAL INTELLIGENCE

BSCS 3

CHRISTIAN SY

Mission Statement

A University for Humanity characterized by productive scholarship, transformative leadership, collaborative service and distinctive character for sustainable societies.

Vision Statement

The Bicol University shall primarily give professional and technical training, and provide advanced and specialized instruction in literature, philosophy, the science and arts, besides providing for the promotion of scientific and technological researches (R.A. 5521, Sec. 3.0).

Quality Policy

Bicol University commits to continually strive for excellence in instruction, research, and extension by meeting the highest level of clientele satisfaction and adhering to quality standards and applicable statutory and regulatory requirements.

COURSE DESCRIPTION

This course will introduce the basic ideas and techniques underlying the design of intelligent computer systems. Specific topics include data analytics, constraint satisfaction problems, and overview of **machine learning, natural language processing**, computer vision.

Credits: 3 units
Prerequisite: 3rd Year Standing

BSCS 3-A (31)
Schedule: MW 4:00 - 5:30 P.M.
Room: CS-02-201 Lecture

BSCS 3-B (31)
Schedule: MW 10:30 - 12:00 A.M.
Room: CS-02-203 Lecture

BSCS 3-C (31)
Schedule: Tue 1:00 - 4:00 P.M.
Room: CS-02-102 Lecture

COURSE TOPICS

1. Introduction to AI
2. Problem Solving using Search
   - ✓ Uninformed/Blind search
   - ✓ Informed/Heuristic Search
3. Game playing/ Adversarial Search
4. Constraint Satisfaction Problems
5. **Machine Learning**
6. **Natural Language Processing**
7. Computer Vision

COURSE REQUIREMENTS

- Passing grade for problem sets/quizzes and major exams
- Participation in class discussion and activities (case studies)
- Submission of properly documented programming projects
  - Data Analytics, Sentiment Analysis, Topic Modeling, Text Classification

GRADING

Midterm Coverage – 50%
Participation and Attendance: 20%
Assignments/Case Study Analysis: 40%
Midterm Exam: 40%

Final Coverage – 50%
Participation and Attendance: 20%
Machine Learning Project: 40%
Final Exam: 40%

COURSE POLICIES

- Academic Integrity
  - Every student is expected to uphold the principles of academic and intellectual honesty.
  - Plagiarism and other forms of cheating are considered to be serious academic offenses.
  - If a student is caught cheating on an exam, he or she will be given zero mark for the exam. If a student is caught cheating twice, the student will be referred to the Office of Student Affairs and Services(OSAS) and be given a failing grade in accordance with the guidelines as stated in the BU Students Handbook.

COURSE POLICIES

- Attendance

  - Attendance is not part of your grade but you are still expected to attend and participate in the classes.

  - According to CHED policy, total number of absences by the students should not be more than 20% of the total number of meetings Students incurring more than 20% the total number of meetings with unexcused absences automatically gets a failing grade regardless of class standing. 4 absences

COURSE POLICIES

- Facebook messenger group chat will be used for sending instant communication to the class

- Google Classroom will be used for posting the learning materials and some activities such as the exams, quizzes, case studies, problem sets and projects

- Enroll in **Artificial Intelligence Google** class using the class code below:

  Block A: wgvpdfy4
  Block B: hlijafof
  Block C: o3uer3q3

WEEK 1

INTRODUCTION TO AI

COURSE OVERVIEW

1. Explore the interdisciplinary foundations of AI.
2. Understand key concepts and goals of AI.
3. Recognize the role of mathematics, science, and logic in AI development.
4. Identify inspirations from human cognition and decision-making.
5. Establish a baseline understanding of AI’s applications and scope.

SPECIFIC LEARNING OUTCOMES

By the end of this week, students should be able to:

1. Explain the basic concept and scope of Artificial Intelligence.
2. Identify major fields contributing to AI development.
3. Describe the main goals and approaches of AI.
4. Recognize real-world applications of AI.

PRE-ACTIVITY: "AI IN MY DAY"

Think of a **way AI might have interacted with you in the past 24 hours** (apps, websites, devices, services).

- ✓ Social media recommendations
- ✓ Voice assistants (Siri, Alexa, Google Assistant)
- ✓ Spam email filtering

WHAT IS ARTIFICIAL INTELLIGENCE?

- John McCarthy, coined the term in 1955

"the science and engineering of making intelligent machines."

intelligent machines="the computational part of the ability to achieve goals in the world"

(McCarthy, 2007)

WHAT IS ARTIFICIAL INTELLIGENCE?

- Artificial Intelligence (AI) is not only focused on studying how human intelligence works (like in psychology or neuroscience), but it also goes further by:
  - Trying to build systems (like robots or programs) that show intelligent behavior.
  - Seeking to understand what it means to be "intelligent"—not just for humans, but for machines or other entities.
- In short: AI is both a science of understanding intelligence and an engineering field that builds intelligent systems.

WHAT IS ARTIFICIAL INTELLIGENCE?

- AI still has openings for new full-time ‘Einsteins’
- This is a metaphorical way of saying that:
  - AI is still an emerging and evolving field, with many unsolved problems.
  - It needs more brilliant minds (like Einstein was in physics) to contribute innovative ideas, theories, and technologies.
  - Students, researchers, and developers can still make major contributions and discoveries in AI.
- In Short: There's still room in AI for groundbreaking thinkers and pioneers.

WHAT IS ARTIFICIAL INTELLIGENCE?

- AI is a universal field
- Applies across all disciplines and industries — from healthcare, education, finance, and agriculture to arts, law, and space exploration.
- Is not limited to computer science alone; it involves math, logic, psychology, linguistics, neuroscience, philosophy, and ethics.
- Impacts society globally, making it relevant to almost everyone.
- In Short: AI is interdisciplinary and globally relevant.

ARTIFICIAL INTELLIGENCE VS INTELLIGENT SYSTEMS

- While often used interchangeably, Artificial Intelligence and Intelligent Systems are related but distinct concepts.

Aspect	Artificial Intelligence (AI)	Intelligent Systems
Definition	A broad field of study focused on creating machines or software that can simulate human intelligence.	Systems (hardware or software) that use AI techniques to **perceive**, **reason**, **learn**, and **act** intelligently.
Scope	Theoretical and practical aspects of machine intelligence (e.g., algorithms, logic, reasoning, learning).	Practical **applications** or systems that use AI to function autonomously or assistive.
Focus	Developing **methods and models** to simulate thinking, learning, problem-solving, and perception.	Building **real-world systems** that use those AI methods to solve specific problems.

In Simple Terms:

•**AI** is like the brain — it's the **intelligence**.

•**Intelligent Systems** are like the body — they **use that intelligence** to interact with the world.

EXAMPLES OF ARTIFICIAL INTELLIGENCE (AI)

AI Category	Example	Description
Machine Learning	Decision Trees, Support Vector Machines, Neural Networks	Algorithms that learn patterns from data to make predictions or decisions
Natural Language Processing (NLP)	ChatGPT, BERT, Google Translate	Enables machines to understand, interpret, and generate human language
Computer Vision	YOLO (You Only Look Once), OpenCV, ImageNet classifiers	Allows machines to interpret and process visual information (images, video)
Expert Systems	MYCIN, DENDRAL	Rule-based systems that mimic human expert decision-making
Reinforcement Learning	AlphaGo, Deep Q-Networks	Systems learn optimal behavior through trial and error
Knowledge Representation	Ontologies, Semantic Networks	Methods to represent facts about the world in a machine-readable way
Robotics AI	Path-planning algorithms, SLAM (Simultaneous Localization and Mapping)	Helps robots understand and navigate their environment

