



IOT BASED SHWD MONITORING WITH SMART BILLING

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Abstract — During the past decade, water needs have increased unpredictably in India. Increasing demand of water supply has become a major challenge for the world. Wasteful usage of water, climatic changes and Urbanization has further depleted the resource. Conservation and management of the resource must be given utmost importance. Here we have design a project for water monitoring and control approach which supports GSM based data collection on real time bases. The system addresses new challenges in the water sector -flow rate measuring and the need for a study of the supply of water in order to curb water wastage and encourage its conservation. We also measure the quality of water distributed to every household by deploying turbidity and conductivity sensors. The traditional water metering systems require periodic human intervention for maintenance making it inconvenient and often least effective. For shortcoming of the existing models for a ubiquitous usage of wireless systems for smart quality monitoring and communicate data wirelessly.

Keywords- smart hot water distribution , MQTT,

I. INTRODUCTION

As we all know water is very important basic element for the life of all living organism on this world including human beings. Human being use water for various activities of every day's life such as agricultural activities, Industrial activities and household activities. It is estimated that water used for household activities itself constitutes around 8% of Global water usage. The major amount of water is used for bathing purpose in which the temperature of water is raised to certain level which is suitable for human body and this water is called hot water. The hot water is been used from long time ago by the human for various purpose other than bathing such as medical treatments, industrial usage.

Information securing and investigation of Hot water framework utilizes MQTT convention to send information utilizing restricted transmission capacity for long separation correspondence. MQTT processes on Publish/Subscribe outline work. It based around a message merchant, with different hubs organized in star topology. To build up a minimal effort frame work for continuous analysis to verify quality of water by IOT technology. Plan to use NXP explore M3 as centralized unit. Outlined framework implies a specific IOT unit to get information via dedicated hardware to cloud. Sensor information's accessed on remote user utilizes different IP, which is doled out to it. Furthermore IOT module likewise gives client to review assented information on the versatile.

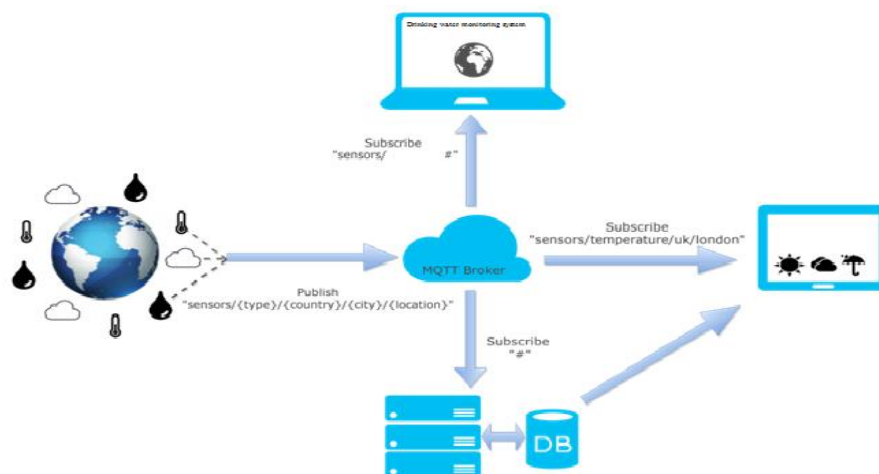


Figure 1. MQTT Architecture

II. BLOCK DIAGRAM

The paper aims to set a maximum limit of water usage which depends on the temperature of water, thus there is need for control system which takes input from the sensor and produce controlling action on the controllable equipment which control the flow of water. Thus the general block diagram of our project will be as shown in figure 2.

