

Assignment 1 – The Solving Problem Process

Casey Behrens: 3281627

Introduction to Information Technology (4478)

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Part One: Step 1-5

Part Three: 163 words

The problem:

"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, etc.)

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"

Part One: On the Solving Problem Process**Step One: Understand and Define the problem (Analyse)**

This problem requires a low-cost automated pet-feeder with a few different features:

- A system that can remember time
- A system that can schedule feeding times
- A dispenser for the food
- A sensor to recognise if there is still food after being dispensed
- A sensor that counts the amount of food that has been dispensed and compares it to the amount being eaten
- An alarm system

We assume that:

- Feeding times have been assigned
- Food is being weighed
- There's a database

Limits may be:

- The amount of memory the system has.
- Animals may accidentally tamper with the sensors or scale leading to false alarm activation and weights being recorded.

Step two: Organise and Describe the Data

Input	Output	Parameters
Clock (real-time)	Dispense food at scheduled time.	Out of food.
Sensor for bowl	Level of food in bowl	May be blocked by food
Scale under bowl	How much food is being eaten	Animals may step on scale.
Food not dispensed	Alarm activates, alert staff	Alert not sent
Food not eaten after 10 minutes	Alarm activates, alert staff	Alert not sent
Timer	10-minute alert	Timing off

Step three: Plan the solution

- At 7AM and 6PM food is dispensed
- If food not dispensed alert staff
- If food in bowl 10 minutes later alert staff
- Track total food dispensed/ consumed

Step four: Implement the Solution

1. If it is 6am or 7pm food is dispensed into the pet's bowl.
2. If food was not dispensed due to an issue, the alarm is activated, and staff are alerted.
3. 10 minutes after the food was successfully dispensed if the sensor can detect food is still in the pet's bowl (the pet has not eaten) the alarm is activated, and staff are alerted.
4. Throughout the day/ process the amount of food dispensed and in turn eaten is recorded by the system and provided to staff.

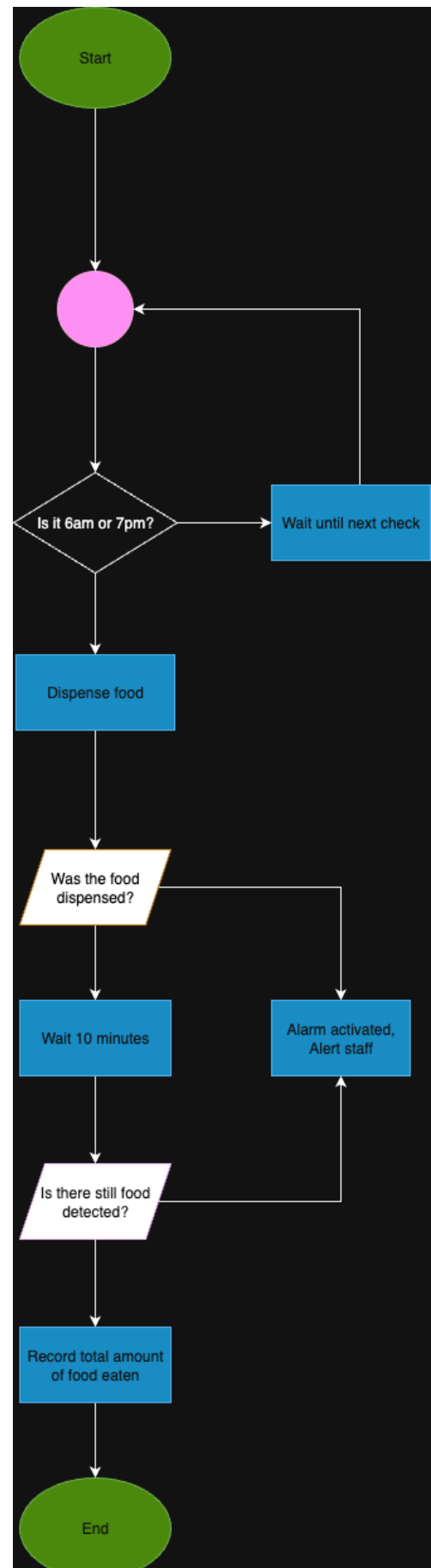
Step five: Test & Refine the Solution

- Pet eats as expected = system records amount
- Pet does not eat = alarm is activated, staff are notified
- Food bin is empty = Food will not be dispensed, alarm is activated, and staff are notified

For most mistakes the expected outcome is the alarm, if something goes wrong with the alarm software there's no backup alert.

A lot of the data is also taken from the sensors; this can be effective but with animals actively interacting with them several things could alter their performance.

A suggested improvement would be a camera with sensors directed at the pet's bowl. With this alteration you can also see any unusual eating patterns and gain more insight into why the pet hasn't finished eating, etc.



Part Three: AI Agent Integration

The first thing I asked Microsoft copilot was how I could improve my step 4 implementation. Its responses showed me several improvements I could make to the system, which helped me realise other inputs/ outputs I had overlooked. Copilot suggested a mobile app that allows the feeding times to be changed by the user and alerts that were more detailed, to provide further detail to the user, for example, "Alert: Food bin empty".

Secondly, I asked AI how it would recommend I summarise this system. First it gave my overall tips on writing a summary (to be clear, etc.), then Copilot gave a more specific draft based on my last enquiry. The provided summary helped me write my README as it gave me a new layout I hadn't thought of and showed me a professional way to organise the information. This was helpful as I have not written a README before this assignment, and I was a bit unsure on where to start.

Pet-Feeding System Summary

This automated pet-feeding system ensures timely, monitored, and data-driven feeding for pets, with built-in safety and alert mechanisms. Key features include:

- **Scheduled Dispensing:** Food is automatically dispensed at 6am and 7pm (configurable).
- **Failure Detection:** If dispensing fails, an alarm is triggered and staff are alerted.
- **Post-Feeding Monitoring:** If food remains uneaten 10 minutes after dispensing, the system activates an alert to flag potential health or behavioral issues.
- **Data Logging:** The system records the amount of food dispensed and consumed, providing staff with daily insights into pet feeding behavior.
- **Alerts & Notifications:** Real-time alerts are sent to staff via integrated channels (e.g., app, SMS).
- **Scalability & Intelligence:** Designed to support multiple pets, with potential for smart features like machine learning-based behavior tracking and camera integration.

This system enhances pet welfare through automation, early issue detection, and actionable data insights.

Copilot reply – summary of my previous provided implementation