EXAMPLES OF INTELLIGENT SYSTEMS

Intelligent System	Description	Uses AI To...
Self-Driving Cars (e.g., Tesla Autopilot, Waymo)	Navigates roads, avoids obstacles, makes driving decisions	Use vision, planning, and decision-making AI
Virtual Assistants (e.g., Siri, Alexa, Google Assistant)	Responds to voice commands, answers questions	Use NLP, speech recognition, and knowledge bases
Smart Home Devices (e.g., Nest Thermostat, Ring Camera)	Automatically adjusts temperature, detects motion	Use AI to learn user habits and optimize performance
Healthcare Diagnostic Tools (e.g., IBM Watson Health)	Assists doctors in diagnosing diseases	Use expert systems and machine learning
Facial Recognition Systems (e.g., Face ID, airport security)	Identifies individuals from images or video	Use computer vision and pattern recognition
Chatbots (e.g., customer service bots)	Interact with users and provide automated responses	Use NLP and machine learning
Predictive Maintenance Systems	Predict when machines or equipment will fail	Use machine learning to analyze sensor data

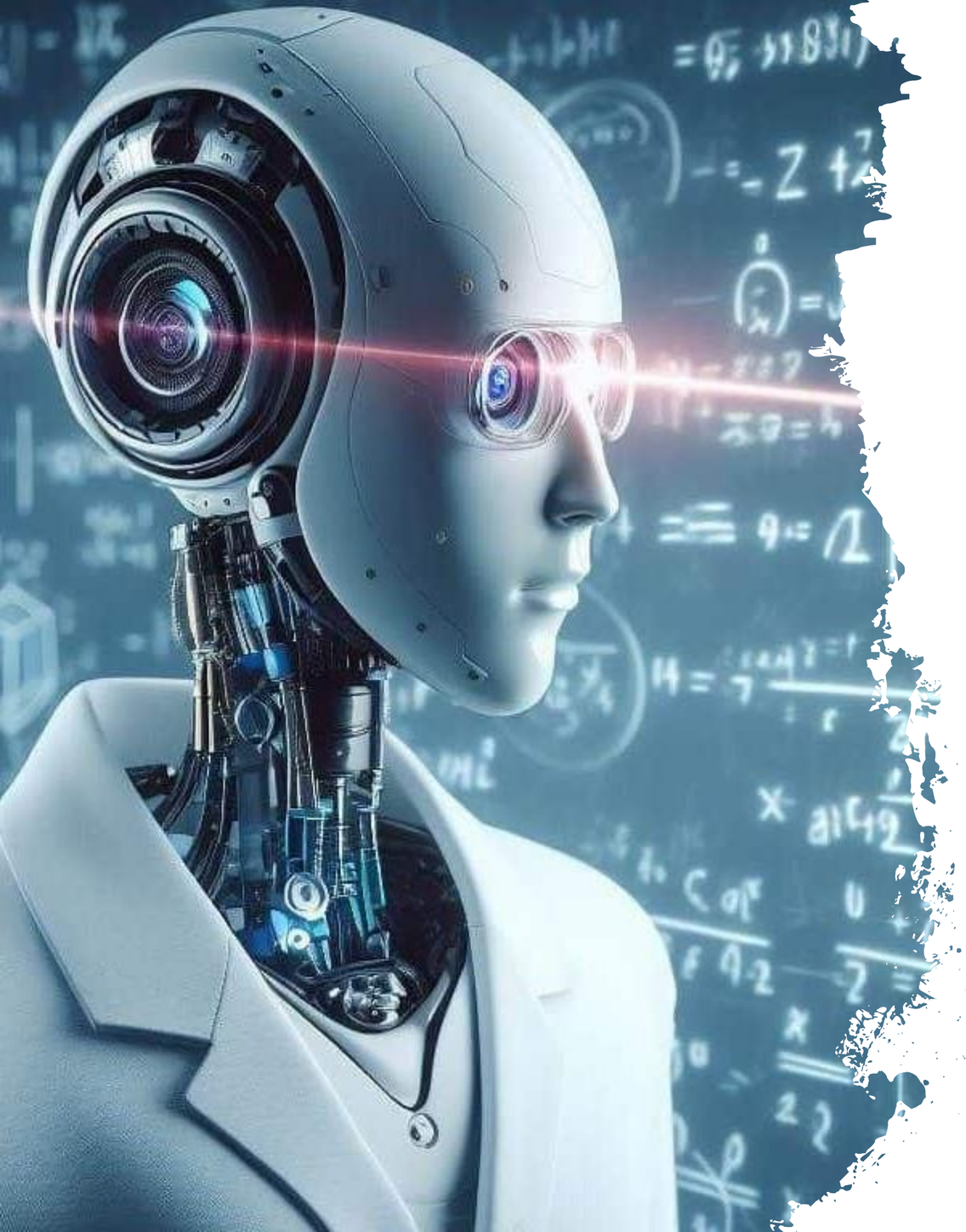
Philosophy

Key Contributions:

- **Logic and Reasoning**: Philosophers like Aristotle developed formal rules of logic, which influence how machines can reason.
- **Mind and Consciousness**: Concepts of what it means to "think" and be "intelligent" guide AI in modeling human-like reasoning.

Examples:

- Turing Test (Alan Turing) – to evaluate machine intelligence
- Logic-based AI systems



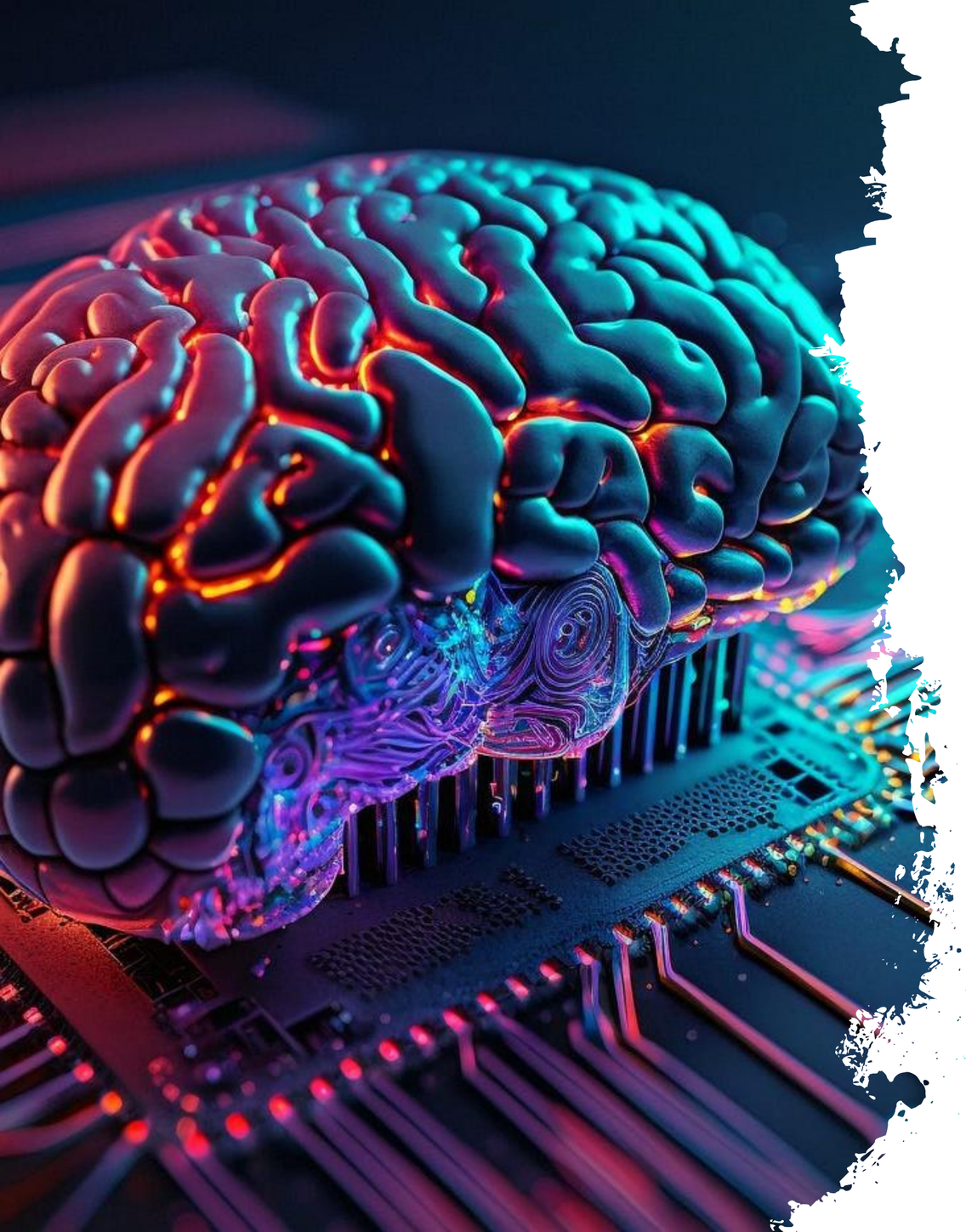
Mathematics

Key Contributions:

