Step 1: Understand and Define the Problem (Analyse)

Problem Statement

The animal shelter requires a low-cost, programmable automated pet feeder that dispenses food for cats and dogs at scheduled times, monitors consumption, and alerts staff if issues occur. The feeder should be simple, reliable, and suitable for future hardware implementation using components such as servo motors and sensors.

Key Features

- Dispense food at specific scheduled times.
- Detect whether food has been consumed (via bowl weight or food-level sensor).
- Trigger alerts if food was not dispensed, not eaten, or if food supply is empty.
- Operate automatically with minimal staff involvement.

Assumptions

- Only one type of dry pet food is used.
- Feeding times are pre-set (e.g., 8:00 AM and 6:00 PM).
- Each feeding dispenses a fixed portion size.
- A weight sensor under the bowl can confirm consumption.
- The system has limited processing power and memory (low-cost microcontroller).

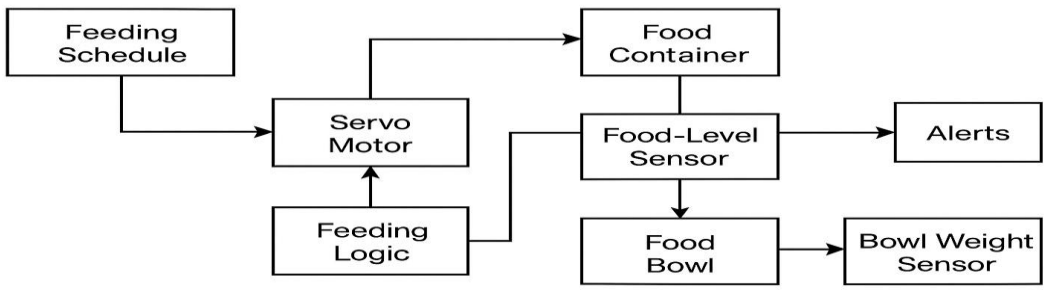
Inputs and Outputs

Inputs:

- Real-time clock (time of day).
- Food-level sensor (checks if food remains in storage).
- Bowl weight sensor (detects if food is consumed).

Outputs:

- Servo motor (dispenses food).
- Alert system (LED indicator, buzzer, or message notification).

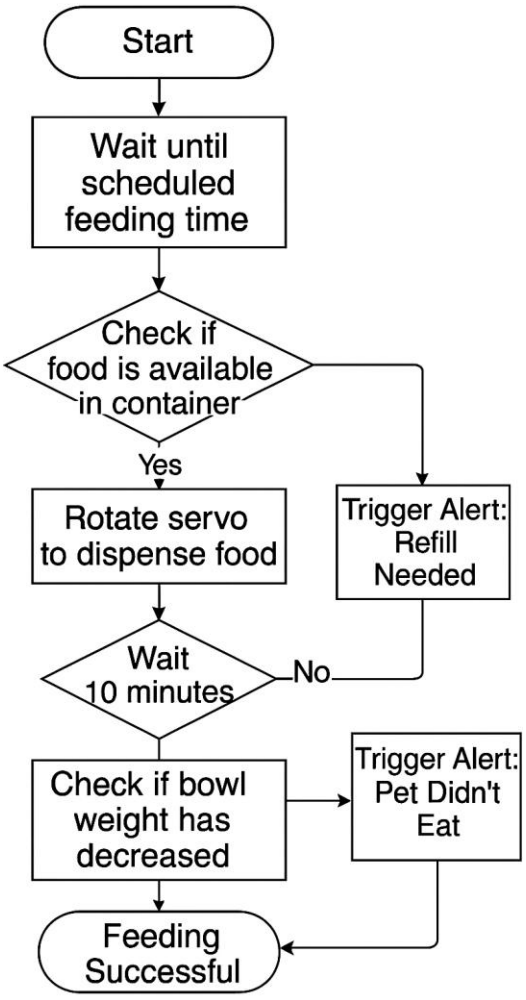


Automated Pet Feeder with simple servo motor and weight sensor, basic scheduling for cats and dogs

Step 2: Organise and Describe the Data

Input / Output	Type	Sample Values	Constraints
Feeding Time (RTC)	Input (Time)	08:00, 18:00	Limited to 2–3 feedings per day
Food Level Sensor	Input (Digital)	1 = Food available, 0 = Empty	Must detect low food bin condition
Bowl Weight Sensor	Input (Analog)	0g, 50g, 0g after eating	Sensitivity ±5g
Servo Motor	Output	Rotate 90° to dispense food	Limited to one fixed portion per cycle
Alert (Buzzer/LED)	Output	ON/OFF	Must activate for errors or empty food

Step 3: Plan the Solution (Design the Algorithm)



Step 4: Implement the Solution (Plain English)

1. The feeder waits until it reaches one of the scheduled feeding times (for example, 8:00 AM or 6:00 PM).
2. When the time comes, the feeder first checks if there is food in the storage container.
    - If no food is available, the feeder will turn on an alert (such as a buzzer or light) to notify staff.
    - If food is available, the feeder will activate the motor to dispense one portion of food into the bowl.
3. After dispensing the food, the feeder waits for about 10 minutes to give the pet time to eat.
4. Once the waiting time is over, the feeder checks the bowl again using the weight sensor:
    - If the weight has decreased (meaning the pet has eaten), the system records that the feeding was successful.
    - If the weight has not changed (meaning the pet did not eat), the system turns on an alert to notify staff that the pet has not eaten.
5. The system then goes back to waiting until the next scheduled feeding time.

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

Scenario	Input Conditions	Expected Output
Pet eats as expected	Time = 08:00, food available, bowl weight decreases	Dispense food → Success message
Pet does not eat	Time = 18:00, food available, bowl weight unchanged	Dispense food → Alert: “Pet did not eat”
Food bin empty	Time = 08:00, food_level_sensor = EMPTY	Alert: “No food available”

Part 2

https://github.com/ThmdHaider/pet_feeder_project

Part 3

Using AI as a support tool in this assignment was very helpful in refining my ideas and improving how I documented them. When I asked the AI to re-write my Word Code into plain English, it helped me express the system’s behaviour more clearly so that even a non-technical reader could follow the logic. This improved the readability of my assignment and gave me confidence that my design steps were understandable.

Prompt 1: *“Can you refine my Word Code for the automated pet feeder into plain English so it is easier to understand?”*

AI Response: The AI simplified the pseudocode into a clear step-by-step explanation in plain English (e.g., “The feeder waits for feeding time, checks if food is available, dispenses food, waits 10 minutes, checks if the pet ate, then either records success or sends an alert”).

Prompt 2: *“Suggest improvements to my pet feeder system design.”*
AI Response: The AI suggested refinements such as adding portion size options for different pets, Wi-Fi connectivity for remote alerts, and a battery backup for reliability.