SMART WATER FOUNTAINS

Pharse3: Development part1

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Project Title: Smart Water Fountains

SMART WATER FOUNTAINS

Meaning

- Smart water management requires the integration of systems and a complex of measures to monitor, control and regulate the usage and quality of water resources as well as maintain the associated equipment (pipes, pumps, etc.).

- Smart water systems based on the combination of Internet of Things, big data and AI technologies can help stop these predictions from happening and undo the damage the imprudent usage of water resources has already caused.

Materials needed

- 4x 12v mini fountain

- 4 relay module

- Arduino

- 12v power supply for the mini fountains

- Female/male to jumper cables

Codes:

- #define RELAY1 9
- #define RELAY2 10
- #define RELAY3 11
- #define RELAY4 12

 Void setup()

 {

 OUTPUT

- pinMode(Relay1, OUTPUT);
- pinMode (RElay2, OUTPUT);
- pinMode (Relay3, OUTPUT);
- pinMode (RELAY4, OUTPUT);

 }

```
Voidloop()
{
digitalwrite(RELAY1,LOW);
delay(500);
digitalwrite(RELAY4,HIGH);


Digitalwrite(RELAY2,LOW);
delay(500);
Digitalwrite(RELAY1,HIGH);


Digitalwrite (RELAY3,LOW);
Delay(500);
Digitalwrite (RELAY2, HIGH);
Digitalwrite(RELAY4,LOW);
Delay (500);
Digitalwrite (RELAY3, HIGH);
}
```

Simulation

Impart machine

Impart time

#pin assignments for the ultrasonic sensor

TRIGGER_PIN=**23 #GPIO23 for trigger**

ECHIO_PIN=**22 #GPIO22 for echo**

#pin assignment for the LED

LEAK_LED_PIN=**19 #GPIO19 for the LED**

#Set the pin modes

Trigger=machine.pin(TRIGGER_PIN, machine.pin.OUT)

Echo=machine.pin(ECHO_PIN, machine.Pin.(N)

