

Step 5: Testing and Refinement

Flowchart Under Test:

Start

: Initialize system;

: Check RTC (feeding schedule);

if (Feeding time?) then

: Activate motor to dispense food;

: Check weight sensor (did the food dispense?);

if (Food dispensed correctly?) then

: Monitor weight sensor (is the food eaten in time?);

if (Food eaten within set time?) then

: Log data (time, food dispensed, eaten);

: Update display (Normal status);

else

: Alert staff (food not eaten);

: Log data (food left in bowl);

: Update display (Food not eaten);

endif

else

: Alert staff (dispensing error);

: Log data (error: no/low food dispensed);

: Update display (Error/Low food);

endif

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else
    : Wait until next scheduled time;
endif
: Check system status;
if (Any component failure?) then
    : Alert staff (system fault);
endif
Stop
```

Test Scenarios, Outputs & Discussions

Scenario 1: Pet Eats as Expected

- RTC: Feeding time triggered
- Motor: Activated, food dispensed correctly
- Weight Sensor: Food eaten within expected time

Expected Output:

- Log: time, amount dispensed, food eaten
- Display: Normal status

Test Output:

[LOG] 08:00 - Dispensed 100g - Eaten

[DISPLAY] Status: NORMAL

Discussion:

- Logic works perfectly.
 - Sensors and motor respond as expected.
 - No refinement needed for normal flow.
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Scenario 2: Pet Does Not Eat

- RTC: Feeding time triggered
- Motor: Activated, food dispensed correctly

- Weight Sensor: Food remains uneaten past timeout

Expected Output:

- Alert staff
- Log: food left in bowl
- Display: Food not eaten

Test Output:

[LOG] 12:00 - Dispensed 100g - NOT EATEN

[ALERT] Pet did not eat

[DISPLAY] Status: FOOD NOT EATEN

Discussion:

- Good for early health alerts.
 - System correctly detects and reports.
 - Could improve: Check for partial eating (not just binary yes/no)
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Scenario 3: Food Bin is Empty

- RTC: Feeding time triggered
- Motor: Tries to activate
- Weight Sensor: No change detected

Expected Output:

- Alert staff: dispensing error
- Log: error
- Display: Error/Low food

Test Output:

[LOG] 18:00 - ERROR: No food dispensed

[ALERT] Dispensing error - Check food bin

[DISPLAY] Status: ERROR / LOW FOOD

Discussion:

- Dispensing error correctly caught.

- Suggestion: Retry dispensing once before triggering alert.
 - Optional: Add a bin-level sensor to detect emptiness preemptively.
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Scenario 4: Feeding Time Not Reached

- RTC: Not feeding time

Expected Output:

- System waits

Test Output:

[LOG] 09:30 - No action: Not scheduled time

Discussion:

- Correctly idle behavior.
 - Suggest adding a status check or heartbeat log for traceability.
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Scenario 5: Component Failure (e.g., weight sensor malfunction)

- System performs component check at end
- Detects weight sensor failure

Expected Output:

- Alert staff
- No impact on feeding flow, but system warns of issue

Test Output:

[CHECK] System status: Sensor ERROR

[ALERT] Component failure: Weight sensor

Discussion:

- System catches failure but too late (post-feed)
 - Suggest running self-check before feeding time, not just after
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Refinement Summary

Area	Current Logic	Suggested Improvement
Food not eaten detection	Binary check	Add partial weight loss detection
Food not dispensed	Single check	Retry once or twice before error
Empty bin detection	Indirect (sensor)	Add bin-level sensor
Component check	Post-process	Also check pre-feed
Idle time logging	No action logs	Add logs for missed/non-feed times
Display updates	Static text	Add timestamps or severity levels