

Android Based Smart Water Pump Controller With Water Level Detection Technique

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Abstract: This study presents a technology of controlling water pumps using smart phones. A basic model of an android based application is proposed by which water pumps can be turned ON and OFF with the help of wireless radio transmitters and Wi-Fi router. The android app can run in Android OS version up to 6.0.1, i.e. Android Marshmallow. The paper briefly shows the connections between the required equipments. A future prospect to integrate the app with support for controlling other electrical appliances is also reflected. The implementation of this proposal can be helpful to prevent wastage of water as well as wastage of electricity.

Keywords: Android operation system, Wi-Fi network, router, transceiver, methodology, application interface.

I. INTRODUCTION

Everyday thousands of pumps are used to fill up water tanks. The process of switching on the pump and switching it off after the tank is filled is a manual process, i.e., someone has to check whether the tank has enough water filled, then he has to turn the pump ON to fill the tank up, then he also needs to see if the tank is filled up or if the water is overflowing, and turn the pump OFF accordingly. After a tank is filled up, lots of water is wasted before turning the pump off.

A study shows, the average household can leak more than 10,000 gallons of water each year. This enormous wastage of water is a concern at the time when water level has gone down below the critical level making it almost impossible to get drinkable water at numbers of places all over the world. It is also seen that even though the tank is filled up, there is no one to switch the pump off.

The result of it, a huge wastage of water, is needless to mention. This paper proposes a technology to stop this age-old practice. Moving on to another perspective, smart phones are widely used technology in today's daily life.

Apps have made daily life more convenient. From information sharing through instant messaging to payments of all kinds of bills is just one touch away. Taking Smartphone as the basic tool and as a step ahead towards Digital India, this paper shows a way how to prevent the water wastage using Smart Pump Controller app for Android based platform. One can use this android application to check water level of a tank and turn the pump on and off from his house or even from anywhere in the world remotely.

II. ANDROID OPERATING SYSTEM

Android is an Operating System that huge populated among the people now a days. It is very easy to use and operate in Google and Linux based system. A comparative

study based on the Figure1 that suggest how android populated in the recent years over other Smart Phone operating System according to source of IDC market study.

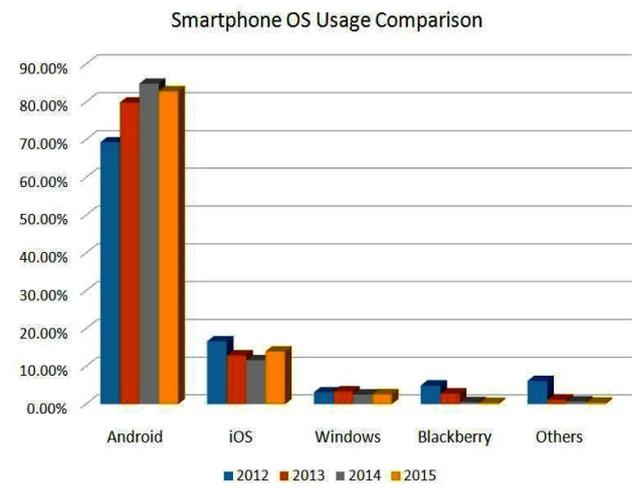


Figure1: Comparison of Different Mobile Operating Systems Year wise.

III. ROUTER

The networking device routers are normally used to connect different network with different network IDs. Each port of a Router connects to a network with a given network ID with different host IDs.

It also connects different MAC schemes like Ethernet and Token Ring with different network protocols like IP and IPX. A Router separates networks into different collision domains and different broadcast domains shown in Figure2. Here Bridge and switch working as a intermediate between Router and post computers.

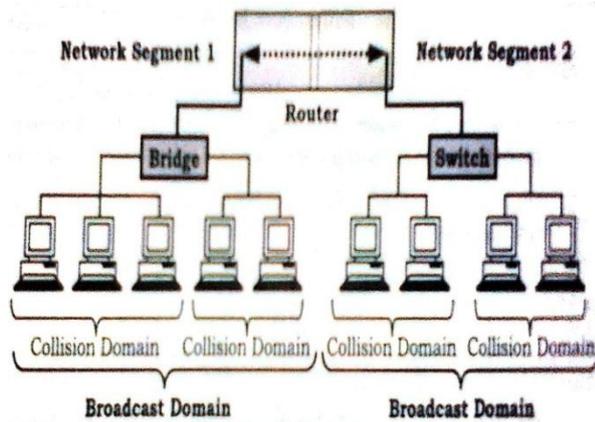


Figure 2: Routers configuration diagram

IV. WI-FI NETWORK

Wi-fi or Wireless Fidelity is a shared networking system working on high frequency range to serve the networking demands through logical connection inside a house or office with access point specification and uninterrupted service to any devices like laptops, printers, scanners, joystick, desktop, mobile phone etc.



Figure 3: Diagram of a Wi-Fi based network

V. TRANSMITTER

Communication equipment used to send electromagnetic waves with some message from source to destination. Now a day Transceiver used to transmit and receive signals simultaneously for a communication channel. In the Figure4 will show you Transceiver with a communication antenna.



