

# Smart water fountain

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# 1. Introduction

## 1.1 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 [1]. 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. On average, one in three households own a dog globally and about a quarter of households worldwide own a cat [2]. Both cats and dogs prefer flowing water. A source of fresh clean running water can encourage pets to drink. Drinking a certain amount of water daily plays an important role in long-term health for pets, especially cats. 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 [3]. Considering the pollution at home can only affect limited factors, we choose temperature, Ph-value and conductance to be the three properties used for calculating water quality in our water fountain. 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.

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```
#include <ESP8266WiFi.h>
String str="";
const char* ssid = "Kriyative";//type your ssid
const char* password = "Kriyative1!";//type your password
```

```
IPAddress ip(192,168,1,8);
```

```
WiFiClient client;
```

```
void setup()
```

```
{
  pinMode(LED_BUILTIN,OUTPUT);
  digitalWrite(LED_BUILTIN,HIGH);
  Serial.begin(9600);
  delay(10);
  // Connect to WiFi network
  Serial.println();
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
```

```
WiFi.begin(ssid, password);
```

```
while (WiFi.status() != WL_CONNECTED)
{
  delay(500);
  Serial.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
```

### 1.3 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.

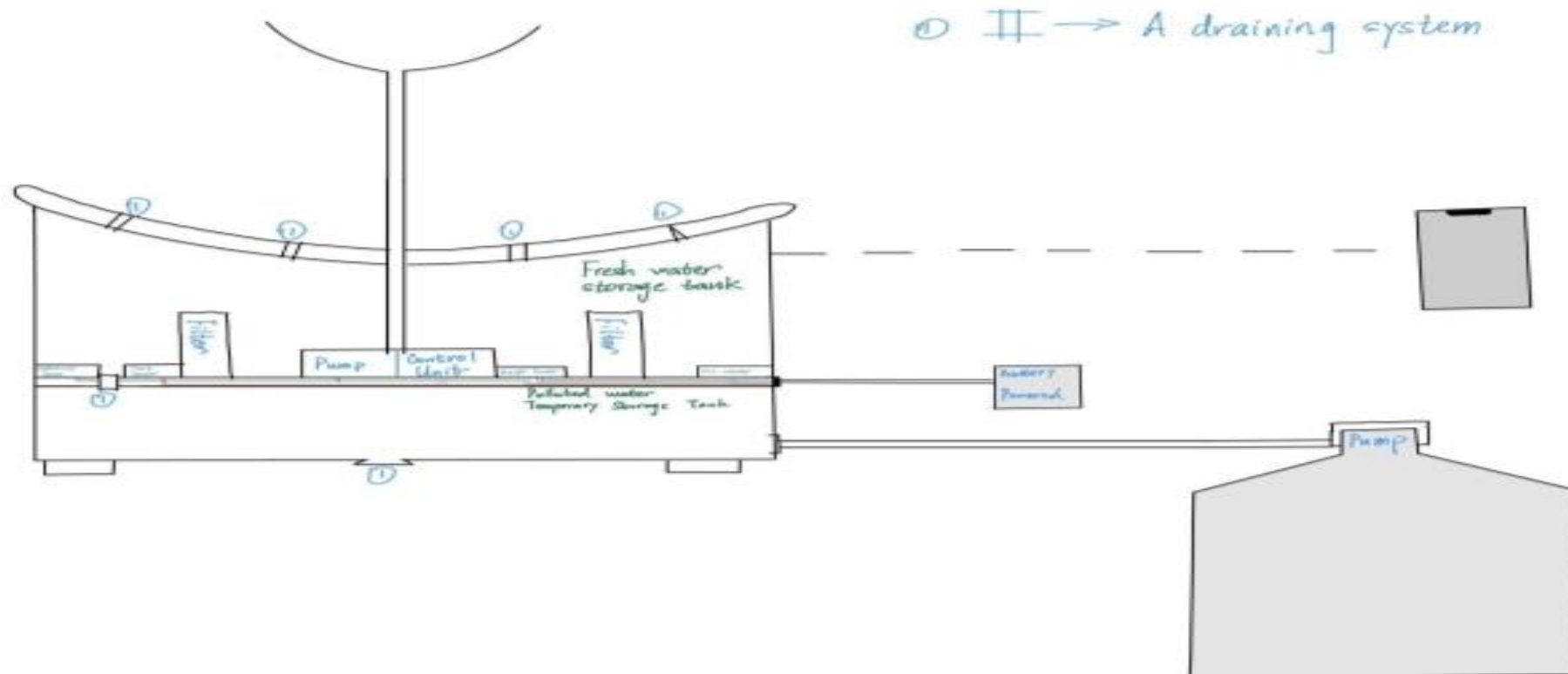


Figure 1 Smart Fountain Physical Diagram

