



## Module 1: What is Artificial Intelligence (AI)?

### Purpose

Artificial Intelligence (AI) simulates human intelligence processes using computer systems, encompassing learning, reasoning, problem-solving, perception, and language understanding. Understanding how AI functions on an input/output framework, as well as using databases of information is essential in understanding how AI functions. AI is already utilized in design processes, such as generating copy/text and images, and personalized user experiences. Students may encounter AI without realizing it, making it crucial for them to comprehend its capabilities and limitations to effectively adapt and utilize it credibly in their future careers. Understanding AI's purpose, capabilities, limitations, and potential uses is vital, as it is becoming a part of daily life.

### Objectives

- Students will be able to describe and explain what intelligence is.
- Students will be able to describe and explain the input/output framework that AI uses to function.
- Students will be able to identify ethical considerations of Artificial Intelligence.

### Key Ideas

- AI (Artificial Intelligence) is a simulation of human intelligence processes, done by machines (generally in computer systems). It has many functions and uses, including inputting data and receiving data back. AI can also automate tasks, learn from data, adapt to new inputs, and even perform decision making and understanding language.
- Not everything that involves automation or even advanced technology is Artificial Intelligence (AI). Computer systems usually run off of a set of limited, predetermined rules or an algorithm. Computer systems without AI do not use a wide variety of methods to solve complex problems. A system has to have the ability to learn and adapt in order to be considered AI.

### Key Vocabulary

- **Intelligence:** The ability to learn, understand, and solve problems.
- **Artificial Intelligence:** The ability of machines or computers to learn, understand, and solve problems like humans.
- **Input:** Information or data that is entered into a computer or machine for processing.
- **Output:** The result or information that is produced by a computer or machine after processing the input.
- **Ethical:** Concerned with what is right or wrong, good or bad, or equitable (especially in relation to moral principles and values.)
- **Agent:** an entity that perceives and acts; the object that we are trying to determine the level of intelligence of. It can be a human, animal, or machine.

## Module Breakdown

|                                          |                                                                                                       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Mini Lesson (10 minutes)</b>          | What is Artificial Intelligence? How does the development and use of AI impact today's world?         |
| <b>Activity (25 minutes)</b>             | Sorting Agents like an AI: Practice sorting and categorizing data as an artificial intelligence does! |
| <b>Debrief &amp; Assess (15 minutes)</b> | Discussion and Assessment                                                                             |
| <b>Extensions (additional time)</b>      | How art and music can be enhanced and shaped by AI.<br>Artificial Intelligence Scavenger Hunt         |

## Mini Lesson (15 minutes)

### 1. Introduction to Students

Artificial Intelligence (AI) can help people predict the weather, diagnose diseases, and even compose music. There is a big variety of ways that people use AI. There's self-driving cars to chatbots, and even ways to automate tasks that people do. But how do we know if something is truly AI or just a clever trick? Not everything that seems to be AI actually is.

### 2. Discussion - What is intelligence?

Briefly discuss the definition of intelligence (see Key Vocabulary in this module for this and other definitions).

- **Intelligence:** The ability to learn, understand, and solve problems
- **Artificial Intelligence:** The ability of machines or computers to learn, understand, and solve problems like humans.

Intelligence overall has unique attributes that all humans, animals and computer systems have. However human intelligence and Artificial Intelligence are different. AI has some of the same intelligent attributes as a human but it is also missing some key attributes of real human intelligence.

- **What are some examples of things that are considered intelligent?**
  - Humans and other animals (like dolphins and monkeys), and some technology, like computers and systems that can solve complex problems and learn/adapt.
- **What are some non-examples of intelligence?**
  - Inanimate objects and things that cannot perform even simple tasks. Things like rocks, chairs, air, and other objects that cannot problem solve or learn.
- **What are attributes of intelligence?**

The following are attributes of any kind of Intelligence (real or artificial):

  - Make decisions
  - Adapt
  - Sense
  - Analyze data to make decisions
  - Learn
  - Remember
  - Generate new output from its given input and knowledge
- **Which attributes do you think AI cannot do?**

The following are attributes of intelligence that AI cannot do:

  - Create unique and new outputs, such as text, images, etc on its own. It must pull information from somewhere, and follow its parameters and/or training

### 3. Video - What is AI?

Play this video: [What is Artificial Intelligence? | Quick Learner - Duke University](#)

### 4. Video Discussion Questions

- How might AI help solve some of the world's biggest issues?