- **Probability & Statistics**: For decision-making under uncertainty
- **Linear Algebra & Calculus**: Core to machine learning and deep learning
- **Set Theory & Graph Theory**: Used in knowledge representation and problem-solving. Categorizing and Mapping

Examples:

- Bayesian Networks
- Support Vector Machines
- Optimization in neural networks



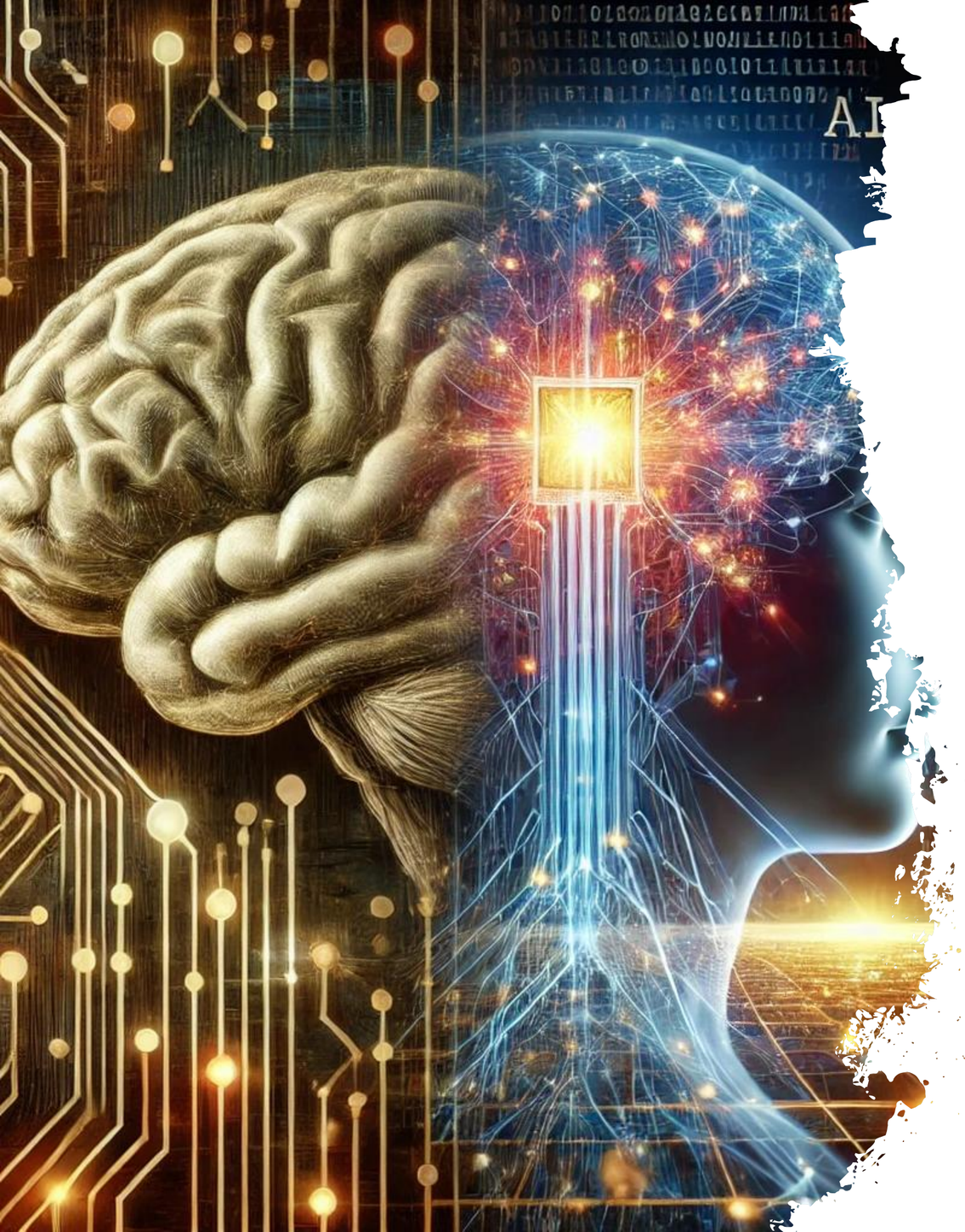
Computer Science

Key Contributions:

- **Algorithms & Data Structures**: Fundamental for building AI programs
- **Computational Complexity**: Understand the limits of what AI can solve efficiently
- **Software Engineering**: Development of reliable and scalable AI systems

Examples:

- Search algorithms (A*)
- Machine learning pipelines



Psychology & Cognitive Science

Key Contributions:

- **Modeling Human Thought**: Understanding how humans learn and solve problems
- **Behavioral Models**: Helps design AI that interacts naturally with humans

Examples:

- Neural networks inspired by the brain

Neuroscience

Key Contributions:

- Understanding brain structure and function
- Inspiration for **artificial neural networks**

Examples:

- Deep learning mimics layered processing in the brain

Linguistics

Key Contributions:

- Understanding language structure, syntax, and semantics
- Helps machines understand, interpret, and generate human language

Examples:

