Lesson Planning Template **Teacher: DeSIRE**

📆Date:	Topic: Intelligent Sound Control	Time Required: 90 minutes

🎯**Learning Target/Objectives:**

- **I can** successfully configure the Arduino IDE to compile and upload acoustic-recognition code to a robotic controller .
- **I can** explain how a sound sensor converts physical sound waves (intensity) into electrical signals to trigger specific robotic action groups.
- **I can** modify and verify program parameters to re-route a robot's destination based on auditory input.

📜**Vocabulary:**

- **Sound Intensity**
- **Acoustic Detection**
- **Analog Signal**
- **Ambient Noise**
- **Threshold Value**
- **Action Group**

❓**Guiding Questions:**

- Why does the lesson recommend operating the robot in a quiet environment?
- How does the robot distinguish between a deliberate command (a clap) and random background noise?
- In what ways could an engineer adjust the code if the sound sensor was too sensitive or not sensitive enough?

📚**Lesson Design Details:**

- **Activity 1: The Ambient Noise Audit**
  - **Focus:** Students use the Serial Monitor in the IDE to observe the "raw data" from the sound sensor in a quiet room versus a noisy room. They must determine the best "Threshold Value" for their specific classroom.
- **Activity 2: Sound Trigger Transport**
  - **Focus:** Students set up the map and blocks. They must successfully move a block from the right side to a new position using exactly one clap near the sensor .
- **Activity 3: The "Middle Pick" Code Edit**
  - **Focus:** Students locate line 80 in sound_control.ino. They must change the code from (12+result) to (13+result), re-upload, and verify that the arm now picks up the middle block.

Key Points (Vocabulary):

- Sound Intensity: The measurable amount of acoustic energy in a given environment, used as a trigger for the sensor.
- Acoustic Detection: The process by which the sensor identifies specific sounds, such as claps, to initiate a command.
- Analog Signal: A continuous signal that varies in intensity, often converted by the sensor into a value the robot can process.
- Ambient Noise: Background sounds that may interfere with the accuracy of the sound sensor.
- Threshold Value: The programmed level of sound intensity required to "activate" a robotic response.
- Action Group: A pre-programmed sequence of robotic movements (e.g., picking up a block) stored in the controller.

Key Points of Instruction

- **Environmental Awareness:** Emphasize that "Ambient Noise" is a major variable. Teach students that a classroom with 30 students will likely trigger the sensor accidentally unless they are in a controlled setting.
- **The "Wait for Verification" Rhythm:** Students must watch for "Done compiling" before they attempt to "Upload." If they pull the cable early, the robotic brain will be empty .
- **Code Arithmetic:** Explain that `(12+result)` in the code isn't just random; it is a mathematical way to select a specific "folder" or action group in the robot's memory.
- **Signal Proximity:** Instruct students to clap close to the controller initially to ensure the sensor reaches its "programmed detected value".

Teacher's Cheat Sheet	
Feature	**Technical Requirement / Value**
Board Type	Arduino / Genuino Uno
Code File	sound_control.ino
Upload Path	Tools -> Port -> Select COM Port
Right Grab Code	(12+result)
Middle Grab Code	(13+result)

Trigger Event	Single clap close to controller
Visual Confirmation	Done compiling -> Done uploading

Category	Standard Organization	Standard/Benchmark Code and Description
Computer Science	NCSOS	HS-CS-03: Illustrate the ways computing systems implement logic, input, and output through hardware components 1.
Technology	ITEEA	STEL-2R: Follow step-by-step instructions to safely use systems and troubleshoot common problems 2.
Engineering	ITEEA	STEL-2V: Analyze the stability of a technological system and how it is influenced by components in the feedback loop 3.
Digital Literacy	ISTE	1.5.d: Students understand how automation works and use algorithmic thinking to develop a sequence of steps 4444.
Science	NCSOS	PHY.2.1.2: Explain the concepts of sound and wave motion.