#### Expected responses:

AI's potential to help solve some of the world's biggest issues delves into almost any field you can think of. It has the potential to enhance medical practices and diagnostic tools, generate solutions and ways to help combat climate change, change the way designers go about creating their deliverables, and even change the way students and adults alike are gaining access to education and credible sources for research.

- **Can we consider Artificial Intelligence true intelligence, especially when comparing it to real human intelligence?** (open ended)

#### Expected responses:

Yes - Intelligence is measured in a lot of different ways. But in terms of being able to create uniquely because of its own intelligence and choices to adapt and learn, it is not considered true intelligence, like humans.

- **What might some risks be with using AI?**

#### Expected Responses:

Getting biased results/outputs. Getting inaccurate results. Loss of jobs that can be automated. Privacy and feeling constantly surveilled. Human dependence on AI alone, leading to the loss of humans being able to do the things needed to survive on their own. Loss of control over AI by users.

## **Activity (25 minutes): What is and is not AI?**

### **5. Explanation**

AI uses classification and categorization to sort and organize data. In this activity, students will practice doing what Artificial Intelligence does in order to organize its information. Students will get to practice AI's structure and algorithms, as if they, themselves, were an AI. Students will sort 5 different agents (listed below) onto the rating scale. The rating scale spans from Not Very intelligent → Very intelligent. Students will first sort these based on their own knowledge base, including biases they may have, extra knowledge they may have, or any other outside data. Then, students will discuss the types of agents they sorted, and why they ranked them as they did on this scale. Students will also get to compare their own ratings of these agents with the ratings of their peers.

### **6. Directions**

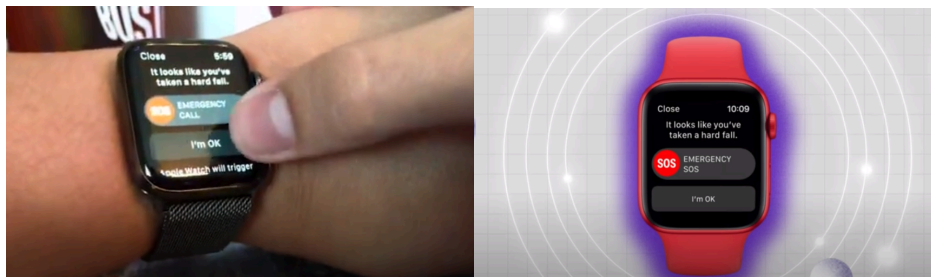
As a whole class, review the following agents and how they work. Discuss the uses, technology, and capabilities of each agent, thinking about how intelligent the agent is.

#### **Agents:**

- Apple watch (fall alert)
- Car assembly robot
- (Pocket) calculator
- Auto-flush toilet
- Google Maps

#### **Resources for explanation of Agents:**

#### Apple Watch (fall alert):



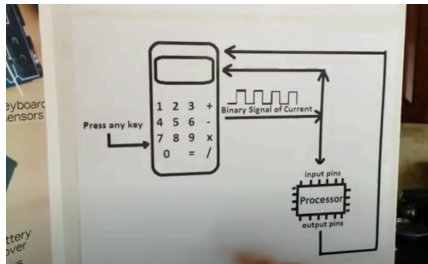
[https://youtu.be/hSNuotpePzQ?si=IIE\\_4xCh1v7B\\_VxX&t=51](https://youtu.be/hSNuotpePzQ?si=IIE_4xCh1v7B_VxX&t=51)  
[https://youtu.be/yZgZAhBa7Kc?si=bWXXQi2niYJVE\\_rl&t=88](https://youtu.be/yZgZAhBa7Kc?si=bWXXQi2niYJVE_rl&t=88)

