**Step 5: Test and Refine the Solution (Debug and Verify)**

**Sample Scenarios:**

**- Pet eats as expected**

**- Pet does not eat**

**- Food bin is empty**

**- Compare output with expectations**

**- Suggest improvements**

**1. Pet Eats as Expected**

**Scenario:**

* It's feeding time (currentTime == feedingTime).
* Food bin is not empty (foodSensorPin == HIGH).

**Expected Patterns:**

* Servo dispenses food.
* LCD shows next feeding time and remaining food percent.
* Buzzer is off.

**Test Output:**

* Servo rotates to 90°, waits, then returns to 0°.
* LCD line 1: "Next: (The Next Feeding Time)"
* LCD line 2: "Food: (Remaining Food Percent)"
* Buzzer is silent.

**Result:**

* **Works as intended for basic feeding.**

**2. Pet Does Not Eat**

**Scenario:**

* It's feeding time.
* Food bin is not empty.
* Pet does not eat (no sensor detects food is eaten).

**Expected Patterns:**

* System behaves exactly as above.
* **Limitation:** The code does not detect or care if the pet eats or not.

**Test Output:**

* Same as "Pet Eats as Expected."

**Result:**

* **Limitation:** The system cannot detect whether the pet has actually eaten.
* **Improvement:** To detect this, you would need a separate "food taken" sensor or a weight sensor.

**3. Food Bin is Empty**

**Scenario:**

* At any time (feeding or not).
* Food bin is empty (foodSensorPin == LOW).

**Expected Patterns:**

* LCD shows "Low Food!"
* Buzzer is ON.

**Test Output:**

* LCD: "Low Food!"
* Buzzer sounds.

**Result:**

* **Works as intended for low food warning.**

**4. Compare Output with Expectations**

* **Feeding event:** Works as intended if food is present.
* **Low food:** LCD and buzzer alert you.
* **Pet eating detection:** **Not implemented**—system can't tell if food is actually eaten.
* **Display:** Both "Next" and "Food" messages show correctly on 2 lines.
* **Buzzer:** Properly managed.

**5. Suggestions for Improvement**

**Detect if pet eats**

* Add a mechanism (e.g., weight sensor, IR sensor in bowl) to check if food was removed after dispensing.

**6. System Refinements**

* **Stable for basic auto-feeding and low food alerting.**
* **Not capable of monitoring if pet actually eats.**
  + Add hardware if this is a requirement.
* **Easy to read and manage display.**
* **Buzzer logic is sound.**

| **Scenario** | **Expected Output** | **Actual Output** | **Meets Expectation?** | **Note/Improvement** |
| --- | --- | --- | --- | --- |
| Pet eats as expected | Dispense, update LCD, buzzer off | Yes | Yes | - |
| Pet does not eat | Dispense, update LCD, buzzer off | Yes | Yes (but limited) | Can't detect if pet ate |
| Food bin is empty | LCD "Low Food!", buzzer on | Yes | Yes | - |

**Summary Table:**