Intelligent Fish Tank

CM 1210 – Introduction to Intelligent Machine

Assignment

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1. Introduction

Fish tanks are used in almost all houses and offices. Fish tanks are used to beautify the surroundings. And Fish tanks are helped to reduce stress, reduce high blood pressure, and maintain mental health. Fish tanks need human intervention sometimes. Some cases like cleaning the fish tank, feeding the fishes, checking the water quality, checking if there are any water leaks happening in the fish tank, need human intervention, and need more time. As we are in the 21st century, it's better if we can make the fish tank intelligent and reduce human intervention. So, by identifying where fish tank needs human intervention and implementing some sensors and AI technologies, we can reduce human intervention on some features such as changing water, feeding fishes, checking water quality, checking water leaks in the fish tank. So, I present intelligent fish tank by analyzing exiting fish tank features. I also suggest possible AI techniques like Fuzzy Logic to implement the above intelligent features in a fish tank.

2. Fish Tank

Diagram (Figure 1) showing basic architecture of a fish tank.

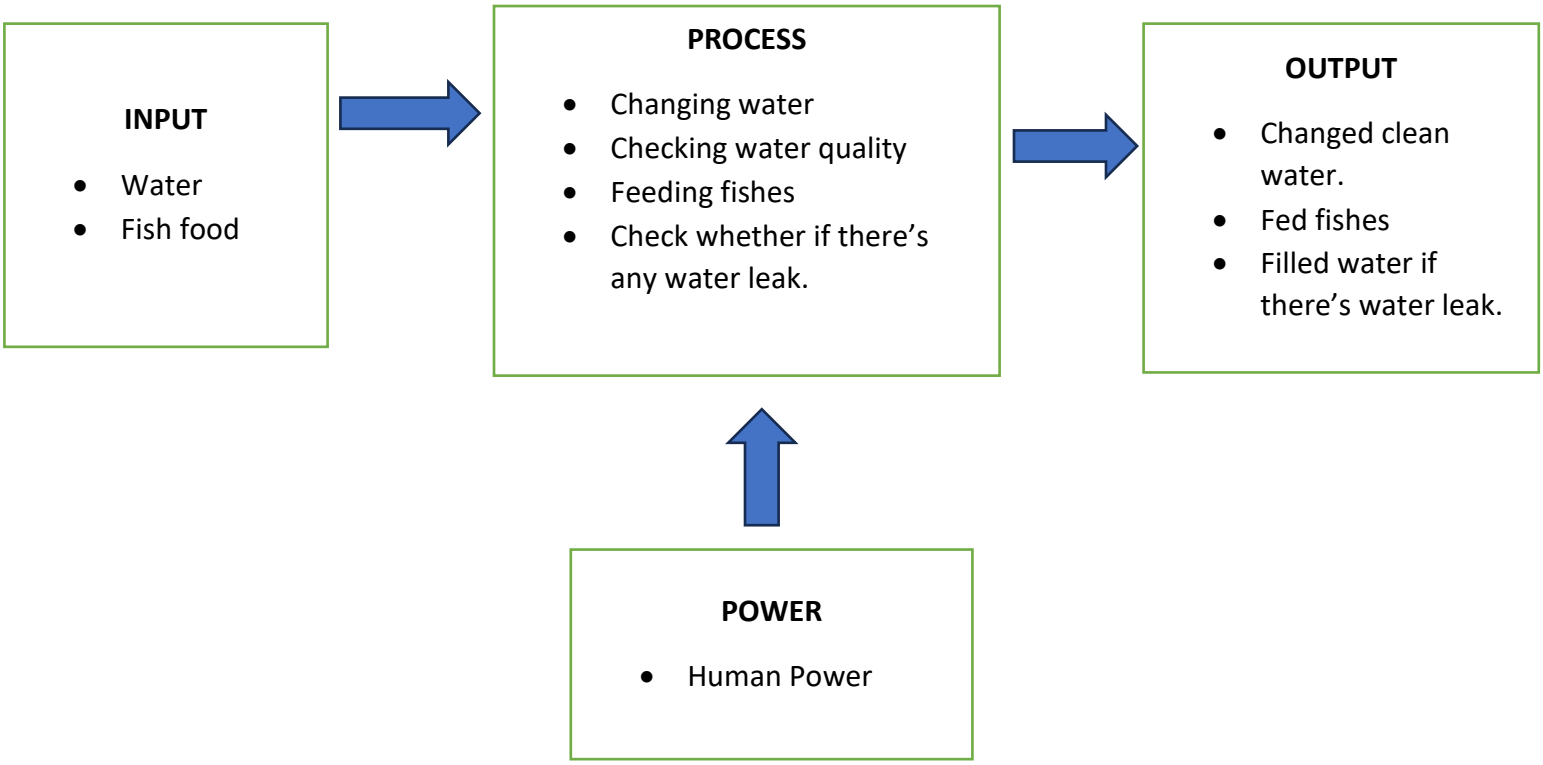


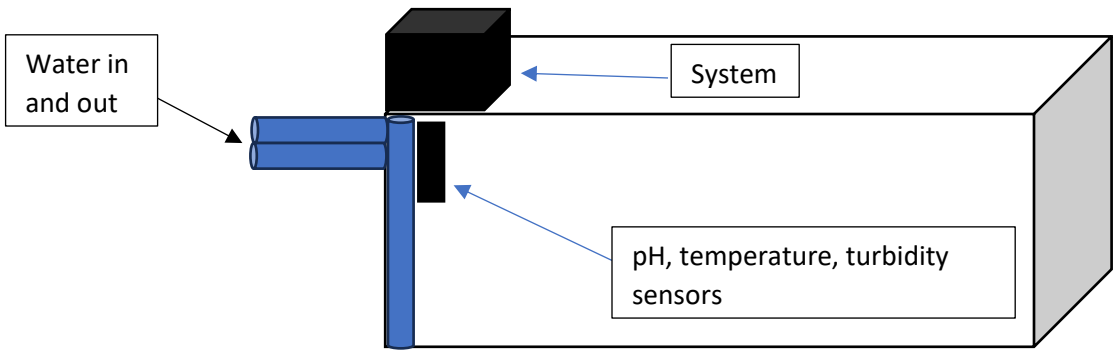
Figure 1 – Architecture of existing fish tank

By using some sensors like pH sensor, water temperature sensor, turbidity sensor, water level sensor and by implementing AI technologies like fuzzy logic, we can add intelligent extensions to tasks such as changing water, checking water quality, adding water if there's any water leak and sound an alarm.

Changing water (impure water to pure water) needs a lot of time from human time, that's why I thought to add intelligent extension to that task.

3. Intelligent Fish Tank

Diagram (Figure 2) showing the architecture of a fish tank with intelligent extensions.