#### Auto-flush Toilet:



<https://youtu.be/J2MFi4Ya-Uk?si=OPV54Q1K-OregwMK>  
<https://youtu.be/3qYYVFPCOWU?si=6XvePARZ-pGVTFVr>

#### Calculator:



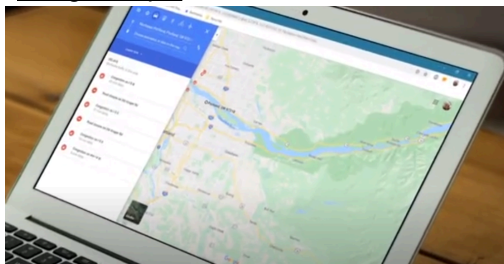
[https://youtu.be/NQHTXdEXLzk?si=9U\\_V0bcNpoH725DO](https://youtu.be/NQHTXdEXLzk?si=9U_V0bcNpoH725DO)

#### Car Assembly Robot:



<https://www.youtube.com/watch?v=pxLpsSkEtuY>  
<https://www.youtube.com/watch?v=gy5g33S0Gzo>

#### Google Maps:



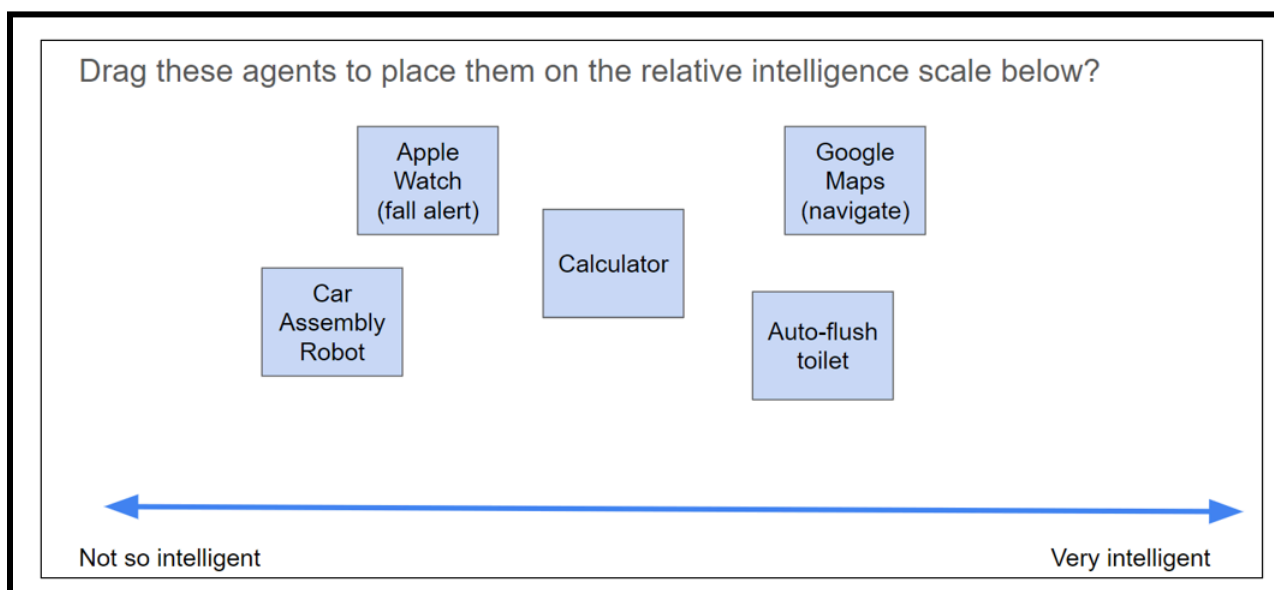
<https://youtu.be/QhcerJZD1Gc?si=-SGiEpMqggSEgQpj&t=18>  
<https://youtu.be/HV46i7xUNXg?si=8veAqhcTzfQjcdN-&t=7>

### Rating the Agents on the Scale:

After learning about each agent, students will sort each agent on the scale (shown below) from Not Very intelligent → Very intelligent.