Leak_led=machine.Pin(LEAK_LED_PIN.machine.pin OUT)

```python
#Measure the echo pulse duration to calculate

Pulse_start=pulse_end=O

While echo.value()=O;

Pulse_start=time.ticks_us()

While echo.value()==1;

 Pulse_end=time.ticks_us{}

Pulse_duration=pulse_start

#Calculate distance in centimetres [assuming the speed of sound is 343m/s}

Distance={pulse_duration°0.0343}/2  # Divide by 2 for one-way travel

Return distance

#function to check the water leak

Def check_for_leak():
```
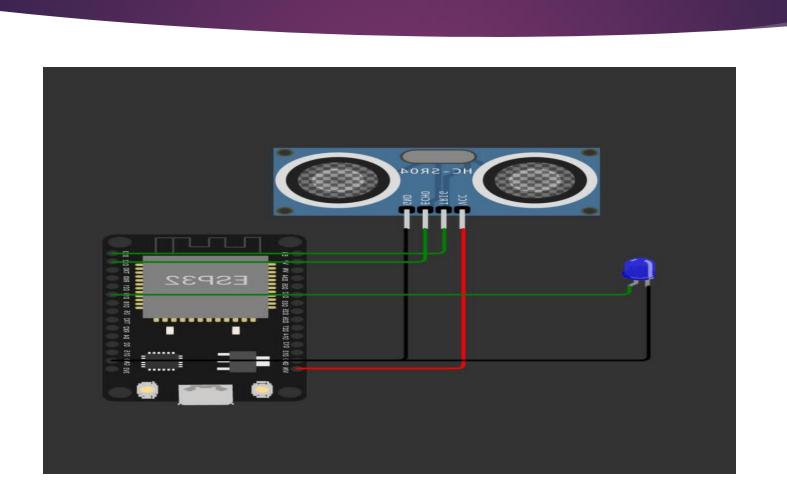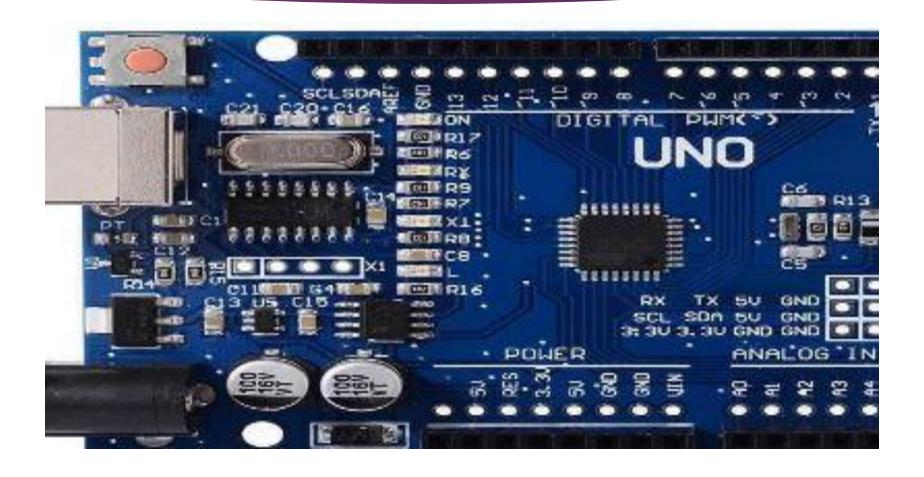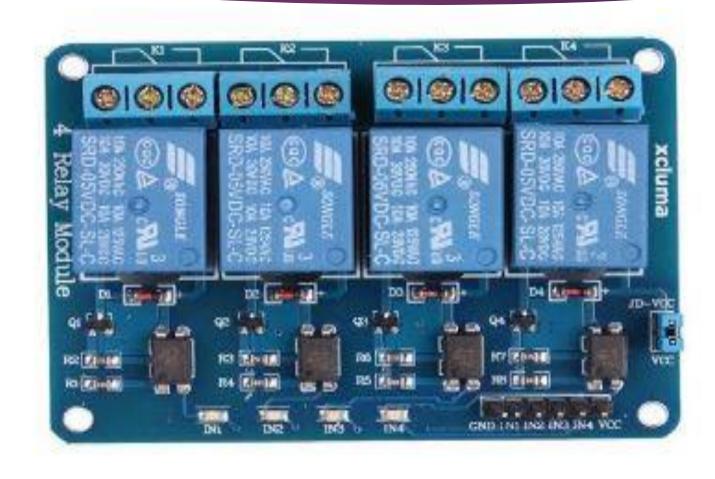
```python
#Main loop
While True;
 If check_for_leak();
  #Blink the LED to indicate a leak
Leak_led.value(1)# led on
Time.sleep{o.5}
Leak_led.value(0)# led off
Else:
Leak_led.value(0) #led off
Time.sleep(1) #delay between measurements
```

Arduino

4 Relay module

4x 12v mini fountain

Female/Male to jumper cables

Modern smart water technologies

- Today, smart water technology brings transparency and improved control to the whole water supply chain starting from a freshwater reservoir to wastewater collecting and recycling.

1. **Sensors**

- Sensors have broad applications in smart water management due to their great diversity and purposes. In a very basic water supply chain, sensors measure:

- the quality of raw catchment water, the chemical composition in the water after treatment and wastewater, etc.

- Changing quantity in the storage reservoir,

- pressure on the pipes in the distribution pipeline,

- wear of the equipment and machinery that process and distribute water to end-user

Objectives of smart water management

The primary objective of smart water management is reasonable and sustainable usage and recycling of water resources. Growing population, increasing environmental issues and pressure on the food and agriculture sector make water even a more precious asset.

1. **Reduce wasting water** used in high volumes for agriculture, manufacturing, power production. It implies the introduction of high-tech practices like precision farming, smart irrigation, crop water management, real-time water metering and other applications of Internet of Things in agriculture. Learn about our agriculture software development services.

2. **Improve water quality** and preventcontamination by chemical waste and natural pollution such as acidification. In order to improve and maintain the quality of water, companies use sensors and IoT technology for real-time monitoring and control.

3. **Enhance the efficiency of water** systems such as water collectors, treatment plants, distribution mains and wastewater recycling centers. Using IoT and data solutions for asset management, companies can keep important measurements such aswater pressure, temperature, flow, etc. At hand, integrate predictive maintenance and avoid breakage and downtime of equipment.

4. **Implement leakage control by using smart water management** devices equipped with leak and moisture sensors. Given that almost $3 billion are spent on fixing the damage caused by leakage yearly, leakage control is essential to keep water resources and budgets safe.

