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Fingerprint Based Hot Water Distribution System

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Abstract:- This paper presents a modelling technique and an optimal scheme for automated hot water distribution which will be possible to distribute the HOT water equally to all candidates in hostels, so that everyone will get the equal amount of hot water. In urban areas, wastage of water and loss of electricity has become the serious problem. To minimize this problem, we can use this distribution system in order to reduce the wastage of water and save the electricity. The limitations to this model is distribution losses which ranges from 10%-40% of annual hot water energy consumption, depending upon factors such as hot water use quantity and patterns. Critical factors that affect the magnitude of the distribution loss include the layout of the distribution system and the magnitude and pattern of hot water loads within the hostels. This technique allows to allocate sufficient amount of water to the authenticated user by using biometric module and also control the flow of water and pressure.

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I INTRODUCTION

" **Water distribution system**" is defined as to transport the water from the treatment facility to the public. The purpose of distribution is to deliver water to public with appropriate quality, quantity and pressure. This system is use to describe collectively the facilitiesuse to supply water from its source to the point of usage. Water quality should not get deteriorated in the distribution pipes.
A water system has two primary requirements: First, it needs to deliver **adequate** amounts of water to meet consumer consumption requirements
plus needed fire flow requirements. Second, the reliability of water system; the required amount of
water needs to be available 24 hours a day, 365 days a year.

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This project involves enhancement of the HWSIM distribution system model to more accurately model pipe heat transfer. Recent laboratory testing efforts have indicated that the modelling of radiant heat transfer effects is needed toaccurately characterize pipingheatloss. An analytical methodology for integrating radiant heat transfer was implemented with HWSIM.

Hot water distribution systems deliver heated water from the heat source to the use points throughout the house. As house size and number of fixtures has increased in recent years, the impact of distribution systems on overall performance has become more significant. Inefficient distribution systems contribute to unnecessary energy and water waste, as well as excessive hot water wait time.

In any residence with hot water service, thermal losses occur in the pipes that connect the water heater to end use fixtures in the home. The magnitude of these losses depends on the location and layout of the distribution system, the homeowner's hot water use, and other factors. The delivery characteristics of hot water distribution systems are a critical factor affecting overall water heating system performance in terms of both energy and water use (and waste).The purpose of distribution system is to deliver water to consumer with appropriate quality, quantity and pressure.

Two of the best ways to reduce hot water distribution losses are an on-demand circulation system and hot water pipe insulation. With an efficient distribution system, the water heater temperature set-point may be lowered. Reducing a tank water heater set-point temperature by only 5°F will result in 10% lower standby losses (a good target is a tank temperature of 120°F).

Hot water savings from improving the distribution system depends on the behaviour of occupants, fixture flow rates and usage patterns. If only one or two fixtures are used frequently for a short time, the piping may not cool down much, reducing the potential for savings. In a well-designed distributed system, a small volume branch line minimizes water waste, the on-demand pump primes the line just before the hot water is drawn and the insulation keeps the distribution piping hot for the subsequent user.

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II. BLOCK DIAGRAM

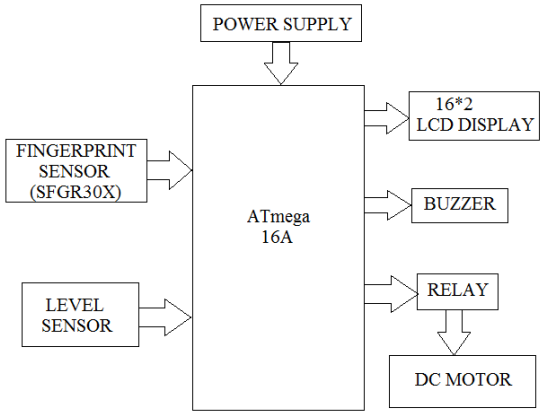


Fig.2.1. Block Diagram

As shown in fig.2.1 block diagram, we proposed a system to provide the secure applicationfor equally distribution of water to all candidates.

Operation:-At the input, when a person gives his/her fingerprint, then the fingerprint module will transmits signal to the microcontroller. Microcontroller will check its database and verify the person identity. Verified persons details will be displayed on 16*2 LCD (Liquid Crystal Display).

After verifying persons details, the controller will give instruction to open the valve at the output. The solenoid valve will be opened to give specified amount of water decided by the microcontroller. As the water is drained out, then the solenoid will be closed after receiving command from the microcontroller. The buzzer will ring to indicate that water is drained out from the valve to the eligible person.

