Lesson Planning Template **Teacher: DeSIRE**

📆Date:	Topic: Color Identify	Time Required: 90 minutes

🎯**Learning Target/Objectives:**

- **I can** successfully configure the Arduino IDE to compile and upload color-discrimination logic to a robotic controller .
- **I can** explain the environmental constraints, such as light intensity and distance, that affect the accuracy of a robotic color sensor .
- **I can** modify software "print" parameters to customize the visual output displayed on an OLED screen .

📜**Vocabulary:**

- **Color Sensor**
- **OLED Screen**
- **discriminate_color.ino**
- **u8g2.print**
- **Strong Light Interference:**
- **Character Limit**

❓**Guiding Questions:**

- Why does the color sensor require the object to be exactly 1 cm away for accurate identification?
- How does the robot "translate" the reflected light it receives into the English words "RED," "GREEN," or "BLUE" ?
- If the OLED screen displays "RED" when you hold up a blue block, what environmental or hardware factors should you troubleshoot first ?
- Why is there a 6-character limit for the words we want the robot to display?

📚**Lesson Design Details:**

- **Activity 1: The Wavelength Validation**
  - **Focus:** Students place the red, green, and blue blocks in sequence 1 cm in front of the sensor. They must verify that the OLED screen displays the correct name for each block .
- **Activity 2: The "Hello Robot" Code Edit**
  - **Focus:** Students navigate to line 97 of discriminate_color.ino. They must change u8g2.print("RED") to u8g2.print("Hello"), re-upload, and verify the red block now triggers a greeting .
- **Activity 3: The Lighting Stress Test**
  - **Focus:** Students test the sensor accuracy under three conditions: normal room light, shadow (covered by a hand), and strong flashlight. They record which condition causes the most identification errors.

Key Points (Vocabulary):

- **Color Sensor:** A sensor that detects light intensity for red, blue, and green wavelengths to identify the color of a target object.
- **OLED Screen:** A digital display module used to output the text result of the color detection .
- **discriminate_color.ino:** The specific Arduino source code file used to run the color identification program.
- **u8g2.print:** A code command used to display specific text strings on the OLED hardware.
- **Strong Light Interference:** An environmental condition where high-intensity light (like sunlight) washes out the sensor's readings.
- **Character Limit:** A physical display constraint where text strings longer than 6 characters will not fit on the OLED screen.

Key Points of Instruction

- **Optimal Testing Environment:** Emphasize that the color sensor is highly sensitive. Instruct students to avoid testing under bright spotlights or direct sunlight, which will degrade performance.
- **The 1 cm Rule:** Precision is key. The sensor has a very short focal length. If the block is too far away, the sensor will return an error or "null" result.
- **Function Selection:** Ensure students find the `draw()` function in the code. This is where the conversion from sensory data to human language happens.
- **String Constraints:** Remind students that when they modify the text (e.g., from "RED" to "Hello"), they must count their characters. Seven or more characters will result in a "cut off" display.

Teacher's Cheat Sheet	
Technical Parameter	**Requirement / Data Point**
Sketch File	discriminate_color.ino
Ideal Distance	**1 cm** from the sensor face
Text Limit	**6 characters** maximum
IDE Space	Uses approx. 21,070 bytes (65% of storage)
Forbidden Env.	Areas with "Strong Light"

Default Board	Arduino / Genuino Uno
Upload Status	Wait for "Done uploading" in the prompt area

Category	Standard Organization	Standard/Benchmark Code and Description
Technology	ITEEA	**STEL-2R:** Follow step-by-step instructions to safely use systems and troubleshoot common problems
Computer Science	NCSOS	**HS-CS-03:** Illustrate the ways computing systems implement logic, input, and output through hardware components
Engineering	ITEEA	**STEL-2V:** Analyze the stability of a technological system and how it is influenced by components in the feedback loop
Science	NCSOS	**PSc.3.2.3:** Explain how light is absorbed and reflected by different objects.
Digital Literacy	ISTE	**1.1 Empowered Learner:** Students demonstrate a sound understanding of technology concepts, systems, and operations