```
}
```

```
void loop()  
{
```

```
    if (client.connect(ip, 8080))  
    {  
        Serial.println("connected");  
        // Make a HTTP request:  
        client.println("GET /stat HTTP/1.1");  
        client.println();  
    }  
    else  
    {  
        // if you didn't get a connection to the server:  
        Serial.println("connection failed");  
    }  
    delay(1000);  
    //Reading the response from the server..  
    while (client.available())  
    {  
        char c = client.read();  
        str+= c;  
        delay(50);  
    }  
    if(str.indexOf("ON")!=-1)  
    {  
        digitalWrite(LED_BUILTIN,LOW);  
        Serial.println("on");  
    }  
    else
```

## 2. 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 next section.

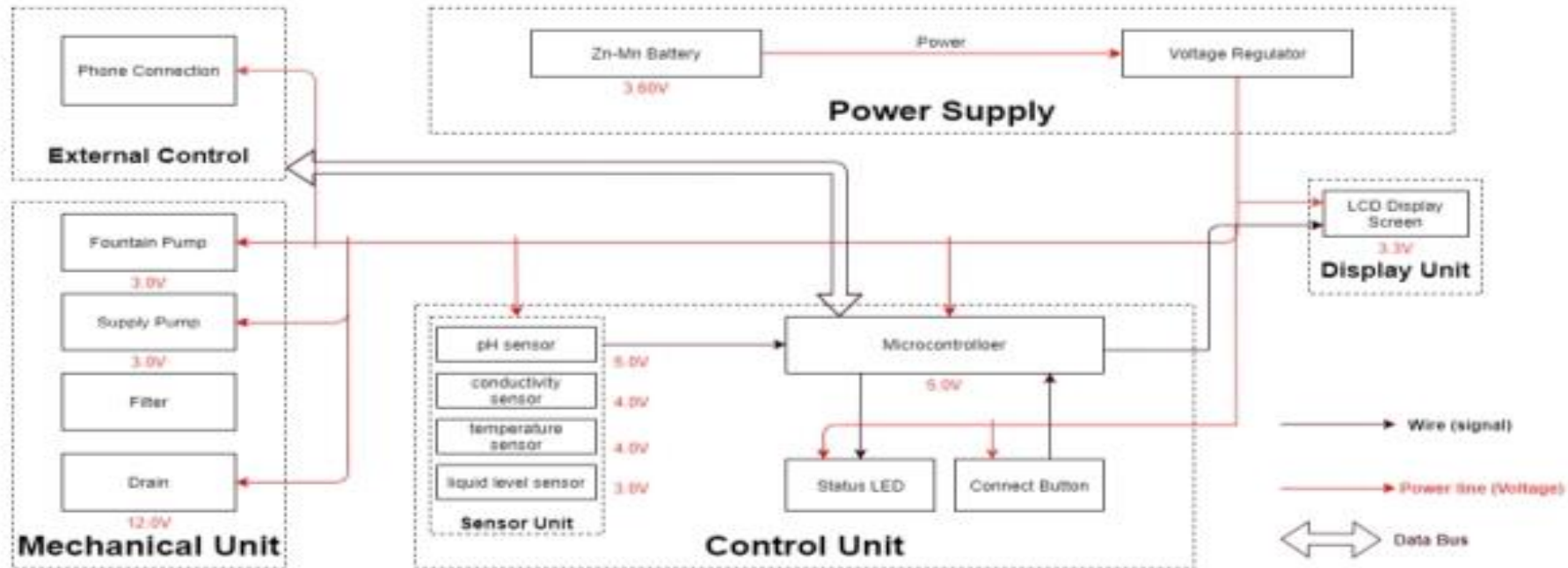


Figure 2 Block Diagram of Smart Water Fountain

### **3. Ethics and Safety**

#### **3.1 Mechanical Unit Block**

##### **3.1.1 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. [12] 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 and complies with the IEEE Code of Ethics #I-1. It not only improves the practicality, convenience, and reduces the future cost when using the water fountain.

##### **3.1.2 II of IEEE Code Of Ethics:**

Quoted from [11]: “II. To treat all persons fairly and with respect, to not engage in harassment or discrimination, and to avoid injuring others.”

As mentioned in the 3.2, the mechanical unit involves electronic components that are physically placed in the water tank. The consequence can be serious if the leakproofness is not performed properly. To maintain a safe, convenient using experience, we will be responsible for testing and ensuring all containers meet the demand. These actions must be taken to ensure the safety of using the water fountain and protect the others.

##### **3.1.3 I-6 of IEEE Code Of Ethics:**

Quoted from [11]: “to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations.”

All team members involved in the development of the water fountain have completed “Laboratory Safety training” and have gained required and necessary knowledge in dealing with emergency situations. In case of accidents, proper reaction will be made to ensure the safety of people and property to the largest extent.

*Thank You*

