MAHENDRA INSTITUTE OF ENGINEERING AND TECHNOLOGY

PROBLEM DEFINITION AND DESIGN THINKING

"SMART WATER FOUNTAINS"

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DECLARATION :

We, student of Computer Science
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MAHENDRA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,TAMILNADU that the work entitled " SMART WATER FOUNTAINS " has been Sucessfully completed under the guidance of Asst.prof.Mrs.ARUNA , Computer science and Engineering and Technology ,Namakkal.This dissertation work is submitted in partial fulfillment of the requirement for award of Degree of Bachelor of Engineering in Computer Science and Engineering during the academic year 2021-2025.

ABSTRACT :

Water Fountains have been a major tourist attraction.thesa days which freeze the attention of tourists with their variety of lights,designs and heights.And as we all know music holes a major part in our day to day lives. and hence our idea is to combine

the beautiful water fountain with mucisic which makes an extraordinary tourist attraction when constructively set with the range of frequencies that enables us to operate through varios electronic devices. Musical water fountaion consist of Arduino, sound sensor with external MIC, submersivle motors, LCD, Relay modules, sound generation using mobile, ARGB LED light strip and adapters.

Introduction

Objective:

Today, more people around the world have pets than ever before. According to American Pet Products Association's survey in 2020, 67% of U.S. households own a pet which is about 84.9 million homes. This proportion has been increased by 20% in thirty years .

Breakdown of the pet types, cats and dogs are the most popular animals, they contribute to about 80% of all pets. Same trend happens all over the world.

A source of fresh clean running water can encourage pets to drink. As a result, a water fountain is essential to most households having cats or dogs as pets. However, we can not ensure the water quality when we are away from home for several days. It can happen when pets have finished all remaining water in the water fountain, or water has been polluted somehow by the pet.These can cause the pet to be unwilling to drink water from the fountain.

"Our goal is to design a smart water fountain that can monitor the water quality and automatically replace water when polluted(not healthy) or running out "

We will use sensors to measure the water quality. Common water quality measurement factors include temperature, Ph-value, conductance, turbidity and hardness. These data will be collected, calculated, and reflected to the user in terms of “Good”, “Average” and “Bad”. The water fountain is also designed to self-filter the water every time when water is pumped through the submersible water pump.

Background:

There have been quite a lot of water fountain products on the market, while most of them have only filtration as an extra function besides providing running water.

The size of the water fountain limits the capacity of the water source that most water fountains cannot store enough water for multiple pets to drink in several days.

Our water fountain can be connected to an extra water source that provides enough water for long-term usage. The link is adaptable to universal water bottles for convenience. The sufficient water source as well as automatic replacing and refilling function enable pet owners to leave home for several days without worrying about water supply for pets.

Physical Design:

A pictorial representation of your project that puts your solution in context. Not necessarily restricted to your design. Include other external systems relevant to your project (e.g. if your Solution connects to a phone via Bluetooth, draw a dotted line between your device and the phone). Note that this is not a block diagram and should explain how the solution is used, not a breakdown of inner components.

High-level requirements list:

• Able to drain the polluted water and replace it with

fresh water. Specifically, the polluted water will be drained by a motor-controlled valve to the “polluted water temporary storage tank” part. After completing the draining process, fresh water will be pumped fromthe general water supply.

• The fountain must accurately monitor the water quality, including measuring water temperature up to 48.89C and pH values between 6.5 and 8.5.

• Able to be connected to the users’ devices through WIFI. Prompt feedback from the smart water fountain to users’ interface with relevant information including the remaining water level and water quality index: ‘Good’, ‘Average’ and ‘Poor’.

Design

The block diagram below is a general design of our solution. We divide our design into four modules, including Power Supply, Control Unit, External Control, and Mechanical Unit.

Details of each unit is presented in the diagram and described in the ne

xt section.

Sensor Unit

This block contains the four sensors. The data acquired from the sensors will be transmitted to the control unit. Control unit will then have some logic designed to send corresponding signals to control other blocks of the water fountain. At the same time, the display screen on the water fountain will display the readings along with the determined water quality level and remaining water quantity.

For the PH-value sensor, temperature sensor and conductivity sensor, values will beretrieved and calculated to determine the overall water quality level. When poor water quality is determined, the water replacement procedures will take place. The weight sensor readings will be used to determine the amount of

fresh water left in the water tank.

Temperature Sensor:

A water-proof temperature sensor is going to be used. Part number from sparkfun is: DS18B20 [6]. This temperature sensor is compatible with a relatively wide range of power supply from 3.0V to 5.5V. The measured temperature ranges from -55 to +125 celsius degrees. Between -10 to + 85 degrees, the accuracy is up to +-0.5 degrees. This sensor can

fulfill all requirements needed for this project.

PH-sensor:

PH value is a valued indicator of water quality. This PH-sensor[7] works with 5V voltage, which is also compatible with the temperature sensor. It can 6measure the PH value from 0 to 14 with an accuracy of +- 0.1 at the temperature of 25 degrees.

Conductivity sensor:

Conductivity sensor is also part of the water quality assessment. The input voltage is from 3.0 to 5.0V. The error is small, +-5%F.S. The measurement value ranges

from 0 to 20 ms/cm which is enough for water quality monitoring.

Power Supply Unit

Zn-Mn Battery

The Zn-Mn battery must be able to continuously support the functioning of the circuit, display unit, and the mechanical unit.

Requirement:

Commercial batteries will be used to maintain a continuous 3.60V power supply for at least 24 hours. If the chosen battery is not powerful enough, 120V power outlets will be considered.

Voltage regulator

The integrated circuit will regulate the power supply for each module to maintain their functionality. This chip must be able to handle the maximum voltage supplied by the battery

(3.60V ± 0.5V) while ensuring the voltage at each module does not exceed their limit.

Requirement: Must maintain thermal stability below

100°C.

Control Unit

This unit contains the control unit which does the following things:

• When the weight sensor reports a weight less than the minimum weight setting, the
control unit will send an alert signal to the user and then control the water supply unit to refill
the water fountain with a certain amount of water.

• Computes the water quality with data transferred from the three sensors in the water

quality module and sends the result in terms of “Good”, “Average” or “Bad” to the user.

• If the water quality is “Bad”, the control unit will control the drain module to drain the water in the fountain and then control the water supply to refill.

Mechanical Unit Block

I-1 of IEEE Code of Ethics:

Quoted from IEEE Code of Ethics[11]: “To hold

paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, to protect the privacy of others, and to disclose promptly factors that might endanger the public or the environment.”

We will carefully choose the materials used to build the container. Non-toxic are sure to be used. We will prefer using reusable materials. In addition to that, the users can choose to buy reusable bottles of water for the freshwater supply for the water fountain. Those universal water bottles are safe and reusable. A special connector will be designed and the universal connection is to be used. After the water in the bottle is used up, this reusable bottle can be recycled and reused. This is the most environmentally-friendly solution. It not only improves the practicality, convenience, and reduces the future cost when using the water fountain.

Conclusion:

The problems associated with the manual watering inspired the development of this project. Thus the project"SMART WATER FOUNTAINS" has been designed successfully and tested to function automatically. Since the

system have been proven to work satisfactory, the aims and objective of this project have been achieved. Further more, this project can bee used to improved standard of living, give our crops healthier life make our environment greener and serve as a means of income if the project designer decides to commercialize it.

REFERNCE:

1. Bordeaux and P. Prevot, "fountain " , 2006.

2. A. Liddel, "Water fountain benefits", net health shops, LLC.

THANK YOU...