- Natural Language Processing (NLP)
- Speech recognition and generation

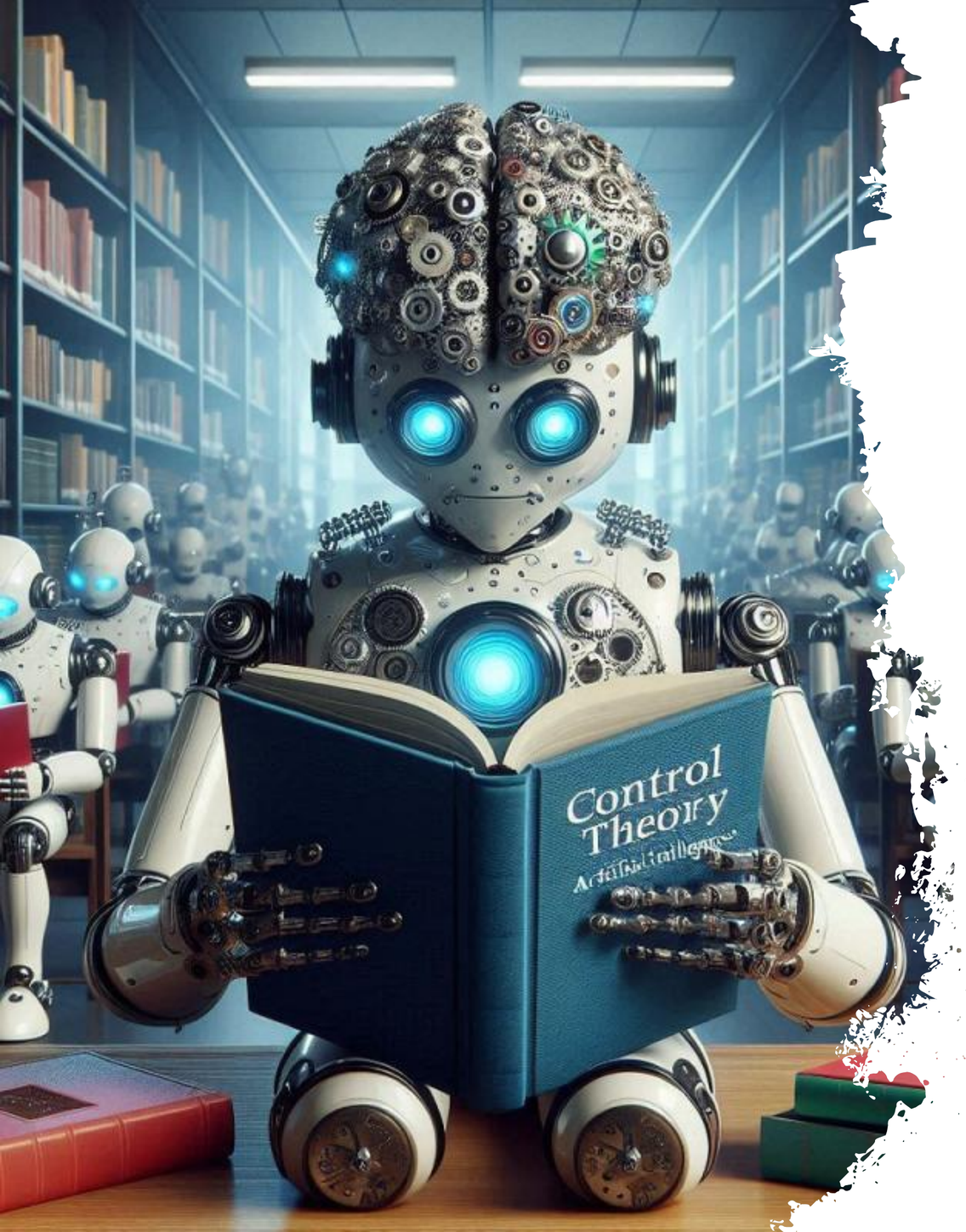
Economics & Game Theory

Key Contributions:

- **Decision Theory**: How rational agents make choices
- **Game Theory**: Multi-agent interactions and strategic reasoning. Chess
- **Utility & Reward Systems**: Core to reinforcement learning. Reward System

Examples:

- AI in autonomous agents and competitive environments
- Bidding agents in online auctions
- Traffic Routing and Ride sharing Optimization



Control Theory & Robotics

Key Contributions:

- **Feedback Systems**: Maintain stability and control in dynamic environments
- **Motion Planning & Sensors**: For robots and autonomous machines

Examples:

- Self-driving cars maintaining safe distances
- Robotic arms adjusting to changing loads

WHAT IS ARTIFICIAL INTELLIGENCE?

Two Dimensions for Defining AI

- ✓ **Reasoning vs. Action** → *Do we care about thinking like a human or just doing the task well?*
- ✓ **Human Standards vs. Rationality** → *Are we aiming for human-like results or the ideal logically optimal results?*

WHAT IS ARTIFICIAL INTELLIGENCE?

Two Dimensions for Defining AI

- ✓ **Reasoning vs. Action** → *Do we care about thinking like a human or just doing the task well?*

Thought Processes/Reasoning: Focus on *how* the system thinks — does it reason, plan, and process information like a human mind?

Example: Cognitive modeling, where AI tries to replicate human thought patterns step by step.

Behavior/Action: Focus on *what* the system does — does it behave in a way that seems intelligent, regardless of how it thinks internally?

Example: A chess-playing program that wins games might use methods very different from a human's, but still achieves intelligent behavior.

WHAT IS ARTIFICIAL INTELLIGENCE?

Two Dimensions for Defining AI

- ✓ **Human Standards vs. Rationality** → *Are we aiming for human-like results or the ideal logically optimal results?*

Success According to Human Standards: The AI's intelligence is measured by how well it mimics human performance.

Example: Passing the **Turing Test** — convincing a human that the AI is also human.

Success According to Rationality: The AI is judged by how well it achieves logically correct or optimal results, regardless of whether the reasoning is human-like.

Example: An algorithm that finds the mathematically shortest path between two points, even if humans wouldn't think that way.

FOUR APPROACHES TO DEFINING AI (RUSSELL & NORVIG'S FRAMEWORK)

Thinking/Reasoning	Behavior/Action
Thinking Rationally – Using logic and rules to reason correctly (e.g., Aristotle's syllogisms, knowledge-based systems)	**Acting Rationally** – Rational agents that act to achieve the best outcome given the information available
Thinking Humanly – Cognitive modeling of human thought (e.g., understanding how humans solve math problems)	**Acting Humanly** – Passing the Turing Test by behaving like a human

"Rationally" by reasonable or logical means

WHAT IS ARTIFICIAL INTELLIGENCE?

Thinking Rationally focuses on **logic-based reasoning** rather than human imitation.

"Thinking Rationally" means designing systems that **reason using the laws of logic** to arrive at conclusions that are **guaranteed to be correct** (if the premises are correct).

- ✓ The emphasis is on **valid reasoning** — making conclusions that follow logically from given facts.
- ✓ Inspired by philosophers and mathematicians like **Aristotle** who studied **syllogisms** (formal rules of inference).

Analogy: Choosing the best route to work by weighing traffic reports, distance, and weather—making a decision based on logic and data rather than habit.

"THINKING RATIONALLY"

Goal

To create AI that can:

- ✓ Represent knowledge formally (symbols, facts, rules)
- ✓ Use inference mechanisms to deduce new facts
- ✓ Solve problems by applying logical reasoning

Key Concepts

- ✓ **Knowledge Representation**: Encoding facts about the world in a way a computer can reason about them.
- ✓ **Logic**: Using propositional or first-order logic to draw conclusions.
- ✓ **Inference Engines**: Software that applies rules of logic to known facts to produce new facts.

"THINKING RATIONALLY"

Example

Syllogism Example (Aristotle):

1. All humans are mortal.
2. Socrates is a human.

   ∴ **Socrates is mortal.**

A “thinking rationally” AI system would:

✓ Encode these statements into logical form

✓ Use inference rules to deduce the conclusion

Applications

- ✓ **Expert systems** (e.g., MYCIN for medical diagnosis)
- ✓ **Automated theorem proving**
- ✓ **Knowledge-based planning systems**
- ✓ **Legal reasoning AI** (rule-based legal advisors)

WHAT IS ARTIFICIAL INTELLIGENCE?

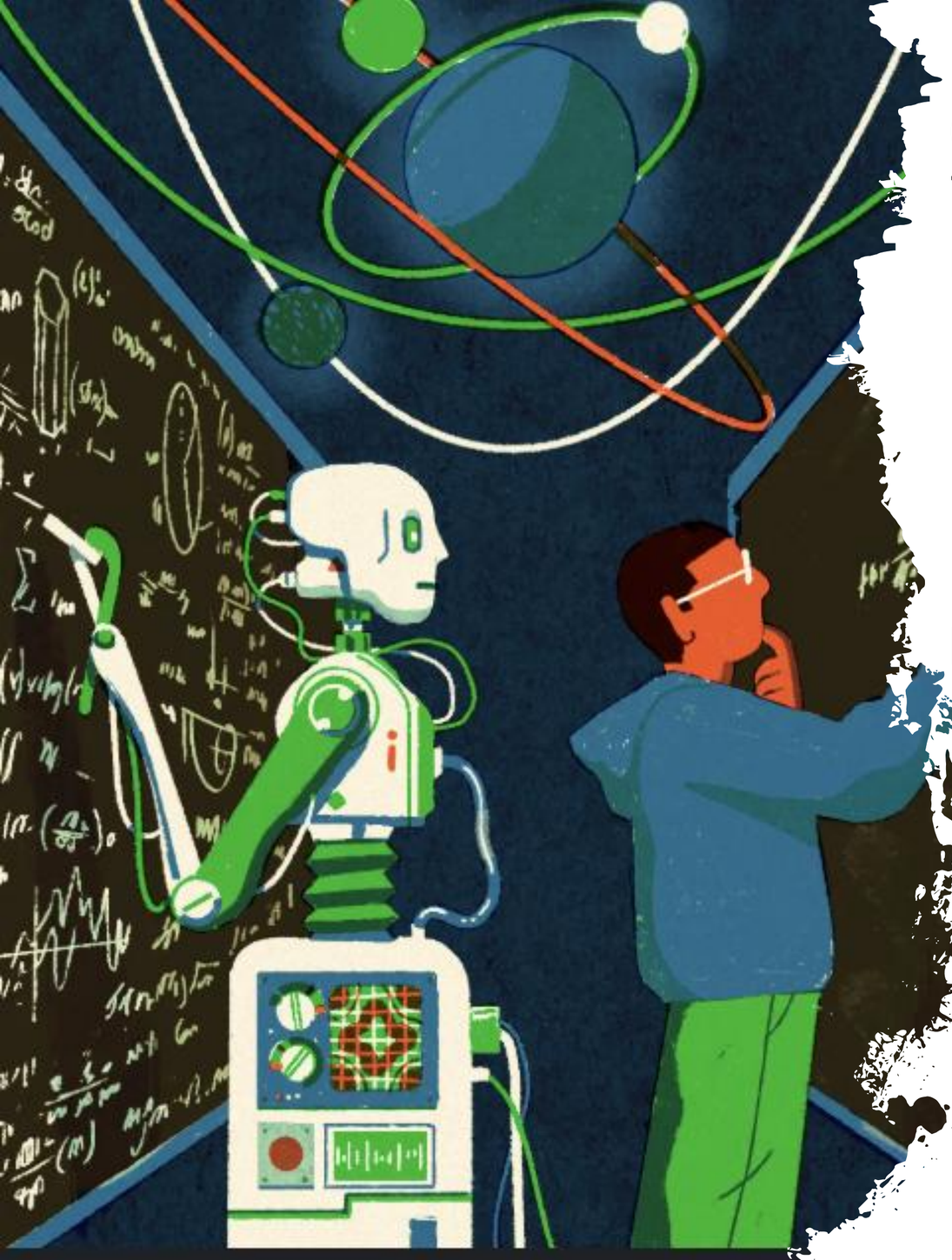
"Thinking Rationally" is about **ideal, logical reasoning** — building AI that thinks in a way that is **consistent, provable, and mathematically sound**, inspired by the formal rules of logic.