Figure 4: Image of a Transceiver

VI. METHODOLOGY

To accomplish the process mentioned earlier, the following equipments are needed:

- i) a water level detector
- ii) two wireless radio transmitters
- iii) a digital on/off switch
- iv) a router
- v) an active internet connection
- vi) Smartphone with Smart Pump Controller application installed.

Steps to be followed:

6.1 A water level detector is needed to be fitted with a water tank. The detector will detect upto what percentage of the tank is filled with water or empty.

6.2 A wireless radio transmitter is to be connected to the detector.

6.3 The transmitter should be connected to a Wi-Fi router. The transmitter will fetch the water level information from the detector and will transmit wirelessly. If the Smartphone is connected to the same router, the app can access the data sent by the transmitter directly from the router.

6.3.1 The second part is to control the pump. In order to control a pump, i.e. turning it on and off, a digital switch is to be attached with the main power supply of the pump.

6.3.2 The switch is also integrated with a transmitter which is connected to the same router. One can instruct the switch to turn the pump ON or OFF from the application.

If the Smartphone is not connected to the same Wi-Fi router, the communication between the application and the stationary system in the pump and the tank will be done via internet.

It is to be noted that the user needs to have an active internet connection and power supply to the equipment should be ON during this process.

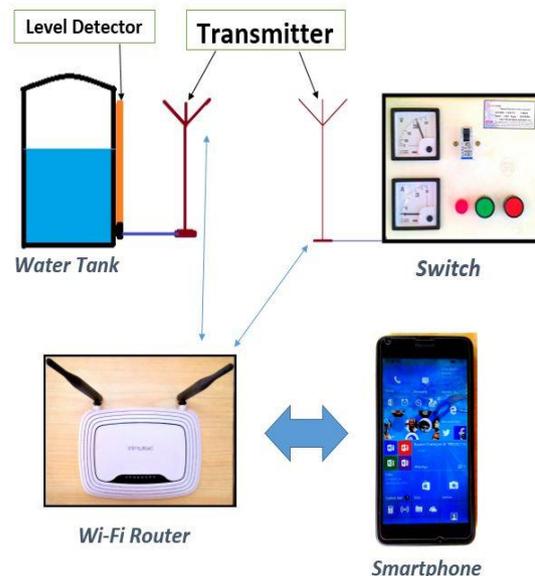


Figure 5: Schematic Diagram

VII. APPLICATION INTERFACE

A typical application interface is shown in the Figure 6 and Figure 7. Figure 6 shows the Home screen where the user can view the water level percentage, pump status, i.e. whether the pump is running or not, time left to fill up the tank and time elapsed after the pump was turned ON. For more flexibility, the user can also switch the pump OFF tapping on the Stop Pump button or may choose to stop the pump after a certain amount of time. The app can automatically switch the pump OFF as soon as the water level reaches 100%.



Figure 6: Home Screen

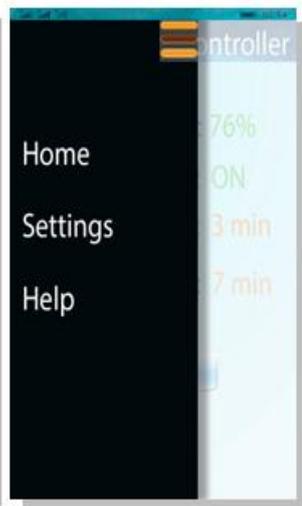


Figure 7: Menu

Figure 7 shows the hamburger menu where Home, Settings and Help menus are included. One can customize the app interface and accessibility from the Settings and can get information about the app and tutorial from the Help menu.



Figure 8: Settings

In Figure 8, a typical settings menu has been shown. Here one can change the application interface theme. The pump can be set to turn OFF after a custom level of water in the tank. The user can manage the Wi-Fi networks from Networks option.

The application is also intended to update periodically with new feature and bug fixes, if any. The app can be downloaded and updated for free.

VIII. CONCLUSION

This paper has proposed a technology which can be used to control pumps used in household and buildings to fill up water tank, and in turn prevention of wastage of water. The user can control the pump even on the go, remotely from anywhere. The method is easy and user friendly. All one needs is to install the mentioned equipments in order and have the application in the Smartphone. The application can be developed for other platforms like Windows, iOS, Blackberry etc.

Apart from savings of water, there is future prospect of this proposal. All the household electrical appliances can be controlled with the help of one Smartphone application. For that, the switches of all the appliances will be wirelessly connected to a router, similarly as in the pump switch. One can switch the appliances ON or OFF using the Smartphone application.

This can be helpful to check whether any light, fan etc. has remained ON even if there is no one to use in a room or house or a building. It may help to prevent wastage of electricity consumption. The system can also be integrated with the ability to measure the daily or monthly electricity consumption which may be helpful to reduce electricity bill by reducing consumption.

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BIOGRAPHIES



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