

Phase 2: Innovation

Design into Innovation for IOT-based Smart Water Fountains.

Water quality: 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. The water fountain is also designed to self-filter the water every time when water is pumped through the submersible water pump.

Sensors: This block contains the four sensors such as, Temperature, PH-value sensor, Conductivity sensor and Liquid level sensor. 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.

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.

- **Requirements:** The fountain pump must lift a cylindrical water stream of diameter 6mm for a height of 400mm. The fountain pump must serve for a duration of 2 years without maintenance or replacement under heavy workload. 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.

- **Requirement:** The supply pump should have an operational condition around 3V, 200mA.

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

- **Requirements:** 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. 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.

Control Unit: 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.

Conclusion: Smart Water Fountain is used for Control water pollution and maintains the quality of water. Our water fountain can be connected to an extra water source that provides enough water for long-term usage.

Steps to put the design into a transformation: The following are the steps that are taken to put the design the IOT based on smart water fountains.

- 1) To solve the problem identified: One of the most challenging points in this project is the precise control of the control unit between different blocks. To react accurately and promptly based on the results from the sensors is the key.
- 2) Research on the smart water fountain: The research on the project that are discussed on the solution of the problem.
- 3) Design of the smart water fountain: To design a smart water fountain using components such as, sensors, pumps, filters, draining system motors are to be placed in the water tank.
- 4) Testing the design: This helps in developing the design and implementing in real world to observe that how it works