IOT BASED SMART WATER FOUNTAINS...

PHASE_2 : INNOVATION

ARDUINO CONTROLLED WATER FOUNTAIN USING SOUND SENSOR.

The basic idea of this Arduino Water Fountain is to take an input from any external sound source like mobile, iPod, PC etc., sample the sound and break it down to different voltage ranges, then use the output to turn on various Relay. We first used a condenser mic based sound sensor module to perform on the sound source to split the sounds into different voltage ranges. Then the voltage will be fed to op-amp to compare sound level with a particular limit. The higher voltage range will correspond to a relay switch ON which comprises a musical water fountain operating to the beats and rhythms of the song.

SMART WATER FOUNTAINS:

If you are not at home ,you don't have to rush back to give them fresh water. Simple use the Tesla smart Mobile app to run the fountain from wherever you are. And if you want to make this pleasant duty even easier, just automate the entire process in the app.

Background:

There have been quite a lot of water fountain products on the market[4], while most of them Have only filtration as an extra function besides providing running water. [5] 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.

MATERIAL REQUIRED:

1.Arduino Nano
2.Sound Sensor Module
3.12V Relay Module
4.DC Pump
5.LEDs
6.Connecting Wires
7.Vero board or Breadboard

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 be Retrieved 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:

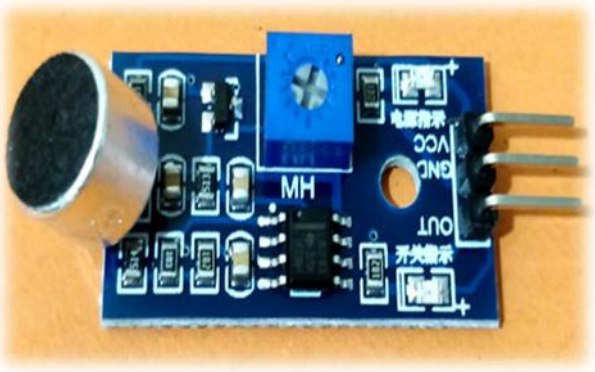
Conductivity sensor is also part of the water quality assessment. The input voltage is from 3.0 to 5.0V. The error is small, +-5%F.S. The measurement value ranges from 0 to 20 ms/cm which is enough for water quality monitoring.

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.

DESIGN FEATURES:

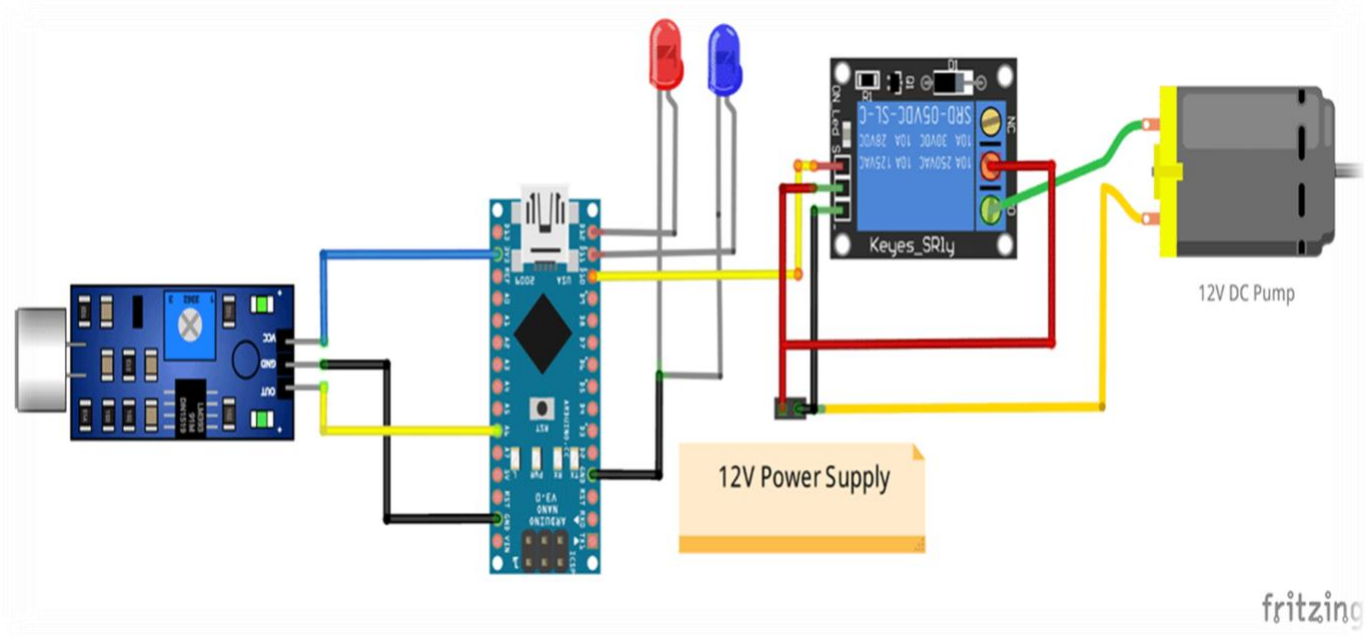
We add for this project sound sensor . The Sound sensor module is a simple electret microphone based electronic board used to sense external sound from the environment. It is based on the LM393 power amplifier and an electret microphone, it can be used to detect whether there is any sound beyond the set threshold limit. The module output is a digital signal which indicates that the sound is greater or lesser than the threshold.