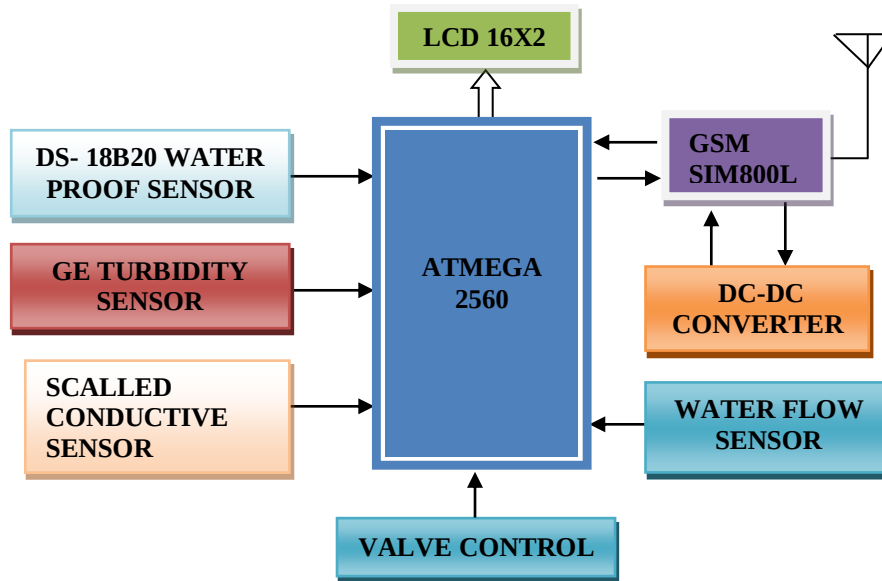


Figure 2. SHWD block diagram

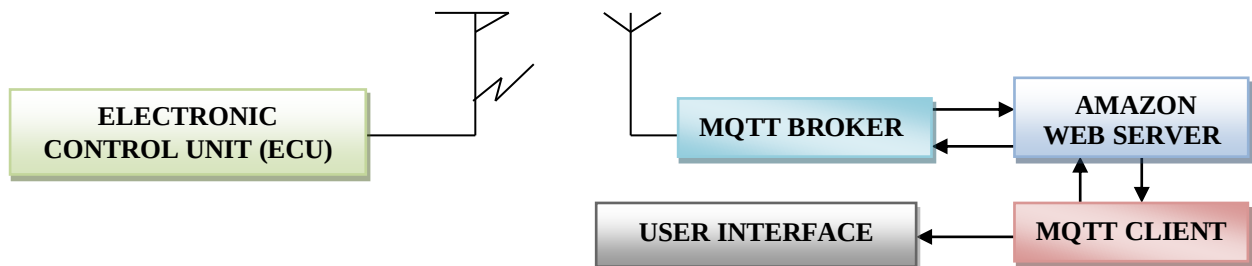


Figure 2.1 Communication block

This paper deals with the control of hot water flow to different houses of an apartment. The control of water flow is carried out by controlling the solenoid valve which is similar to an electric on-off switch. The state of solenoid valve is controlled by microcontroller which is programmed to receive data input from temperature sensor and flow sensor and produce output to the relay drive which in turn controls the solenoid valve.

Along with controlling of solenoid valve, this paper aims at generation of billing which is done in microcontroller. Since all the data regarding temperature of water, amount of water flowed; rate per unit consumed are presented in microcontroller it is easy job to produce a bill format using this data. The rate per water consumed is also decided by temperature range which fix higher rate for higher temperature whereas for lower temperature is enforced with lower rate as given in table 1.2

Table 1.2 shows the variation of cost per liter consumption of hot water with respect to the temperature range

Temperature range	Rate in paisa per every liter of hot water consumed
Below 70 ⁰ C	1 paisa
Between 70 ⁰ C and 80 ⁰ C	2 paisa
Between 80 ⁰ C and 90 ⁰ C	3 paisa
above 90 ⁰ C	4 paisa

III. RESULTS

The control of hot water flow to different houses of an apartment, hospitals and hostels. The control of water flow is carried out by controlling the solenoid valve which is similar to an electric on-off switch. The state of solenoid valve is controlled by microcontroller which is programmed to receive data input from temperature sensor and flow sensor and produce output to the relay drive which in turn controls the solenoid valve. Along with controlling of solenoid valve, the generation of billing which is done in microcontroller. Since all the data regarding temperature of water, amount of water flowed are presented in microcontroller it is easy job to produce a bill format using this data.