5. **Practice consumption monitoring** via IoT-based water management systems. It helps to optimize and keep under control the usage of water resources at different levels — households, communities, countries and the whole planet.

Benefits of using IoT for Smart water management

► **Transparency**

One of the biggest benefits of smart water management using IoT is improving the transparency of all the processes in the water supply chain. Thanks to the data collected throughout the supply chain, different stakeholders get important insights on their resources and system performance. As a result, they can make informed decisions on how to improve their operations.

► **Immediate response**

Another benefit of integrating intelligent water management systems is the ability to identify or even predict issues and respond immediately to minimize damage. For instance, real-time monitoring of water quality and chemical composition allows to detect even a slight contamination and initiate rapid response before it becomes dangerous.

► **Optimized cost**

Automation, optimized use of human resources, data-driven strategy and proactive approach to equipment maintenance and resource usage eventually translate in significant savings. One of the reasons why water companies look into the use of IoT in water management is to reduce operational costs in the long run.

► **Sustainability**

Sustainability goals are at the center of many retrofit and innovation projects not only in the smart water industry but across any other sector such as energy, construction, logistics, etc. Technologies for smart water use are no longer seen as a source of savings and higher efficiency only, but as the means to reach different environmental goals including reduced carbon footprint, pollution and, essentially, water preservation.
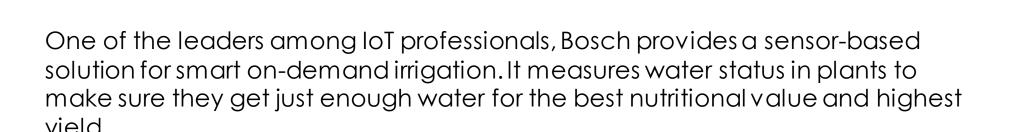
► **Forward-looking strategy**

When it comes to saving water, smart technology is beneficial not only to businesses and consumers but also to the researchers responsible for building forward-oriented water conservation strategies. Using the data provided by water supply management and other connected systems throughout the supply chain, researchers can build data-driven strategies on how to optimize the use of water resources for the benefits of communities, ecosystems and the whole planet.

IoT applications in Smart water management

There're many Internet of Things water management systems and big data solutions in the market that demonstrate the impact these technologies make on the entire industry
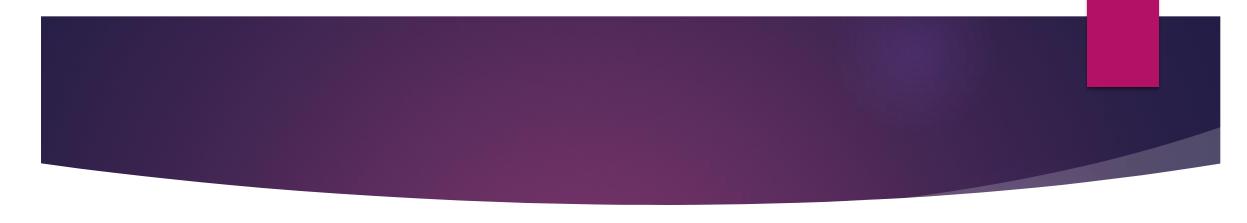
1. **Smart irrigation**

One of the leaders among IoT professionals, Bosch provides a sensor-based solution for smart on-demand irrigation. It measures water status in plants to make sure they get just enough water for the best nutritional value and highest yield

2.Smart water monitoring

Adcon is a smart water company that provides a wide range of water management services from leakage detectors to irrigation management and rainwater monitoring. One of the company's solutions is focused on smart water measurement and quality monitoring for different businesses in the supply chain — farmers, meteorologists, utility services, etc. The solution includes sensors, stations, telemetry units and software which processes generated data and creates insights for the decision-makers.

3.Rainstrom water management

Companies like Raingrid turn rain and stormwater into a water resource able to fully provide water needs for independent households and the whole neighborhoods. The company designs and implements IoT and data solutions to harvest rainwater and transform it into a major water source for off-grid communities. This approach shows how the application of Internet of Things in water resources management helps unlock the new options for more sustainable and resilient living.

IoT Smart water management solutions at Digiteum

▶ At Digiteum, we design and develop IoT software and big data applications for sustainable and resilient use of resources. One of the systems we have been working on is a power consumption monitoring system paired with solar that allows households to get full control over their electricity usage and go completely off-grid.