Presentation Title: AQUA ACE

College: IIITDM, Kurnool

Student level: Under Graduation

Presentation Type: Oral

Presentation at: IIITDM

Keywords: NodeMCU

Ultrasonic sensor

Arduino

RF module

Mass flow sensor

Solenoid valve

Duration: One month

Abstract:

Water supply is the most important thing in daily activities. However, our 100% dependency on a mechanical switch based system is responsible for the wastage of our precious limited resource due to common human errors. In this work a fully automated water maintenance system is proposed, which takes care of filling the water tank automatically when it reaches its threshold low level, daily consumption and leakage detection. The system is designed using an Ultrasonic sensor, RFmodule, NodeMCU, Massflow Meter and a Microcontroller which is responsible to handle the automation process proposed above. The prime motto of this project is to upgrade our existing old fashioned fully manual water maintenance systems to a prosperous fully automatic system which is not prone to silly human errors.

Problems:

- Water overflow/wastage from tank due to non automated system
- Shortage of water in tank or empty when needed sometimes
- Wasteful energy consumption
- Water leakages or running taps
- Over consumption or usage of water

Introduction:

Have you ever faced a situation where you are in a total hurry and when you turn on the tap all you see is three or four drops of water dripping from your beloved tap and suddenly nothing….

The tap goes dry and you are frustrated because you are unable to perform your daily routine because of the incompetence of the one taking care of such stuffs. Well now its time for some change, something that can take care of all these stuffs pretty much on its own and that's our product that we call ***Aqua Ace***.

Water is the most important natural resources in human's life. However, the amount of clean water is decreasing, whereas the number of consumers are increasing numerously.

The proposed technology seeks to relieve people from their insignificant but impactful work i.e., to take care of running motor that fills water. One of the present technologies is automation technology. In some cases, people like to carry their work to be set automatically so that they can save power to perform another activity. Some sophisticated automation materials have been established in order to automate work using embedded systems.

Water pump is a tool used for pumping the groundwater to fill a water tank. The various water pump models have currently been used. The first model, the water pump can be operated by turning on and turning off the machine manually. On the other model, the water pump is equipped by a floating ball acted as a

physically tap when the water has fulfilled a tank. However, some weaknesses can be discovered on both models. The manually-operating water pump is not efficient because the water pump cannot turn on and turn off automatically. Sometimes, the condition will cause overflows leading to wastage of user consumable water due to human errors. It leads to excessive loss of electricity, and it also affects the walls making it weak. Likewise, we argue that the second model of floating ball tap-equipped water tank is more useful than manual switch, but the floater sometimes makes the tap and the pipe leaks because the ball has not firmly closed the tap frame. To handle the problems caused by both model, we intend to propose the tank equipped with an ultrasonic sensor with in order to automate the process of maintaining the water level. The sensor will automatically turn on the machine in the certain water tank level and it will be turned off automatically after the water tank is fully filled by the water.

In an era of water scarcity and limited supply other nations such as Germany are driving down consumption to 100 litres per capita per day. Granted we are in a tropical climate for the most part, an effort needs to be made to understand true demand and consumption. In order to consume water frugally this system seriously works.

Methods:

To perform this work, several materials will be used such as Arduino, an ultrasonic sensor, RF module, a relay switch, nodeMCU, mass flow sensor. By using ultrasonic sensor, which is mounted on the top of the tank, transmits an ultrasonic pulse down into the tank. This pulse will be reflected back to the transmitter from the liquid surface. The time delay measurement between transmitted and received signals enables the device to calculate the distance to the surface. The micro controller is programmed to automatically determine the liquid level and send the data to NodeMCU via RF module which is then updated to cloud and also sends the data to a micro controller which switches the pumping machine. In this case, the Arduino board will receive the analog data converted from the ultrasonic signal recorded by the ultrasonic sensor. At the same time, the received data will trigger the relay to control the water pump on or off through RF module of nodeMCU. The ultrasonic sensor works to measure

the distance without contacting the surface. Solenoid valve is placed to change the water supply control of one tank to another either automatically or manually.

A mass flow sensor is connected to main water supply pipe line in each floor so as to detect the amount of water that is flown and is displayed. This reminds each individual to save water as an earth being.

Water leakage is another major problem which need to be taken care of, to prevent this an ultrasonic sensor is placed in inclined posture at the entrance of the rest rooms so as to detect the persons entering and leaving the room and to notify the micro controller when the water flow is present in absence of people in rest room.