WHAT IS ARTIFICIAL INTELLIGENCE?

Thinking Humanly focuses not just on producing correct answers but on mimicking the way human reasons, learns, and solve problems.

"Thinking Humanly" means designing systems that **models and replicates human thought processes**.

Analogy: Customer service chatbots that remember past interactions and respond with empathy (“I’m sorry you experienced that issue; let’s fix it together”) rather than just giving factual answers.



"THINKING HUMANLY"

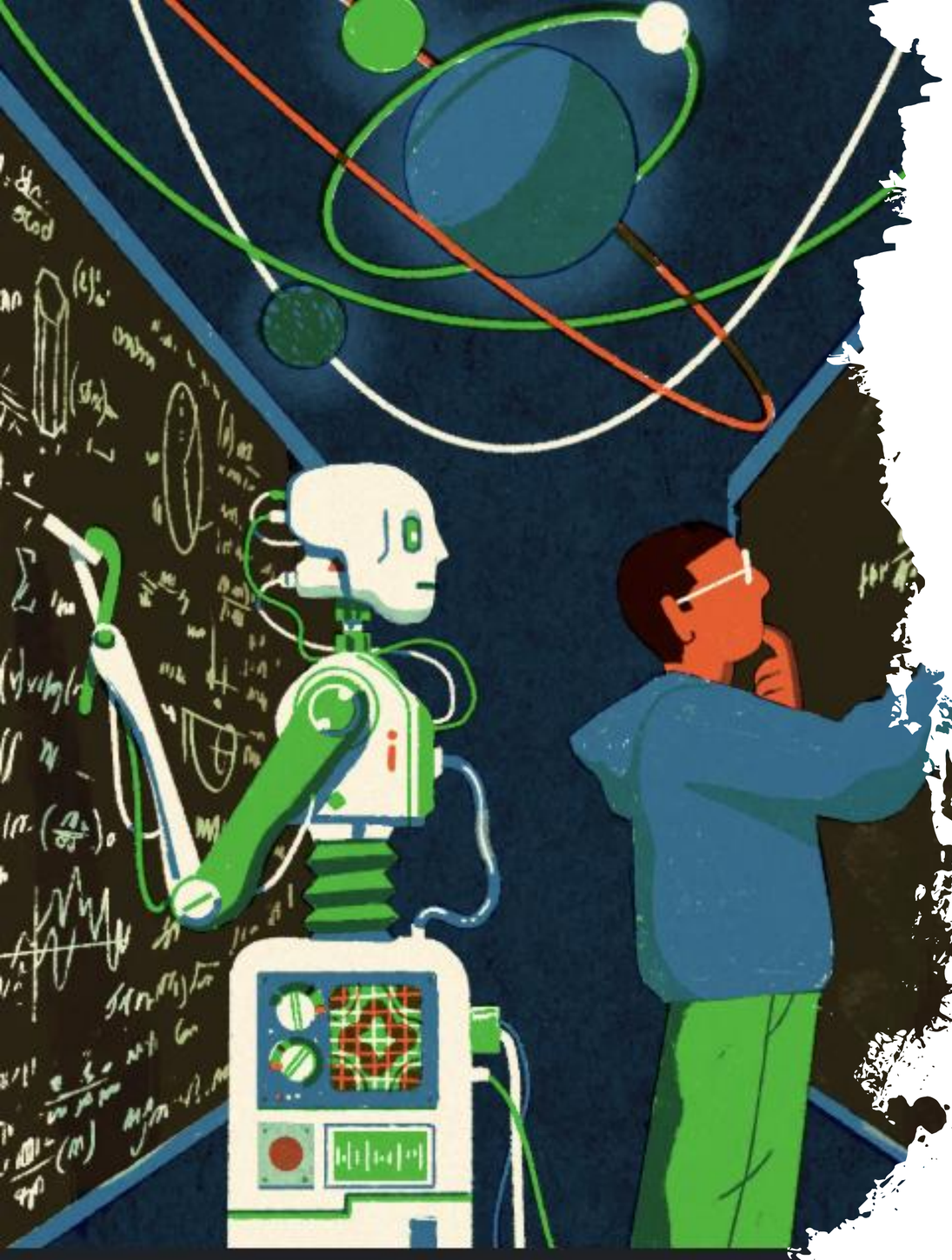
Goal

To understand how humans think and then create machines that can:

- ✓ Perceive the environment as humans do
- ✓ Process information in ways similar to human cognition
- ✓ Make decisions based on reasoning patterns observed in humans

Key Concepts

- ✓ **Cognitive Modeling:** AI aims to replicate how humans think by studying mental processes through psychology, neuroscience, and linguistics.
- ✓ **Human-Like Learning & Problem-Solving**: Systems learn, reason, and solve problems in ways similar to human thinking patterns.
- ✓ **Experimental Validation**: AI models are tested by comparing their reasoning steps with actual human thought processes.



"THINKING RATIONALLY"

Example

If you give a math problem to both a human and an AI, a "**thinking like humans**" approach would aim for the AI to:

- ✓ Break the problem into smaller parts like a human
- ✓ Possibly make the same intermediate mistakes
- ✓ Arrive at the solution through a human-like reasoning path—not just jump to the correct answer instantly using brute-force computation.

Applications

- ✓ Cognitive architectures like ACT-R or SOAR that simulate human problem-solving.
- ✓ Speech-based tutoring systems that adapt to the learner's style, as a human tutor would.
- ✓ Cognitive robots that can interpret and respond in human-like ways.
- ✓ AI that can learn by observation and imitation (similar to how humans learn).

WHAT IS ARTIFICIAL INTELLIGENCE?

“Systems that think like humans” are **AI models inspired by human cognitive processes**, aiming to replicate *how* we think, not just *what* we do.

