PHASE-2 INNOVATION

SMART WATER FOUNTAIN

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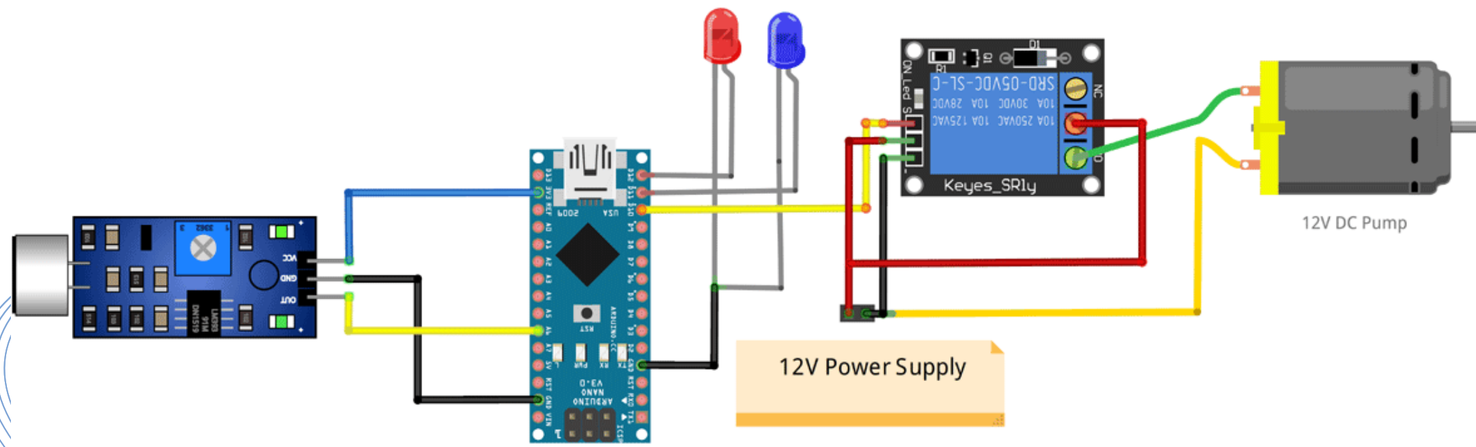
INTRODUCTION

Smart Water Fountain using IoT. This is a great system and project for techies, hobbyists, and project makers. What do you need to make this system and how you can make it we will share all the details. We have uploaded a lot of projects before from our smart irrigation system using Arduino

