

Flood Monitoring and Early Warning

Abstract:

A flood warning system typically integrates information on telemetric precipitation and water level/flow, calculated at different places in the local area. Based on these observations, it is difficult to provide information about river conditions, flood types, etc. Floods and excessive rainfall are unavoidable phenomena that can cause massive loss of people's lives and destruction of infrastructure. Flash floods rise rapidly in flood-prone areas, resulting in property damage, but the impact on human lives is relatively preventable by the presence of monitoring systems. Although there are many systems widely in practice by disaster management agencies in monitoring flood levels, most of these systems are limited range and sophisticated to be used and maintained. Furthermore, in most developing countries, the conventional flood gates in water canals are manually operated and suffer from the lack of real-time monitoring of water levels, leading to an overflow in the channels and flash floods. On top of that, the lacking accurate data analysis in the system that can be accessed is one of the limitations of the conventional flood monitoring and warning systems (FMWS). Therefore, in this paper, we have explored and reviewed the existing methods of flood monitoring and emphasizing their structure and sensing techniques. We have also classified and compared their advantages and limitations and accordingly suggested new solutions and improvements by utilizing new technologies based on the Internet of Things. This paper introduces a detailed mini-review of sensing methods in the existing flood systems as reported in previous studies to serve as a quick guide to researchers who are engaging in this field. Based on the review, conclusions have been drawn.

Building Of Flood Monitoring and Early Warning:

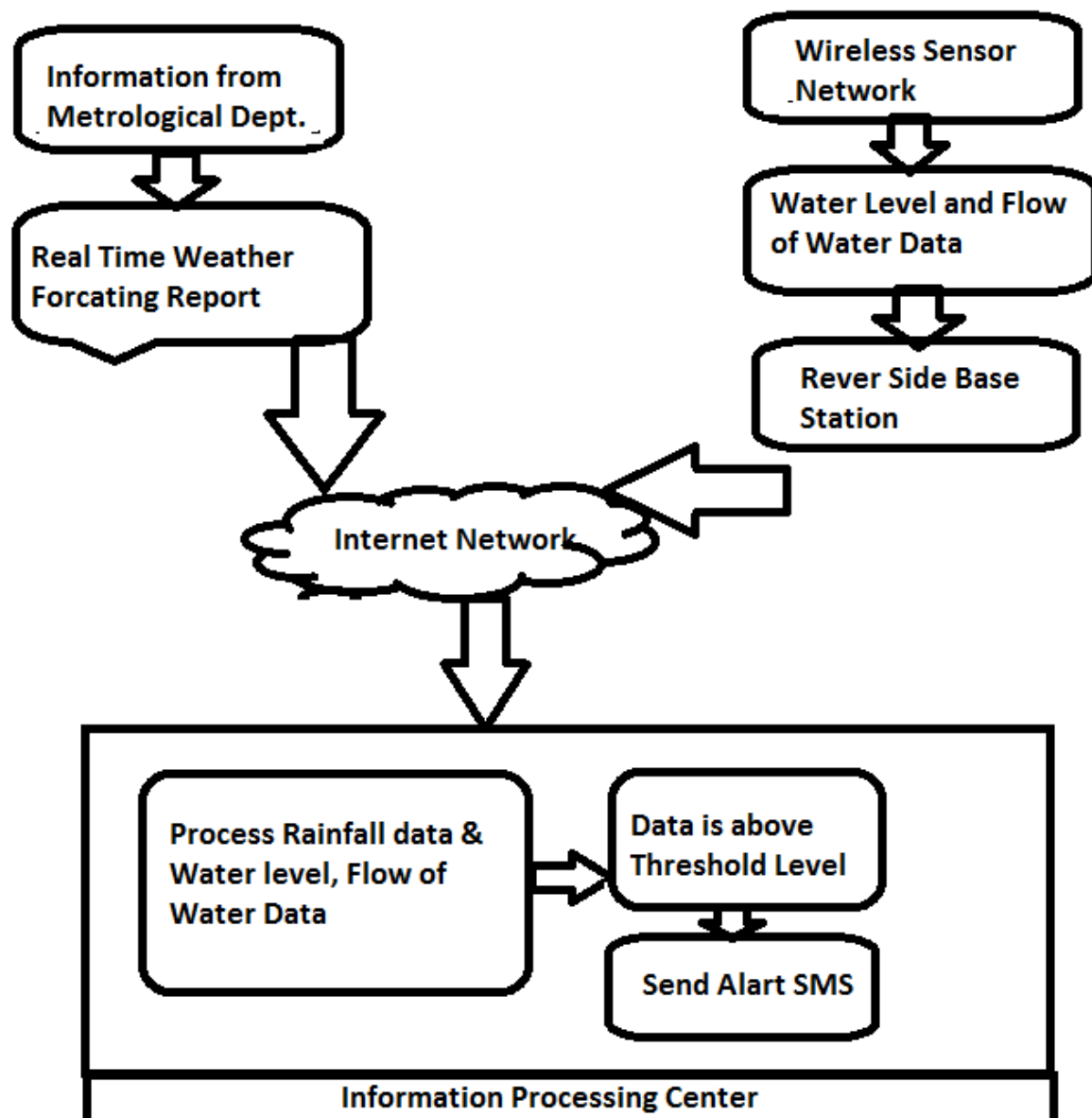
The early warning system is a web-based system that users can access which includes web flood information. The ultrasonic sensors used temperature and humidity sensors to achieve better sound waves which are further combined with flash flood sensors installed on bridges for convenient access to the river.

