

What is Artificial Intelligence (AI)?

Two categories – Weak and Strong AI

Weak AI (“narrow AI”) relies on algorithms and programmatic responses to **simulate** intelligence.

- Computer follows a program or action, based on input
- Exp. Alexa can recognize key sounds and word patterns to trigger basic tasks (e.g. “turn on the lights”), but the system does not recognize the intent behind words
- May appear convincingly “intelligent” to users, but is actually a programmatic response
- No actual “thinking” occurs
- Most examples of current use fall into this category

Strong AI systems are designed to **mimic the human brain** and its higher-level capacity for thought and decision making.

- Designed to be **cognitive** – to be aware of context and nuance, not just literal intent
- Decisions are not strictly programmatic, but based on reasoned analysis
- Capable of making decisions with incomplete information, by analyzing patterns, applying context, and determining a reasoned course of action
- Learns and adapts as it assimilates new information and repeats tasks – improves over time
- Goals of each strong AI system vary, so each iteration looks very different and is highly customized

Machine learning is a type of AI process that gives the computer access to a data set and allows it to “learn” from that information.

- Makes determinations based on available data, previous historical evidence, and anticipated outcome
- Exp. Alexa does not use machine learning to turn on the lights, because it is not “learning” anything.
- Exp. The Nest Thermostat uses actual machine learning to adapt and respond to the light usage of an individual or family.
- Not only responsive to data, but also designed to search data for trends, patterns, and anomalies.
- Helps the AI improve over and become more accurate over time.

Steps to designing and AI system:

- 1) Identify the primary purpose or goal for the AI – What do you want it to do?

- 2) Determine the type, amount, and nature of the data that the AI will need to function effectively.
- 3) Design the coding architecture for the AI
- 4) Train the AI with a preliminary data set
- 5) Test the AI
- 6) Identify failure points or aberrant behavior
- 7) Refine, modify, and enhance coding architecture as necessary
- 8) Provide the AI with access to additional data that will allow it to improve over time
- 9) Repeat steps 5-8

Key AI Points:

- **Training** is the single most important factor in the effectiveness of an AI system.
- AI can be a powerful tool, but there are also many gratuitous uses of AI emerging in the market – AI hair dryer, AI yoga pants, etc.
- AI interfaces can vary widely – APP, computer software, integrated firmware/hardware, complex networked system.

Points to consider when training an AI:

- Quantity and quality are both important
- AI (like people) will make mistakes more often if it is trained with bad information
 - o Exp. If you tag all of your emails as spam, an AI email filter will mis-identify all of your future emails as spam.
- Training is not a “one and done” process. Once trained, the AI must continue to be trained with additional data points and feedback on how effectively it is interpreting the initial data set.
 - o Exp. If the AI email filter falsely identifies something as spam, you may improve future results by providing new data points or by correcting the AI on how it responded to the previous data.
- Access to data is **CRITICAL**, but we live in a data rich society – social media, sensors, cloud-based data storage, etc.

AI Technology Solution Pitch and Presentation:

Mission – Your team will apply what you have learned about AI and the engineering design process by identifying a problem and formulating an AI based technical solution. Each team will scope an AI-based technology solution and create a “Shark-Tank” style pitch presentation.

Your team must first ideate to identify a problem or need that may be addressed or resolved through the application of AI technology – e.g. more efficient farming, online safety for children, machinery maintenance at an oil refinery, health and wellness, etc.

Once your team has agreed to a general vision or scope of work for the project (what you want to achieve), you must determine whether AI is a legitimate solution.

- Is there an easier, faster, less expensive, or more efficient solution?
- Will an AI system actually address the problem in a meaningful way, or does it just seem like a cool idea?
- Is there another product on the market that already does what you are proposing to do?
- Is there a viable market for this solution? Consumer market, military, government, corporate, non-profit, etc.

Next, you must map out the logistics and technical requirements and specifications necessary to bring your AI system to market.

- What type of data will you need to train the AI?
- Do you have access to existing data, or will you also need to create a data collection and aggregation system?
- What type of interface will your AI employ? APP, software, seamless firmware integration, a complex networked system, etc.?
- Are there any functional limitations to implementing the AI solution?

After working through the technical logistics of your AI project, your team must prepare a presentation. You will have 7min to pitch your AI project, followed by a 5min Q&A session, during which the judges will interrogate your ideas.

Presentation tips:

- Clearly identify and articulate the goal of your AI project.
- Identify the problem and value proposition. Explain why it is worth addressing (public safety, monetary value, improves society, etc.)
- Think about your audience and tailor your presentation to them. Assume that they may have a limited understanding of AI and they may not be familiar with the problem you hope to address.
- Include all team members to some degree in your presentation.

- Don't get bogged down in technical detail, unless it is necessary or the audience requests clarification.
- Address any complications or problems that you anticipate, and explain how you intend to overcome these.
- Use strong and compelling visuals – images, clear font, appropriate formatting.
- Use appropriate and correct grammar.