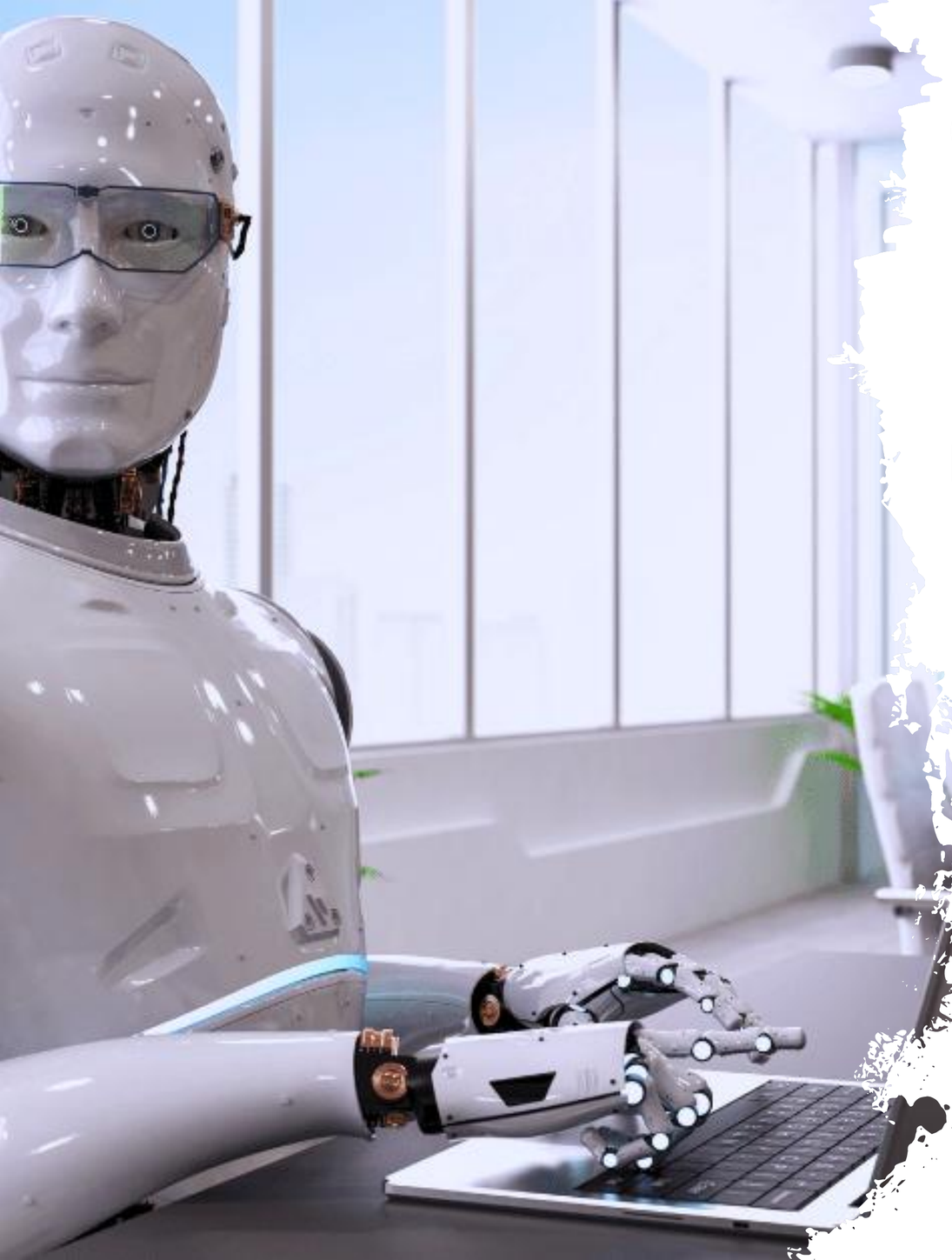
WHAT IS ARTIFICIAL INTELLIGENCE?

Acting Rationally focuses on building systems—called rational agents—that choose the best possible actions to achieve their goals, based on available knowledge and constraints.

Key ideas:

- ✓ **Goal-Oriented Behavior** – The agent acts to maximize success in achieving its objectives.
- ✓ **Decision-Making with Limited Information** – Uses the best action possible given what it knows at the time.
- ✓ **Adaptability** – Adjusts actions when new information or changes in the environment occur.

Analogy: It's like a GPS navigation system — it doesn't care about scenery or small talk, it simply calculates the most efficient route to get you to your destination based on logic, data, and optimal decision-making.



"ACTING RATIONALLY"

Goal

- ✓ To design intelligent agents that select and execute actions that maximize the likelihood of achieving specific objectives, given their knowledge and environmental constraints.

Key Concepts

- ✓ Rational Agent – An entity that acts to achieve the best outcome (or the best expected outcome) in a given situation.
- ✓ Perception–Action Cycle – Agents perceive their environment, process the information, and act accordingly.
- ✓ Performance Measure – A metric to evaluate how successfully an agent meets its goals.
- ✓ Autonomy – Ability to operate and make decisions independently, with minimal human intervention.
- ✓ Adaptability – The capability to modify behavior based on new experiences or environmental changes.

"ACTING RATIONALLY"

Example

- ✓ Self-driving cars choosing the safest and fastest route.
- ✓ Autonomous drones delivering packages while avoiding obstacles.
- ✓ Stock trading bots making buy/sell decisions based on market conditions.
- ✓ Robotic vacuum cleaners adjusting cleaning paths based on room layout.

Applications

- ✓ Transportation – Autonomous vehicles and traffic management systems.
- ✓ Healthcare – AI-driven surgical robots, patient monitoring systems.
- ✓ Business & Finance – Automated investment strategies, fraud detection systems.
- ✓ Military & Defense – Autonomous surveillance and reconnaissance robots.
- ✓ Home Automation – Smart assistants and household robots that optimize daily tasks.

WHAT IS ARTIFICIAL INTELLIGENCE?

“**Acting Rationally**” refers to AI systems designed to make the best possible decisions to achieve specific goals, focusing on optimal actions and outcomes rather than mimicking human thought processes.

WHAT IS ARTIFICIAL INTELLIGENCE?

Acting Humanly focuses on creating AI systems that behave in ways indistinguishable from humans, often evaluated through interaction and observable behavior rather than internal reasoning processes.

Key ideas:

- ✓ Mimics human actions, communication, and responses
- ✓ Evaluated by the Turing Test (language, reasoning, learning, perception)
- ✓ May use machine learning, natural language processing, and perception systems

Analogy: It's like a **tour guide robot** in a museum — it doesn't just give you the shortest or most efficient explanation (acting rationally), but also **tells stories, makes jokes, and adjusts its tone** like a friendly human guide would, making the experience warm and relatable.

"ACTING HUMANLY"

Goal

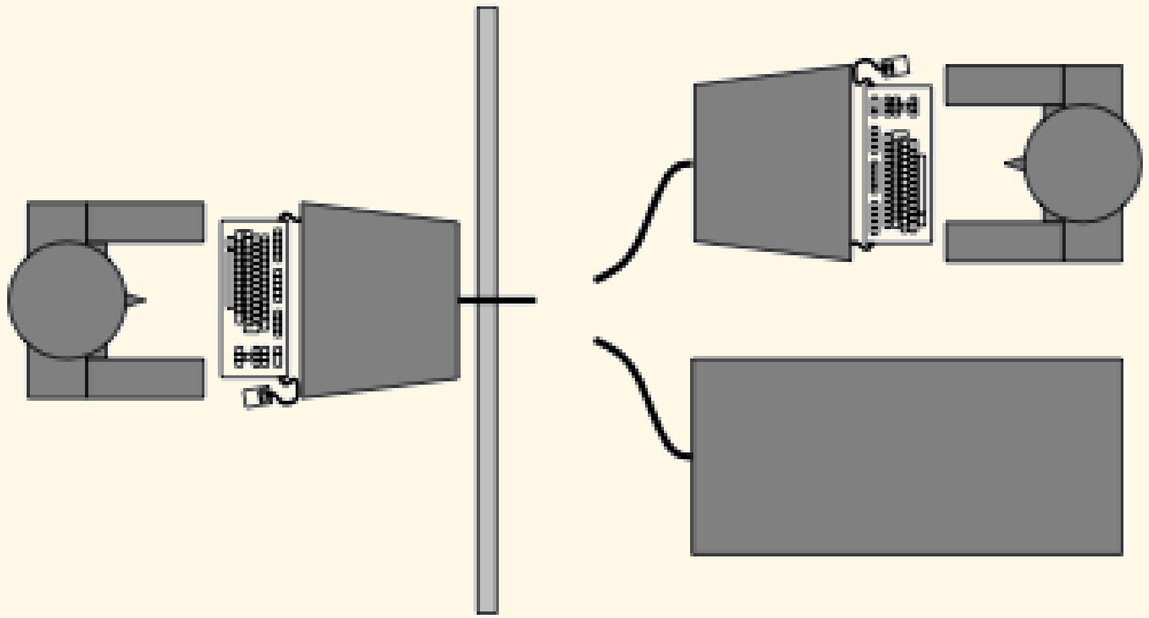
- ✓ To design AI systems that exhibit human-like behavior, making their actions and interactions indistinguishable from those of a real person.