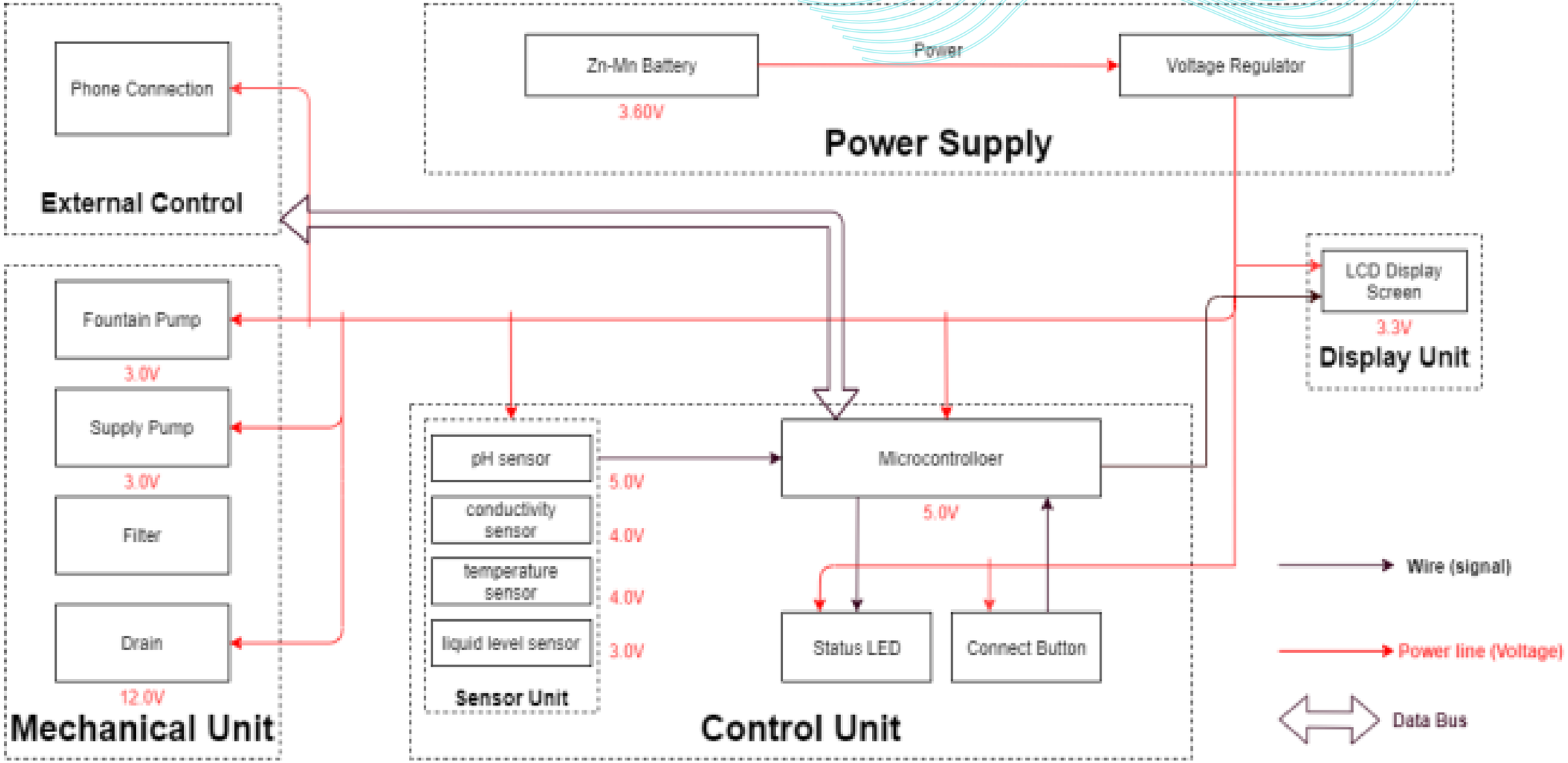


DESIGN PRINCIPLE

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

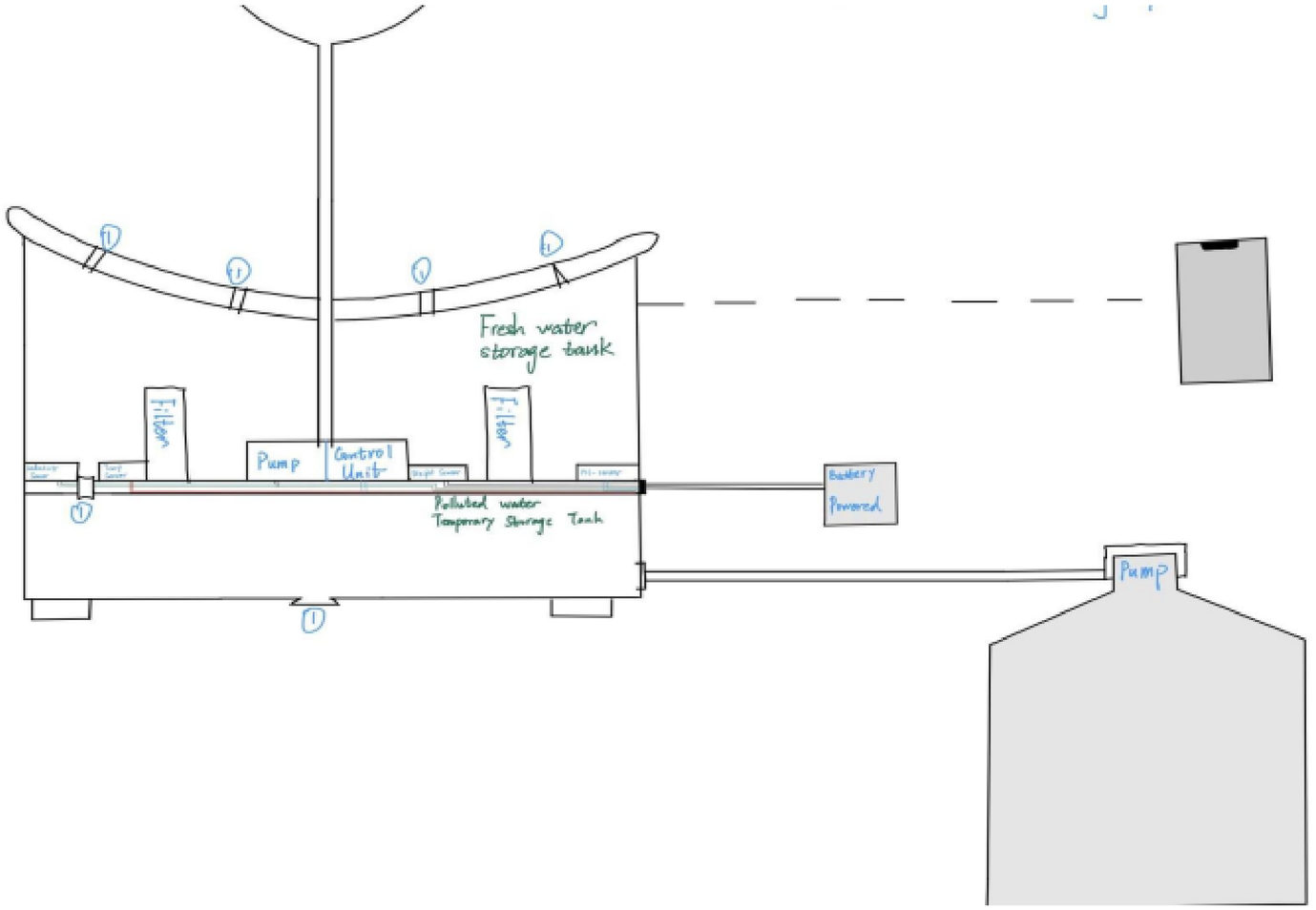
BLOCK DIAGRAM:



Block Diagram of Smart Water Fountain

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.