- Create a rating scale (like shown below) that is large enough for each student to place multiple sticky notes onto. This can be done on a white board, or large poster paper. There is also a digital version in the Sorting Agents Like an AI resource link.
  - Digital Template: [Sorting Agents Like an AI](#)
- Give students sticky notes and pencils, or prepare your copy of the digital template for this activity.
- Allow students to discuss each of the 5 agents in a small group and rate them on the scale of intelligence.
- After students have rated each agent on its intelligence level, allow students to compare their ratings with their peers' ratings, and also with the accurate ratings seen in the example.
  - Use the discussion questions below to help guide your students' discussion about each agent's intelligence level.

Here is the rating scale with each agent rated appropriately:



## 7. Discussion

**Which Agent seemed to score the lowest on this scale, and seems the least intelligent?**

Expected response:

- *Car Assembly Robot.*

**Why did we feel this agent was not very intelligent?**

Expected response:

- *Car Assembly Robots can look and function differently depending on what its main function is supposed to be. It's hard to really tell, just based off of "car assembly robot" if this agent could do more than just the thing it is programmed to do, such as assemble a part of a car.*

**Which Agent seemed to score the highest on this scale, and seems the MOST intelligent?**

Expected response:

- *Google Maps*

### **Why did we feel this agent was VERY intelligent?**

#### Expected response:

- Google Maps actually does use algorithms WITH machine learning to function the way it does. For example, it can identify alternative routes for the user, without more input than what it was given (point A location to point B location). It can do this, because it can access MORE data, like whether or not there are accidents or road closures on the best route to your destination.

### **What makes the Apple Watch and its Fall Detection Feature fall into the middle of not very intelligent and very intelligent? What makes it intelligent, and what does not?**

#### Expected response:

- If a person wearing a fall detection enabled Apple Watch falls or falls due to being unconscious, the watch detects that, calls emergency services, and shares the location. However, every fall might not need police and emergency services to be contacted.

#### Why Intelligent:

- It can make decisions and perform tasks based on some data (like whether or not a fall was detected). If a fall was detected, then the action of notifying emergency services and sharing your location is automatic, but it must have been given parameters on what to sense (falls) before contacting emergency services.

#### Why not intelligent:

- It may deem every fall as worthy of emergency services, it cannot determine if a fall needs emergency services or not, which may waste valuable resources and time. It may also cause undue stress and anxiety for someone who doesn't want to interact with or call for emergency services.

### **What makes the Calculator fall into the middle of not very intelligent and very intelligent? What makes it intelligent, and what does not?**

#### Expected response:

- Calculators do seem highly intelligent, since they can perform actions many people cannot perform on their own, like calculating complex math concepts. However, it can only perform tasks it was programmed and coded to do, and nothing beyond that. There is no possibility of a calculator generating anything new, learning, or adapting.

#### Why Intelligent:

- It can tell me answers to problems I can't do in my head, like the square root of 71. Super fast and always accurate. Better than humans.

#### Why not intelligent:

- A human still has to code a calculator to do anything and everything it can do. The calculator can only do what it is programmed to do, and nothing more. It can do one action at a time, started by the user, and output the answer one time for the user. It doesn't make decisions, or even generate anything new.

### **What makes the Autoflush Toilet fall into the middle of not very intelligent and very intelligent? What makes it intelligent, and what does not?**

#### Expected response:

- It can automatically flush the toilet when it senses the user is done, or has left the stall. It can begin this task autonomously, without the user needing to input anything other than simply being there, or not being there.

#### Why Intelligent:

- It uses the data it uses to decide whether to flush or not comes from a true or false sensor. If it senses a user is there, it isn't supposed to flush. If it senses the user has left/is leaving the stall, it is supposed to flush.