Key Concepts

- ✓ Turing Test as a benchmark for human-like performance
- ✓ Natural Language Processing (NLP) for communication
- ✓ Knowledge Representation to store and use information
- ✓ Automated Reasoning for problem-solving
- ✓ Machine Learning to adapt and improve behavior
- ✓ Perception (e.g., vision, speech recognition) to sense and respond to the environment

SYSTEMS THAT ACT LIKE HUMANS

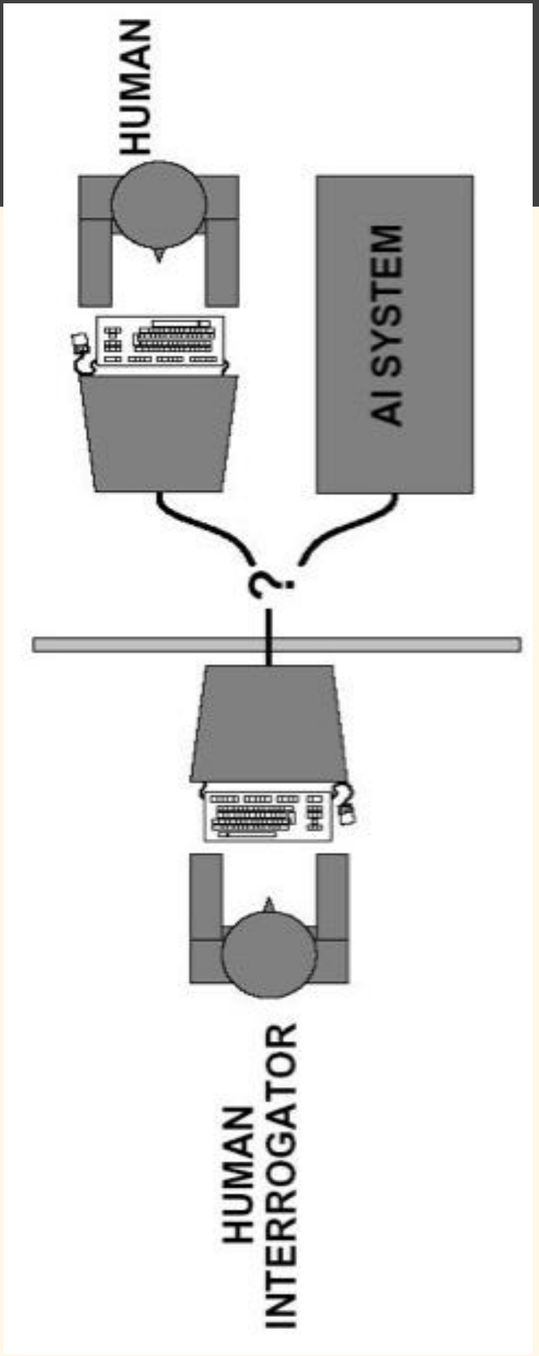
When does a system behave intelligently?
Turing (1950) Computing Machinery and Intelligence
Operational test of intelligence: imitation game



SYSTEMS THAT ACT LIKE HUMANS

The Turing Test

- ✓ The computer passes the test if a human interrogator, after posing some questions, cannot tell whether the written responses come from a person or not .



“ACTING HUMANLY"

Example

- ✓ Chatbots like ChatGPT or customer service bots
- ✓ Social robots such as Sophia
- ✓ Virtual assistants like Siri, Alexa, or Google Assistant

Applications

- ✓ Customer service and support automation
- ✓ Human–robot interaction in healthcare and education
- ✓ Entertainment (NPCs in games, virtual companions)Personal digital assistants

WHAT IS ARTIFICIAL INTELLIGENCE?

"**Acting Humanly**" refers to AI systems designed to perform tasks and communicate in ways that humans naturally recognize, with the goal of making machine behavior indistinguishable from human behavior.

WHAT IS ARTIFICIAL INTELLIGENCE?

1. **Systems that think like humans** – AI models inspired by human cognitive processes, aiming to replicate *how* we think, not just what we do.
2. **Systems that think rationally** – AI designed to reason logically, using rules and inference to reach conclusions that are always logically correct.
3. **Systems that act like humans** – AI built to imitate human behavior and interactions, often evaluated using the **Turing Test**.
4. **Systems that act rationally** – AI agents that make the best possible decisions to achieve goals, given the available information and constraints.

HOLY GRAIL OF AI

WHAT IS ARTIFICIAL INTELLIGENCE?

- **A.I.** is the ability of a machine to display human-like capabilities such as **reasoning**, **learning**, **planning** and **creativity**.

TYPES OF AI BASED ON ABILITY ARE GENERALLY CLASSIFIED INTO THREE MAIN CATEGORIES:

Artificial Narrow Intelligence (ANI) – *Weak AI*

- **Focus:** Performs specific tasks efficiently but cannot generalize beyond its training.
- **Examples:** Siri, Google Translate, recommendation systems.
- **Key Point:** Most AI in existence today is ANI—it's smart in one thing, clueless in others.

Artificial General Intelligence (AGI) – *Strong AI*

- **Focus:** Matches human-level intelligence; can understand, learn, and apply knowledge across domains.
- **Examples:** Currently theoretical; would be able to solve problems in any field without retraining.
- **Key Point:** AGI is the "holy grail" of AI research—promising but still theoretical.

Artificial Superintelligence (ASI)

- **Focus:** Surpasses human intelligence in all areas, including creativity, decision-making, and emotional understanding.
- **Examples:** Hypothetical future AI—often discussed in ethics and sci-fi contexts.
- **Key Point:** ASI raises serious ethical and safety concerns; researchers stress the need for control mechanisms before achieving it.

FOUNDATIONS OF AI'S LEARNING CAPABILITIES

- Learning is one of the most critical foundations of Artificial Intelligence, as it allows systems to improve their performance over time based on data, experience, and interaction with their environment.
- In AI, **learning** refers to the process where algorithms adjust and optimize their models to make better decisions or predictions without being explicitly programmed for every situation.

FOCUS AND ELEMENTS OF AI LEARNING

The focus of AI learning capabilities is to enable machines to:

- ✓ **Adapt** to new situations.
- ✓ **Improve accuracy** through feedback.
- ✓ **Recognize patterns** in data.
- ✓ **Predict future outcomes** based on past experiences.

General (Strong) AI

Elements

- **Data** – The foundation for training AI models.
- **Algorithms** – The methods that process and learn from data.
- **Feedback** – Corrective signals to refine performance.
- **Generalization** – Applying learned knowledge to unseen data.

EXAMPLES

- ✓ **Recommendation Systems** (Netflix suggesting shows based on viewing history)
- ✓ **Speech Recognition** (Siri improving voice understanding)
- ✓ **Fraud Detection** (banking AI learning new fraud patterns)
- ✓ **Predictive Maintenance** (AI predicting when a machine will fail)

General (Strong) AI

REAL WORLD AI APPLICATIONS

Healthcare

- ✓ **Medical Diagnosis** – AI models (e.g., IBM Watson Health) analyze medical images, lab results, and patient histories to detect diseases like cancer or pneumonia.
- ✓ **Drug Discovery** – AI speeds up the identification of potential compounds and predicts their effectiveness.
- ✓ **Personalized Treatment** – Systems recommend customized treatment plans based on patient data.
- ✓ **Example Tools:** Google DeepMind's AlphaFold, PathAI, Babylon Health.
- ✓ **Impact:** Faster diagnosis, reduced errors, and improved patient outcomes.