Smart Fountain Physical Diagram

COMPONENTS :

Sensor Unit :

- Temperature Sensor
- PH-sensor
- Conductivity sensor
- Liquid Level Sensor

Display unit:

- Screen

Ethics and Safety:

- 1 of IEEE Code of Ethics:
- I-6 of IEEE Code Of Ethics:
- II of IEEE Code Of Ethics:

Power Supply Unit:

- Zn-Mn Battery
- Voltage regulator

Mechanical Unit :

- Fountain Pump
- Supply Pump
- Filter
- Drain

COMPONENTS :

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

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.

Liquid Level Sensor:

This sensor [9] is responsible for reflecting how much freshwater is left in the water tank. When the water level is low, fresh water will be pumped to the water tank to ensure the water fountain keeps running with freshwater. This sensor is 0.5 Watts. For water level from 0 to 9 inches, the corresponding sensor outputs readings from 0 to 1.6. From that, the quantity of freshwater left can be determined.

COMPONENTS :

Display unit:

The screen will be used to display the readings from the sensors in a real-time manner.[10] In addition, other necessary information will also be displayed. As described in the sensor part, the water quality and remaining water quantity will be displayed. The screen will be programmed so that it makes it easy for users to read information.

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.

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.

Mechanical Unit:

Fountain Pump

The fountain pump must maintain a continuous water supply through the fountain mechanism. The pump must work 24 hours a day, 7 days a week unless the user manually turns off the power supply.

Requirement 1: The fountain pump must lift a cylindrical water stream of diameter 6mm for a height of 400mm.

Requirement 2: The fountain pump must serve for a duration of 2 years without maintenance or replacement under heavy workload.

Requirement 3: The fountain pump should have an operational condition around 3V, 200mA

Supply Pump

The supply pump must function when a low water level alert is raised. While no water supply is requested, the pump must prevent water flow between the main supply and the fountain.

Filter:

The filter must maintain the water quality through controlling the pH value and conductivity of the water.

Requirement 1: The filter must have a cost less than $5 each for frequent replacement. Each new filter must serve a duration no less than 3 month.

Requirement 2: The filter must be designed for easy removal and installation, while the connection mechanism must have a low degenerate rate when submerged in water.

Drain:

The drain must be able to hold and release water in the fountain. When water in the fountain should be replaced, the faucet should automatically drain the fountain once instruction is received from the integrated circuit.

Ethics and Safety :

I-1 of IEEE Code of Ethics:

Quoted from IEEE Code of Ethics: “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.”

2 II of IEEE Code Of Ethics:

Quoted from : “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 I-6 of IEEE Code Of Ethics:

Quoted from [11]: “to maintain and improve our technical competence and to undertake hnological tasks for others only if qualified by training or experience, or after full disclosure of rtinent limitations.” All team members involved in the development of the water fountain have ompleted “Laboratory Safety training” and have gained required and necessary knowledge in ling with emergency situations. In case of accidents, proper reaction will be made to ensure the safety of people and property to the largest extent.

COMPONENTS :

SOFTWARE :

- 1 Arduino IDE
- 2 Blynk Platform

WORKING PRINCIPLE:

Nowadays, the internet of things has been improved greatly with the progress of the sensor, big data, mobile Internet and other relative technologies. One water fountain with intelligent monitoring system based on the internet of things is discussed in this paper. The key parameters of the water fountain were derived from the sensors and transmitted the encrypted data by GPRS or WIFI net to central server automatically. The Access database was established according to the real time running data of each water fountain fixed everywhere. The unified database management and maintenance could be achieved with the PC interface application by the users or the server station administrator with different authority. Products applications show that this intelligent monitoring system could provide reliable real-time monitor, control the water fountain through internet and inform abnormal states of the machine to the administrator and the users in short message promptly.

CONCLUSION :

Nowadays, the internet of things has been improved greatly with the progress of the sensor, big data, mobile Internet and other relative technologies. One water fountain with intelligent monitoring system based on the internet of things is discussed in this paper. The key parameters of the water fountain were derived from the sensors and transmitted the encrypted data by GPRS or WIFI net to central server automatically. The Access database was established according to the real time running data of each water fountain fixed everywhere. The unified database management and maintenance could be achieved with the PC interface application by the users or the server station administrator with different authority. Products applications show that this intelligent monitoring system could provide reliable real-time monitor, control the water fountain through internet and inform abnormal states of the machine to the administrator and the users in short message promptly.