

Automated Pet Feeder System - Assignment 1

Introduction

The local animal shelter has asked us to design a low-cost, programmable automated pet feeder that can feed both cats and dogs reliably. The feeder should be able to dispense food at specific times, detect whether the food has been eaten (or how much of it has been eaten), and notify staff if something goes wrong. For instance, if the dispenser fails to release food or if the pet ignores the meal, the system should send an alert. Although the final product will be built using simple and affordable components like servo motors and sensors, our current task is focused on designing and simulating the logic behind the system.

Step 1: Understand and Define the Problem (Analyse)

To clearly define the problem, the following assumptions were made:

- Only dry food will be provided for both cats and dogs.
- Feeding times are fixed in advance.
- Sensors are considered reliable for detecting food levels and weight changes.
- The system can send simple alerts (SMS or email).
- The feeder must run efficiently since it has limited memory and processing power.

Key Inputs:

- Feeding times (clock input)
- Food level sensor readings
- Bowl weight sensor readings
- Manual override button

Key Outputs:

- Motor signal to dispense food
- Alerts when the container is empty or food is uneaten
- Feeding log for record keeping

Step 2: Organise and Describe the Data

Here are some of the inputs and outputs with examples:

Input: Feeding Time | Type: Time (HH:MM) | Example: 08:00, 18:00

Input: Food Level Sensor | Type: Percentage | Example: 75%

Input: Bowl Weight Sensor | Type: Grams | Example: 250g

Output: Motor Activation | Type: Command | Example: Rotate 90 degrees

Output: Alert Message | Type: Text | Example: 'Pet has not eaten'

Step 3: Plan the Solution (Design the Algorithm)

The system follows this general logic:

1. The feeder continuously checks the current time.
2. When the current time matches a feeding time, the feeder checks the food container.
3. If food is available, it activates the motor to dispense a portion into the bowl.
4. After dispensing, the system waits for 10 minutes before checking if the bowl weight has changed.
 - If the weight has changed, the system logs that the pet has eaten.
 - If the weight has not changed, it sends an alert.
5. If the container is empty at feeding time, an alert is sent immediately.
6. The process repeats for all scheduled feeding times.

Step 4: Implement the Solution (Word Coding)

BEGIN

SET feeding_times = [08:00, 18:00]

LOOP forever

current_time = GET current time

IF current_time in feeding_times THEN

IF food_level > 0 THEN

DISPENSE food (rotate motor)

WAIT 10 minutes

IF bowl_weight has changed THEN

LOG 'Feeding successful'

ELSE

ALERT 'Pet has not eaten'

ENDIF

ELSE

ALERT 'Food container empty'

ENDIF

ENDIF

END LOOP

END

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

To ensure the system works properly, I would test different situations:

- Scenario 1: Pet eats as expected → Feeding logged successfully.
- Scenario 2: Pet does not eat → Alert is sent after 10 minutes.
- Scenario 3: Food container empty → Alert is sent before feeding attempt.
- Scenario 4: Time does not match a feeding schedule → No action taken.

Possible improvements after testing:

- Add reminders for staff if the pet misses multiple meals.
- Double-check sensor readings before sending alerts to reduce false alarms