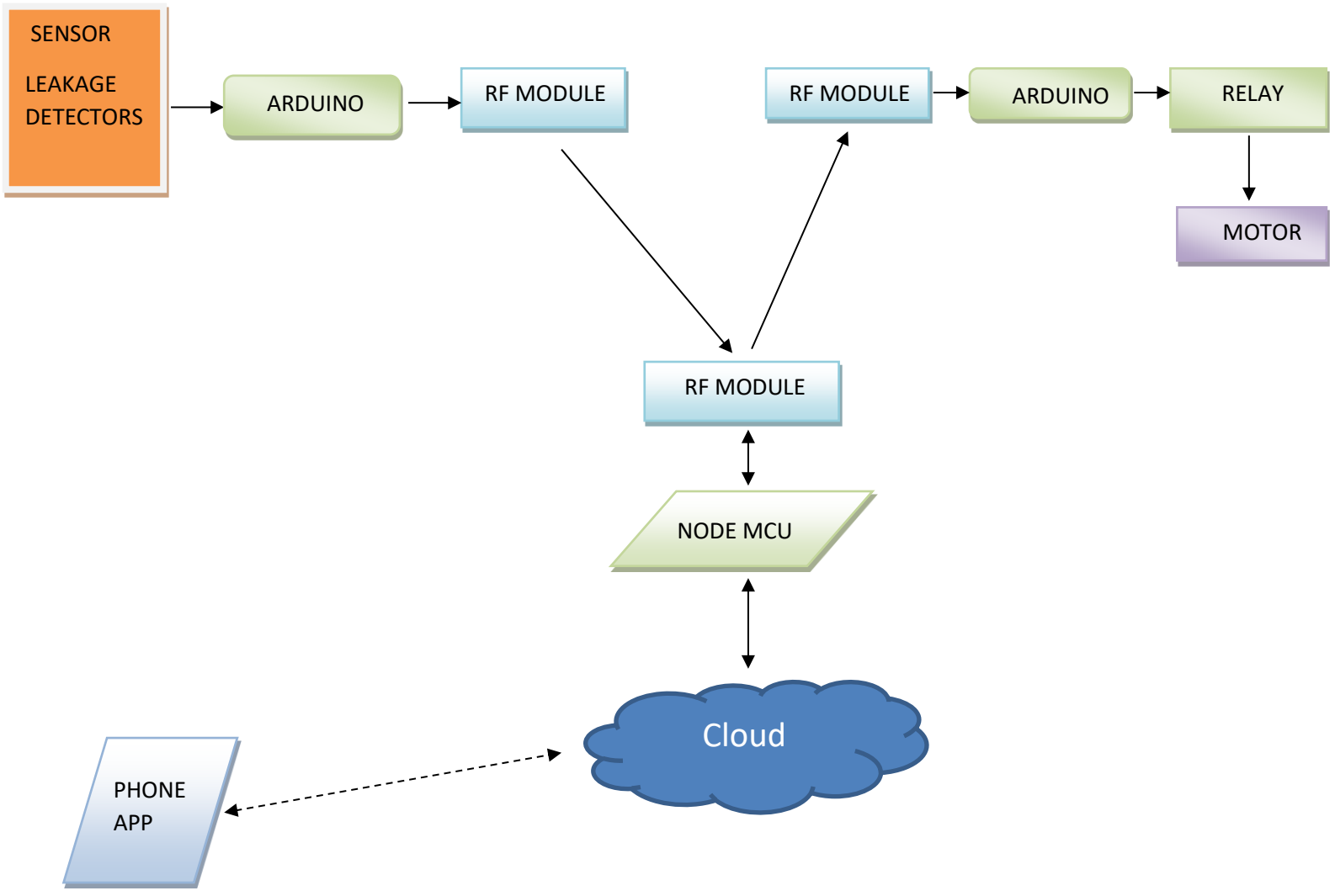
The data uploaded in cloud will be transmitted to mobile app that is used by the security guard to keep track of the water levels in the tank and smooth working of the system. He/She receives an alarm in case of any detection of water leakages and the best part is that he/she can take control of the system and control the pumps with the touch of a button.

Components Required

Name	unit(s)	Est.price
• Arduino UNO	- 3	800/-
• NodeMCU ESP32	- 1	450/-
• Ultrasonic sensor	- 5	5x250/-
• NRF24L01	- 3	3x350/-
• Relay switch module	- 2	150/-
• Water flow sensor (SEN-HZG1WA)	- 1	800/-
• 3 way solenoid valve	- 1	3000/-
• Miscellaneous		500/-

Total – 7500/- (appr)

FLOW CHART


SENSOR
LEAKAGE DETECTORS
ARDUINO
RF MODULE
RF MODULE
ARDUINO
RELAY
MOTOR
RF MODULE
NODE MCU
Cloud
PHONE APP

Advantages:

- With the use of this system, the possibility of tanks getting over filled can be negated completely.
- The motor switch is automatically switched on even when the underground tank is empty.
- With the introduction of automatic system, the energy consumption of motor can be minimized.
- This system helps to monitor the level of water in the tank and give alarms via mobile app.
- It detects the water leakage or running taps and give alarm to the user.
-
- It calculates the water used by each floor per separately and compares it with WHO standard usage (i.e,50 liters per person per day) and send the excess quantity of water used in each floor to cloud.
- Low maintenance of the system (using rechargeable batteries).

Conclusion:

Once the system is set and calibrated, it's time to sit back and rest peacefully because our product exists just to serve you in a productive way without any maintenance.

Conserve water, conserve life