SOUND SENSOR

WATER FOUNTAINS CIRCUIT DIAGRAM:

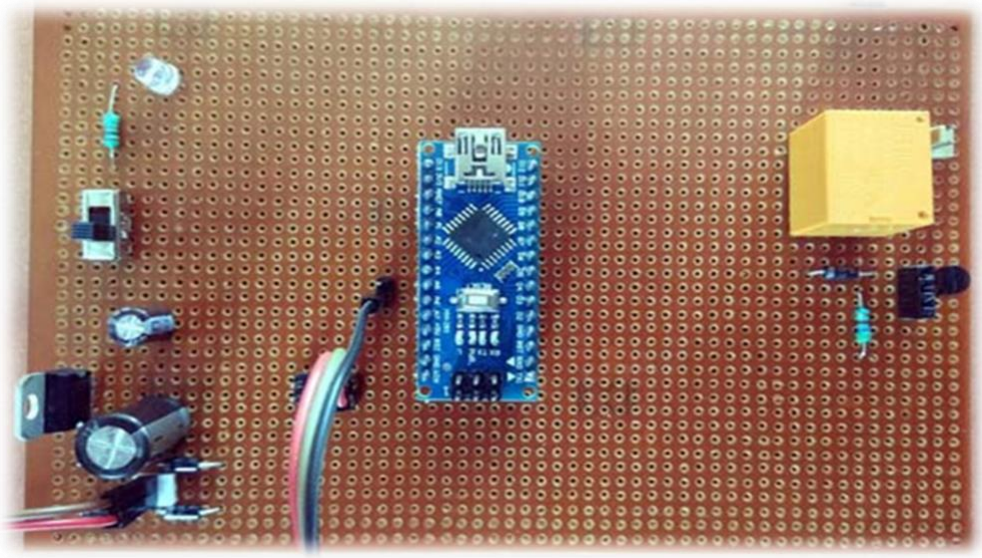
A pictorial representation of your project that puts your solution in context. Not necessarily Restricted to your design. Include other external systems relevant to your project (e.g. if your Solution connects to a phone via Bluetooth, draw a dotted line between your device and the Phone). Note that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



As shown in the above water fountain circuit diagram, the sound sensor is powered with 3.3V supply of Arduino Nano and the output pin of the sound sensor module is connected to the analog input

pin (A6) of Nano. You can use any of the analog pin, but make sure to change that in the program. The relay module and DC pump is powered by an external 12VDC power supply as shown in the figure. The input signal of relay module is connected to digital output pin D10 of Nano. For lighting effect I chose two different colours of LED and connected them to two digital output pins (D12, D11) of Nano.

Here the Pump is connected in such a way that when a HIGH pulse is given to the input of Relay module, the COM contact of the relay is get connected to the NO contact and the current gets a closed circuit path to flow across the pump to activate the water flow. Otherwise the pump will remain OFF. The HIGH/LOW pulses are generated from Arduino Nano depending on the sound input.



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.

Programming Arduino Nano for water Fountain:

The complete program of this Arduino water fountain project is given at the bottom of the page. But here I am just explaining that by parts for better understanding:

The first part of the program is to declare the necessary variables for assigning pin numbers that we are going to use in the next blocks of program. Then define a constant REF with a value which is the reference value of for the sound sensor module. The assigned value 700 is the bytes equivalent value of the output electrical signal of the sound sensor.

```
int sensor = A6;

int redled = 12;
```

```
int greenled = 11;
int pump = 10;
#define REF 700
void setup()
{
 pinMode(sensor,INPUT);
 pinMode(redled,OUTPUT);
 pinMode(greenled,OUTPUT);
 pinMode(pump,OUTPUT);
}
void loop()
{
 int sensor_value = analogRead (sensor);
 if (sensor_value>REF)
 {
  digitalWrite(greenled,HIGH);
  digitalWrite(redled,HIGH);
  digitalWrite(pump,HIGH);
  delay(70);
 }
 else
 {
  digitalWrite(greenled,LOW);
  digitalWrite(redled,LOW);
  digitalWrite(pump,LOW);
  delay(70);
```

```
    }
}
```