

Background: Automated Pet Feeder System

A local animal shelter is looking for a low-cost, programmable automated pet feeder that can:

- Dispense food for cats and dogs at scheduled times.
- Monitor whether food has been consumed or the amount of food that has been consumed.
- Alert staff if there's an issue (e.g., no food dispensed, food not eaten).

They want a solution that could eventually be implemented using low-cost components (like a servo motor and sensors), but your task is to design and simulate the logic and behaviour of the system first.

Step 1: Understand and define the problem (Analyze)

Problem statement

Design a simple automated pet feeder that dispenses the right amount of food at scheduled times, checks whether food has actually been eaten, and warns the owner if something is wrong (e.g., no food left or the bowl is still full).

Some features that feeder must include.

- Schedule feeding at specific times each day.
- Dispense a measured portion.
- Sense bowl/plate weight.
- Alert the staff for problems (low bin, pet not eating).

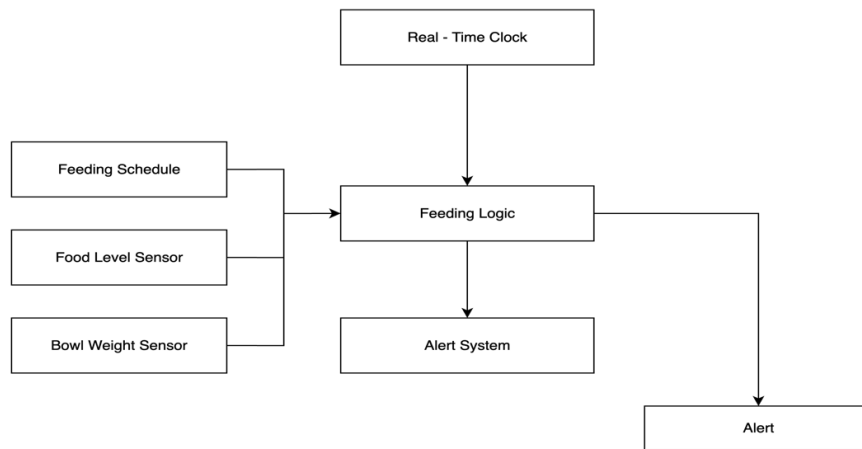
Assumptions and Limitations:

- Only one pet and dry food are used.
- Overtime eating is not allowed, feeder only runs at scheduled times.
- Limited memory and processing power.
- System operates indoors.
- Pets eat from individual bowls.
- Sensors are simple:
 - Bin level sensor: "OK" vs "LOW".
 - Bowl weight sensor: reports grams.
- Motor dispenses a known portion in one cycle (e.g., ~80 g).

Inputs & Outputs:

- Inputs: Current Time, Feeding Schedule, Food Bin level (OK/LOW), Eating Bowl Weight (g).
- Outputs: Motor ON/OFF, Alerts/Notifications.

Block diagram of the system:



Step 2: Organise and Describe the Data

Variables	Type	Unit	Notes
Real Time Clock	Input	Time	Must be accurate and 24hr clock
Feeding Time	Input	Time	Twice Daily
Food Level Sensor	Input	Boolean (OK/LOW)	Must detect low food and trigger alert
Bowl Weight Sensor	Input	Integer	Detects if pet has eaten
Servo Motor	Output	Boolean (ON/OFF)	ON for fixed duration to drop food
Alert System	Output	String (Text)	Notify the staff

Operational Parameters:

- Target portion: 80 g.
- Low bin threshold: Sensor reports LOW when below minimum.
- Eat check window: Check bowl again after 30 minutes.
- Feeding time: 8AM or 6PM