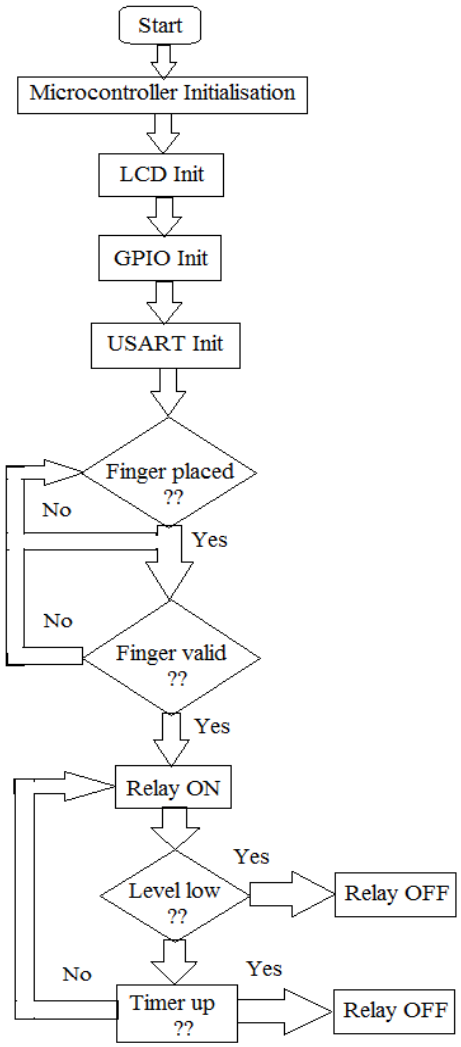
Also, the temperature sensor will continuously measure the temperature of water through the electrical signal. When the water temperature goes below the 45 degree centigrade set point, then the controller will give the instruction to simple ON/OFF the heater at the output.

Water heater will get simply ON to heat the water when the temperature goes below the set point. As the water is heated upto a set point, the heater gets simply turned off to save the electricity.

The level sensor will check the water level and if the water level goes below fixed level, then the sensor will give command to controller by which controller will give the alert command to the buzzer.

III. ALGORITHM

1. Start
2. Initialize microcontroller
3. Initialize LCD
4. Initialize GPIO
5. Initialize USART
6. Check fingerprint placed or not, if placed then go to next step. Otherwise repeat same step.
7. If fingerprint is matched with database, relay turns ON, otherwise go to step 6.
8. If water level is below than specified level, then relay turns OFF as soon as timer goes up.
9. Stop



IV. RESULTS

We have overcome the results that proposed system gives specific amount of water to authenticated user using biometric module. The water savings come from the fact that little to no water runs down the drain while waiting for hot water. With an efficient distribution system, the water heater temperature set-point may be lowered. The test conditions are :

a) If fingerprint matches with database in microcontroller & water level is above set point, relay turns ON for specific time interval set by timer.
b) Water level sensor continuously check water level in a container by comparing water level with reference level.

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c) If temperature of water decreases below set point temperature, relay turns OFF & little to no water drain out.

Hot water inlet temperature, air and radiant environment temperature, and fluid flow rates are all specified to match the reported test conditions for this system.

V. ADVANTAGES

- As it gives specific amount of hot water to each user & equally distribution of water among all the users.
- Mostly useful in winter days because in winter season solar heater is not useful due to absence of sunlight in early morning.
- This system is fully secured i.e. no user can take excess water than pre-decided amount of water.
- Once the water is heated, it distributed in its all users in less time as compared to conventional heaters.
- Fingerprint module takes attendance at a time of fingerprint verification & saves the user data in database of microcontroller. Without fingerprint match of user with database in microcontroller, there is no access to hot water.
- It is cost effective multifunctional system.

VI. CONCLUSION

An optimal control system for hot water distribution system has been developed an implemented to overcome wastage of water, loss of electricity and distribution losses. It also allows to distribute the hot water automatically to an authenticated person by verifying persons identity using biometric module. The development and validation of these enhanced tools is an important step in the process towards accurately evaluating the performance of hot water distribution systems and the resulting impact on the water heater.

The impact of distribution systems on overall performance has become more significant. Inefficient distribution systems contribute tounnecessary energy and water waste, as well as excessive hot water wait time. The magnitude of the distribution loss are affected by the layout of the distribution system and the magnitude and pattern of hot water loads within the hostel, which are highly variable.Not enough evaluation of the system has been done yet, but some benefits of this control have already been confirmed.

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