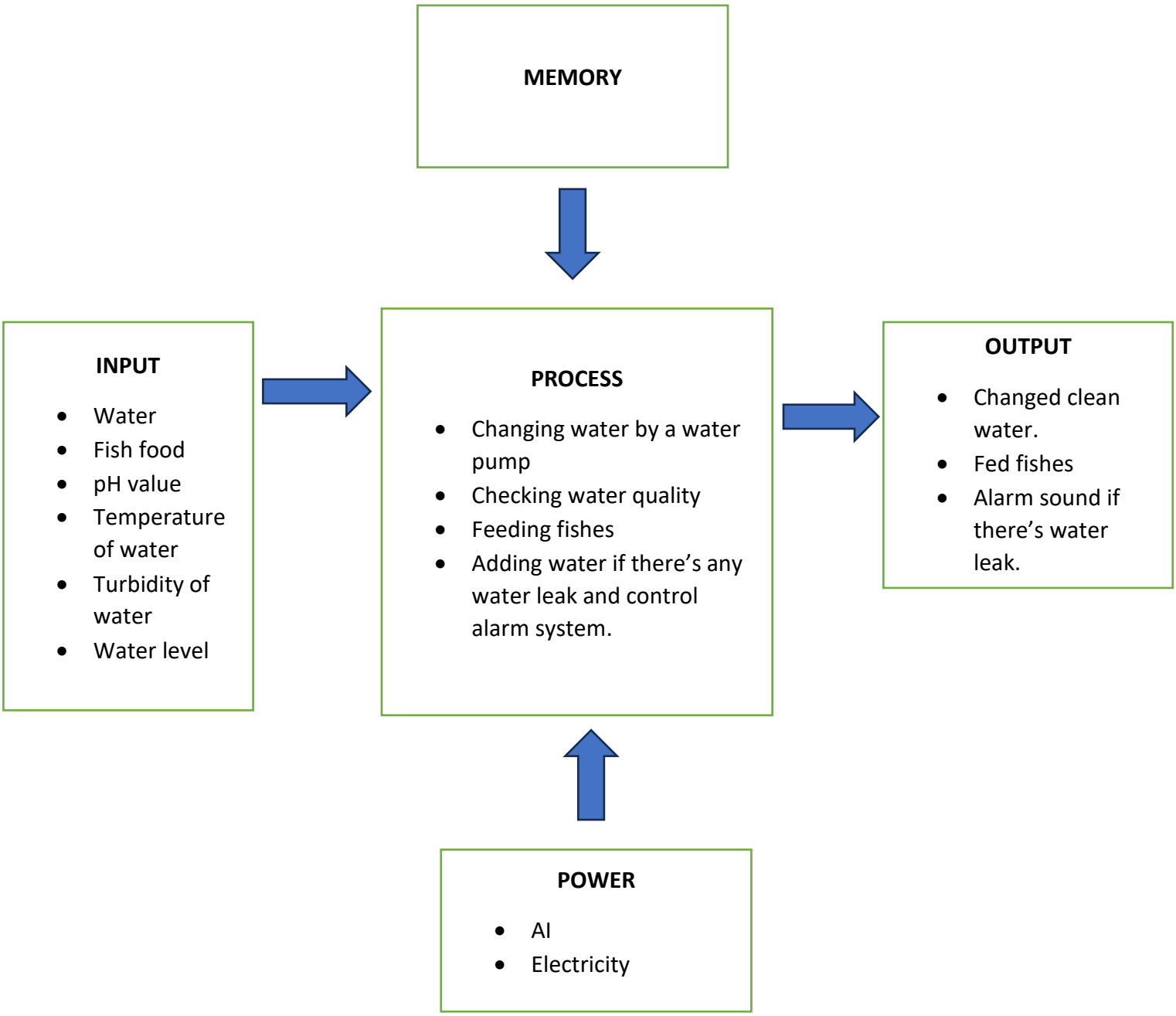


Figure 2 – Architecture of Intelligent Fish Tank

Here in intelligent fish tank, there are some sensors (pH sensor, water temperature sensor, turbidity sensor) to detect water quality, water level sensor to check water level, Alarm system to inform user if there's water leak in the fish tank. And according to sensor input data, water changing task, water filling task and sounding alarm system task will happen. Fuzzy Logic AI technique used in that intelligent fish tank system.

1. pH sensor
    - pH value of water should in between 6.8 – 7.8.
    - If the pH value of water is smaller than 6.8 or higher than 7.8, the system will start to change current water to new pure water until pH value become normal (in range 6.8-7.8).
    - It implements **Fuzzy Logic** AI technique - Being sensitive about several values rather than looking for one static value. (pH range in between 6.8 to 7.8 is good for a fish tank)

2. Temperature sensor
    - The temperature of water should in between 25 C – 27 C.
    - If Temperature of water smaller than 25 C or higher than 27 C, system will start to change current water to new pure water until Temperature become normal (in range 25 C - 27 C).
    - It implements **Fuzzy Logic** AI technique - Being sensitive about several values rather than looking for one static value. (Temperature in between 25 C to 27 C is good for a fish tank)

3. Turbidity sensor
    - If the Turbidity level of water is high, the system will start to change current water to new pure water until turbidity level becomes low.
    - It also implements **Fuzzy Logic** AI technique - Being sensitive about several values rather than looking for one static value.

4. Water Level sensor
    - If the water level is lower than the assigned value range or higher than that value range, the system will start to fill the tank or remove water from the tank until water level reaches that assigned range.
    - It also implements **Fuzzy Logic** AI technique - Being sensitive about several values rather than looking for one static value. (for example, water level should in between 30-35 cm from the bottom of the fish tank)
    - If Water level is not reaching correct level range by the time, it means that there's a possibility of water leak in the tank, then the system will start to sound the alarm to inform the user about that.

4. Summary

This document presents my proposal to extend a standard fish tank with intelligent features. The purposed intelligent fish tank has implemented the intelligent features, namely, decision making to change the water and to identify whether water is leaking or not and for that I implemented fuzzy logic AI technique.