Flood Early Warning System (FLEWS) is a system by which flood induced hazards can be minimized and prevented. Currently different organizations are working on flood forecasting and early warning at national, continental and global scale.

The flood monitoring and warning system developed by ENVIRA IoT receives accurate and reliable information about real risks, so measures to protect the most vulnerable areas can be established and Public Administrations can collect real data to generate statistics for the design of optimal protection strategies.

Dams provide flood control and also serve many other purposes: water storage, recreation, navigation, electrical generation, and irrigation. Flood control dams keep floodwaters impounded and either release floodwaters in controlled amounts downstream to the river below or store or divert water for other uses.

Avoid building in flood prone areas unless you elevate and reinforce your home. Elevate the furnace, water heater, and electric panel if susceptible to flooding. Install "Check Valves" in sewer traps to prevent floodwater from backing up into the drains of your home.

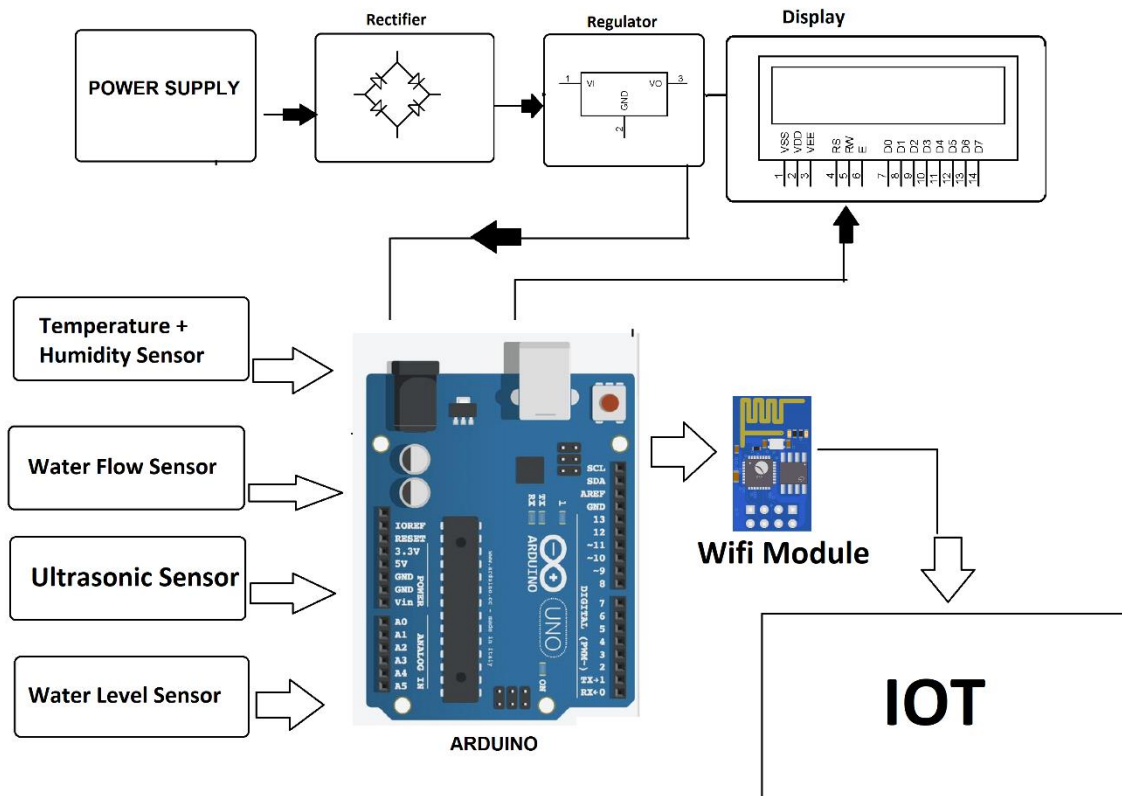


Deploy IoT sensors (Water level sensors) in flood-prone areas and configure them to measure water levels:

An Internet of Things (IoT) water level control and monitoring system is a smart, automated solution to manage and maintain water levels in various applications such as tanks, reservoirs, and swimming pools.

Ultrasonic sensors play a vital role in the systems used for these purposes, which makes them important to flood preparedness.

It is a advanced sensor module with consists of resistive humidity and temperature detection components. The water level is always under observation by a float sensor, which work by opening and closing circuits (dry contacts) as water levels rise and fall.



Python Script:

```
import time
```

```
from your_sensor_module import read_water_level # Replace with your sensor library
```

```
def check_water_level(threshold):
```

```
    while True:
```

```
        water_level = read_water_level() # Replace with your sensor data retrieval function
```

```
        if water_level is not None:
```

```
            if water_level > threshold:
```

```
                alert_flood_warning(water_level, threshold)
```

```
            time.sleep(60) # Check every minute (adjust as needed)
```

```
def alert_flood_warning(water_level, threshold):  
    # Implement your alerting mechanism (e.g., sending emails, SMS, or push  
    notifications)  
    print(f"Flood Warning! Water level is {water_level} meters (Threshold:  
    {threshold} meters)")  
  
if __name__ == "__main__":  
    threshold = 5.0 # Set your threshold value (in meters)  
    check_water_level(threshold)
```