

## Hour of AI Activity: Exploring Bias with a Wave Detector

### Teacher Guide

#### Resources

- [Student Worksheet](#)
- [Detailed Blog](#)
- [Educator Guided Course](#)
- Video Tutorial: [Training a Machine Learning Model with CreateAI](#)



#### Overview

In this activity, students explore how machine learning models can reflect bias based on the data they are trained on. Using a micro:bit and the CreateAI platform, students will train a simple model to recognize hand gestures—such as waves—and observe how data limitations can affect a model's performance. Through discussion and experimentation, students will connect this experience to real-world examples of bias in AI systems.

#### Learning Objectives

- Understand that AI models learn from data and can reflect biases present in that data.
- Use micro:bit and CreateAI to train and test a machine learning model.
- Evaluate how training data impacts a model's fairness and accuracy.
- Reflect on human responsibility when creating and using AI systems.

#### Materials Needed

- [micro:bit](#) with battery pack and wrist strap (such as [CHARGE](#))
- Access to [CreateAI](#)
- Computer or tablet with internet connection

## Lesson Steps

1. Begin with a class discussion about waving. Ask students to wave and notice how each wave differs (right vs. left hand, big vs. small, fingers open or closed).
  - Encourage students to get creative: try a 'queen wave' or an 'ocean wave'
2. Introduce the concept of bias in AI by explaining that AI models learn from data. If we only teach the model one kind of wave, it may not recognize others.
3. Have students connect their micro:bit to CreateAI and record at least three samples of their individual wave gesture.
4. Record two additional actions (e.g., thumbs up, resting hand) to help the model distinguish between gestures.
5. Click 'Train model' in CreateAI to generate the machine learning model.
6. Test the model by performing each gesture and observing the certainty scores.
  - Optional: Ask students to switch micro:bits and test their wave on a classmate's model – is CreateAI able to recognize the wave?
7. Discuss: Does the model correctly identify different kinds of waves? What happens if the wave differs from the training data?
8. Encourage students to add more diverse data (e.g., left-hand waves) and retrain their model to improve fairness and accuracy.
9. Optionally, open the model in MakeCode and use it to trigger LED or sound outputs when a wave or other action is detected.

## Discussion & Reflection

- How accurate was your machine learning model? Was it able to detect a wave?
- What happened when you switched micro:bits with a classmate? Was your machine learning model biased towards your individual wave?

- If the machine learning model wasn't able to detect a classmate's wave, does that mean their wave didn't happen? Or is it not a real wave?
- If our wave detector can only accurately detect certain types of waves is that fair?
- How could you make your model more fair or accurate for all users?
- Why is it important to think critically about the output of the AI machine learning model?
- What responsibilities do humans have when creating AI models?

### **Extension Ideas**

- Train a model to recognize sign language gestures or other helpful hand signals.
- Use a machine learning model to control a physical robot. ([Video tutorial](#))
- Collect data from multiple students and compare how model performance changes with more diverse samples.
- Research examples of bias in facial recognition or voice recognition systems and discuss their real-world impacts.