REAL WORLD AI APPLICATIONS

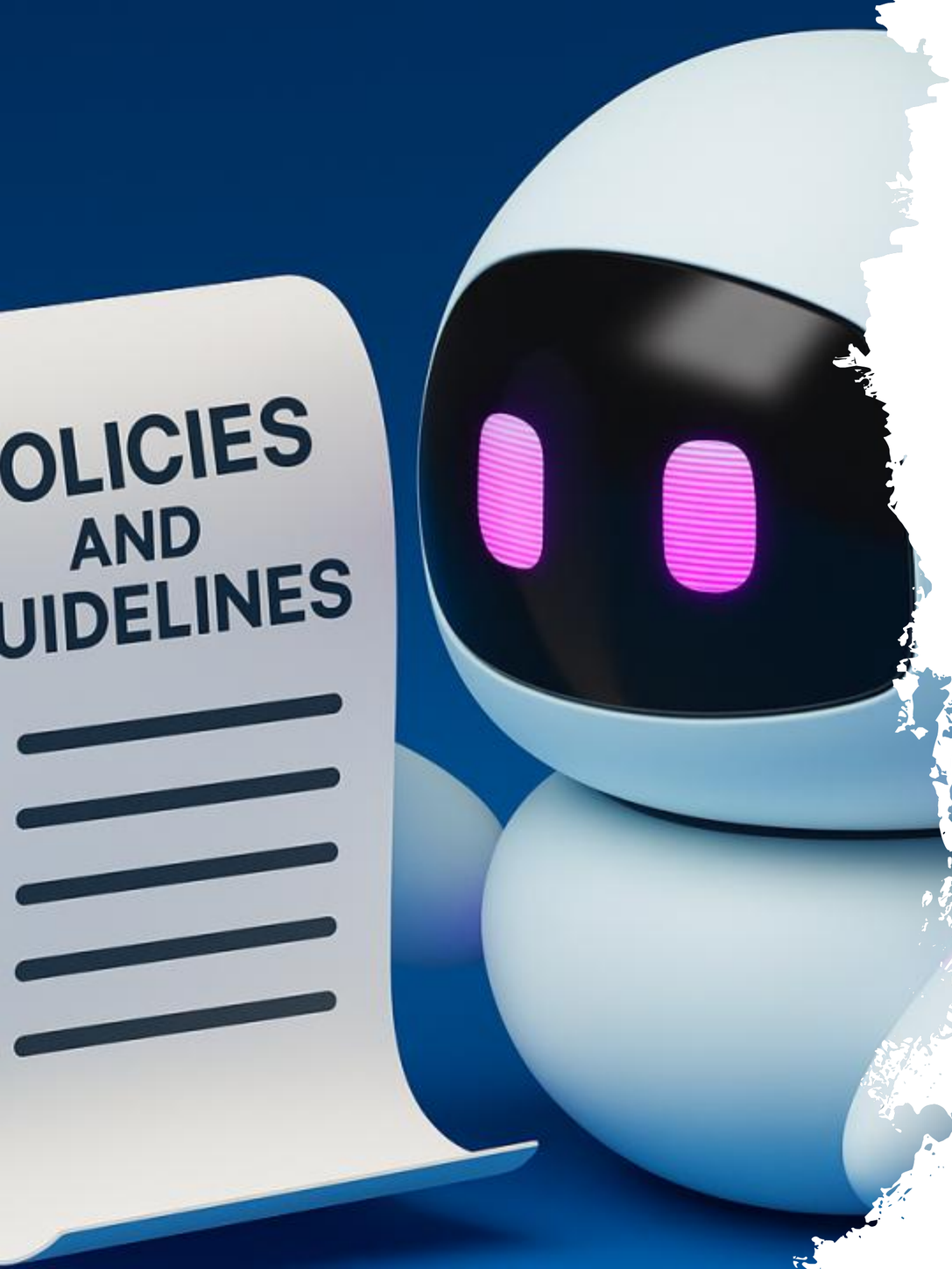
Transportation

- ✓ **Self-Driving Cars** – Autonomous vehicles (Tesla Autopilot, Waymo) use AI for perception, decision-making, and navigation.
- ✓ **Traffic Prediction & Management** – AI predicts congestion and optimizes traffic light timing.
- ✓ **Example Tools:** NVIDIA Drive, Google Maps AI.
- ✓ **Impact:** Reduced accidents, improved traffic flow, and enhanced commuter safety.

REAL WORLD AI APPLICATIONS

Finance

- ✓ **Fraud Detection –** AI detects suspicious transactions using anomaly detection algorithms.
- ✓ **Algorithmic Trading –** AI predicts market trends and executes trades at high speed.
- ✓ **Credit Scoring –** AI evaluates creditworthiness using alternative data.
- ✓ **Example Tools:** ZestFinance, Kabbage, Mastercard Decision Intelligence.
- ✓ **Impact:** Reduced financial fraud, better lending decisions, and improved investment strategies.



REAL WORLD AI APPLICATIONS

Customer Service

- ✓ **Chatbots & Virtual Assistants –** AI answers customer queries 24/7 (e.g., ChatGPT-powered bots, Siri, Alexa).
- ✓ **Sentiment Analysis –** AI gauges customer mood from interactions to improve service.
- ✓ **Example Tools:** Zendesk AI, LivePerson, IBM Watson Assistant.
- ✓ **Impact:** Faster service, higher customer satisfaction, cost savings.

REAL WORLD AI APPLICATIONS

Manufacturing

- ✓ **Predictive Maintenance –** AI predicts when machines will fail to prevent downtime.
- ✓ **Quality Control –** AI inspects products using computer vision.
- ✓ **Example Tools:** Siemens MindSphere, GE Predix.
- ✓ **Impact:** Increased efficiency, reduced waste, and lower operational costs.

REAL WORLD AI APPLICATIONS

Education

- ✓ **Personalized Learning –** AI tailors lessons to students' learning styles and pace.
- ✓ **Automated Grading –** AI grades assignments and provides feedback.
- ✓ **Example Tools:** Coursera AI, Duolingo, Content Technologies.
- ✓ **Impact:** Better learning experiences, reduced teacher workload.

REAL WORLD AI APPLICATIONS

Security & Surveillance

- ✓ **Facial Recognition –** AI identifies individuals in real-time for security purposes.
- ✓ **Anomaly Detection –** AI flags unusual activity in security footage.
- ✓ **Example Tools:** Clearview AI, Hikvision AI.
- ✓ **Impact:** Enhanced safety, crime prevention, and faster response.

REAL WORLD AI APPLICATIONS

Entertainment & Media

- ✓ **Content Recommendations** – Netflix, YouTube, and Spotify use AI to suggest content.
- ✓ **Content Creation –** AI writes scripts, composes music, and generates art.
- ✓ **Example Tools:** OpenAI's DALL·E, Jukebox, Runway ML.
- ✓ **Impact:** More engaging experiences, personalized media.

POST ACTIVITY - "AI IN MY DAILY LIFE – MINI REFLECTION"

1. List **three (3) examples** of how you interact (directly or indirectly) with AI in your daily life.
2. For each example:
   - ✓ Identify the **type of AI based on ability**.
   - ✓ Explain briefly (**2–3 sentences**) how the AI works in that context.
3. End with a short paragraph (5–7 sentences) reflecting on:
   - ✓ Which AI you rely on the most
   - ✓ What would happen if that AI did not exist
   - ✓ How it has changed the way you live or work as a student

General (Strong) AI

AI Example (partial)**:** Google Maps

•**Type of AI:** Narrow AI / Limited Memory

•**How it works:** Uses location data, historical traffic patterns, and algorithms to suggest the fastest route. Continuously updates based on current conditions.

BICOL UNIVERSITY COLLEGE OF SCIENCE

CS Elective – Artificial Intelligence

Case Study #1

LN, FN MI.

*short/A4 size, single space, font size 12 - Times New Roman, save as lastnamefirstnamecase#1.pdf

THANK YOU!

ANY QUESTIONS?