#### Why not intelligent:

- It is a simple on and off sensor, It either flushes or does not flush. It is not collecting a robust amount of data to make the decision. It only uses one data point and once that algorithm is complete, it forgets it and waits for the next one. It doesn't always work correctly. It senses motion when there isn't any. It has to sense motion with laser technology, as it cannot use a camera or even microphone to gather data: privacy issue. Therefore, it often flushes when it wasn't asked to, and the user did not want it to flush at that time. There is too much uncertainty with whether a user is truly done using the toilet or not. It cannot learn or adapt, so it will continue behaving this way unless a human codes a new set of parameters into the programming.

## Debrief & Assessment: (15 minutes):

### 8. Debrief

- **After talking about each of those agents, would you reconsider your rankings?**
- **What are some other agents, or complex systems that would be categorized as intelligent, or not intelligent?**
  - Not intelligent agents: automatic door openers, self checkout
  - Intelligent agents: self driving cars, text generation, spam filters, chess playing robot, chatbot
  - \*It is getting more and more difficult to distinguish between computer systems and AI.
- **Can you think of any tasks that AI cannot perform?**

Currently, AI cannot perform the following tasks:

  - Creativity (creating truly original and innovative ideas - it can try, but it is not truly original, as AI functions on some level of human input (data) to make its decisions, and set its parameters.
  - Emotional Intelligence: responding and reacting to human emotions and social interactions.
  - Complex Decision Making: AI processes large amounts of data and makes decisions based on predefined criteria, but it cannot yet make decisions that are complex and unpredictable.
  - Dexterity and Mobility: AI can control robots and other automated systems, but it cannot exhibit the same level of dexterity and adaptability that a human can. These AI controlled robots do not have the same senses as a human: touch, feel, taste, smell etc. Cameras can allow "sight" for the robot, but it is moreso for input like distance, size, color, shape than true sight, like humans have, to clearly identify things in the world around us..
- **What makes AI unique in terms of its ability to learn and adapt?**
  - Computer systems function off predetermined rules and instructions. Computer systems themselves cannot be considered AI, as they do not have the ability to adapt and change that AI and real human intelligence can. AI requires users to input data in order to make adaptive changes and decisions. Computers function off of predetermined rules and instructions too, but they cannot adapt, learn, or change on their own.
- **Can you think of any situations where AI might raise ethical concerns?**
  - Bias/Equity, Privacy/Surveillance, Job Displacement, Social Manipulation, Spreading of Misinformation, Accountability and Transparency, and even autonomous weapons can all be considered ethical concerns when AI is used.

### 9. Assessment

- **What are some examples of tasks that artificial intelligence (AI) can perform?**
  - Predict outcomes, process languages, recognize images and video, robotics, automation, medical diagnoses and procedures, help detect fraud and hacking, generate new images, text, video, and other content using the data it can access.
- **How is AI different from traditional computer programs or algorithms?**

Multiple Choice:

  - a) AI is always faster than traditional computer programs.
  - b) AI is always used only for gaming, and other computer programs are used for many things.
  - c) **AI can learn and adapt with user input, while other computer programs cannot.**
  - d) AI is always a physical robot, but traditional computer programs are only for computers.

- **What are some potential ethical considerations users should consider when it comes to the use of AI?**
  - Privacy concerns, bias and equity, accountability for what can be produced by AI, transparency and credible sourcing

## **Extensions**

- **AI vs. Non-AI Scavenger Hunt:** Create a scavenger hunt where students have to identify and differentiate between AI and non-AI technologies in their daily lives. They can take photos or make a list of examples, then discuss and categorize them in class.
  - **Technology for Oceans by National Geographic:** Is this AI or not? (this is not considered AI due to its lack of autonomous decision making and learning capabilities. It is remotely controlled by human users)  
<https://www.nationalgeographic.com/adventure/article/underwater-robot-submarine>
- **What is AI? by Code.org:** <https://code.org/ai>