Figure 3.1. Final project over view



Figure 3.2. Data displaying on MQTT app

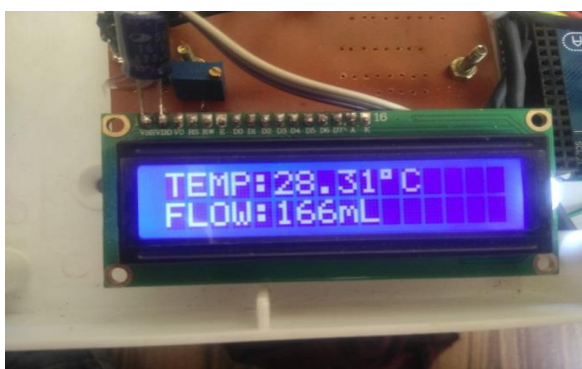


Figure 3.3. Temperature and Flow of water is Displaying on LCD

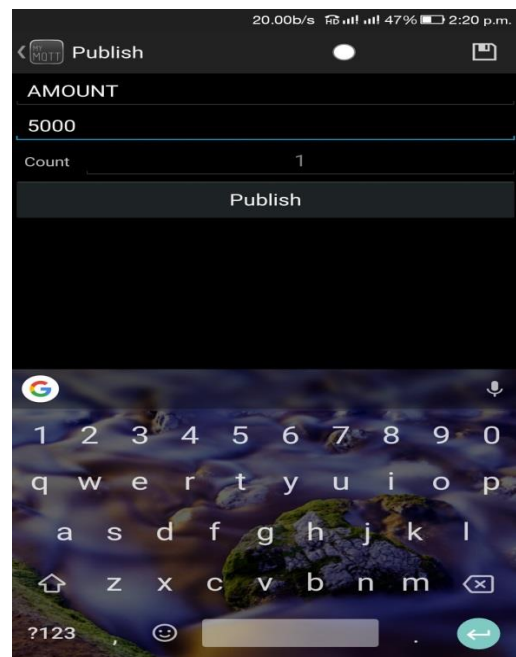


Figure 3.4. Amount sending through the MQTT app

Figure 3.1 shows the final over view of the project; we have used a water tank filled with hot water at required height to meet the required pressure to the flow sensor. Water will be distributed evenly through a Solenoid valve, which can be operated by means of MQTT app.

Figure 3.2 shows the overall data which must be known to the user such as Temperature of water, Flow rate of water, Turbidity of the water, State of the Solenoid valve(ON/OFF).

Figure 3.3 shows the total flow of hot water and its temperature which help us to estimate or generate the bill to the user through MQTT app as shown in the figure 3.4.

IV. CONCLUSION

We can conclude that project can effectively use a maximum usage of hot water which depends on the temperature of water and flow rate of water, thus enforcing an even distribution of hot water among various houses of an apartment. As the price per unit of water depends on the usage of water, a fair pricing system is implemented which eliminates the problem of “paying for what is not used”. From the sample bill generated which consists data of all 30 days of a month such as temperature of the day, amount of water consumed, and rate of pricing. Thus this variation of data can be used in optimization of existing hot water generating system. By examining all the data available at the end of month, the load forecasting can be done which helps to reduce the installed capacity of hot water generating system and optimum usage of existing system. With advancement in the field of technology, the life style of people has changed such that it results in scarcity of resources available for the further use. But this work proves that the same advancement in technology can be used for better utilization of available resources. The control system developed not only helps in conservation of water source but also for the smooth and smart operation of billing process.

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