

SMART WATER METERING SYSTEM

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ABSTRACT

Water is most important role in the day-to-day life. The Smart Water Metering System is used to control the water supply in the house so that the wastage of water will be less. The municipal corporation measures the estimated water usage for a person. Suppose the estimated value is 50 liter per head, if there are 5 members in a home then the water will reach till 250 liter in a home and the valve will shut off after 250 liter. If the guests are there in home then we should pass the signal to the water distribution center, if they allow then they will pass a return signal and we can get the more water. The water consumption will be according to the use so that the wastage of water is reduced and can prevent the water for future use.

Keyword: - Micro-controller, zigbee, control section, remote section, signal transmission.

1. INTRODUCTION

Water is very important source in the life. The flow of water to the user is from the dam. It collects the rain water for the usage of water for the whole year. The water is then passed to the purification center for the purification of water which removes all the dust and pollutants. It is then passed to the reservoir through the pump or pipelines. Reservoir stores the water and is passed to the domestic use such as home etc. reservoir is also called as water distribution center. Our system can be designed for the complete process. That is from dam to water distribution center and then to the users tap. Our system is used in the control section i.e. water distribution center and the remote area i.e. house, industries, temples etc. the communication is carried out between control section and the remote section. Zigbee is used here for the communication part. PIC micro-controller is used for the controlling of the system.

2. LITERATURE REVIEW

The current supply of water is continuous, i.e. we can use the water as much as we want. Due to which the wastage is also more. Because of the usage is more, till the month of march or april the water supply to user is less because of the lack of water in the dams etc. Due to the shortage of water the current measures taken by the municipal corporation is to reduce the time duration of water supply and to reduce the pressure of the water. The shortage is due to improper measure and distribution of water is taken place from distribution center and no measures are taken place by household work before use. The current situation is the estimated water usage does not meet the actual water usage. The estimated value is we can calculate the census of the people in the area and can allot particular amount of water for per person. But the actual usage of water is more than the estimated value. To avoid such situation and to prevent the water for future use we need to take some precaution and reduce the wastage of water. This system will help to decrease the wastage of water by giving per person a required amount of water.

3. METHODOLOGY USED

In this process we are giving some constant value of water in a liter. If in a home there are n numbers of members then the constant value we have multiplied by the n number of members. The initial value or set point is set in the microcontroller for each home. After the set point is reached then the water supply will cut off. If we need more water supply due to some condition or some guests have come then we can send the signal by pressing the required amount of water in keypad and the signal is sent through the zigbee. Return signal will come if the water distribution area is allowing more supply.

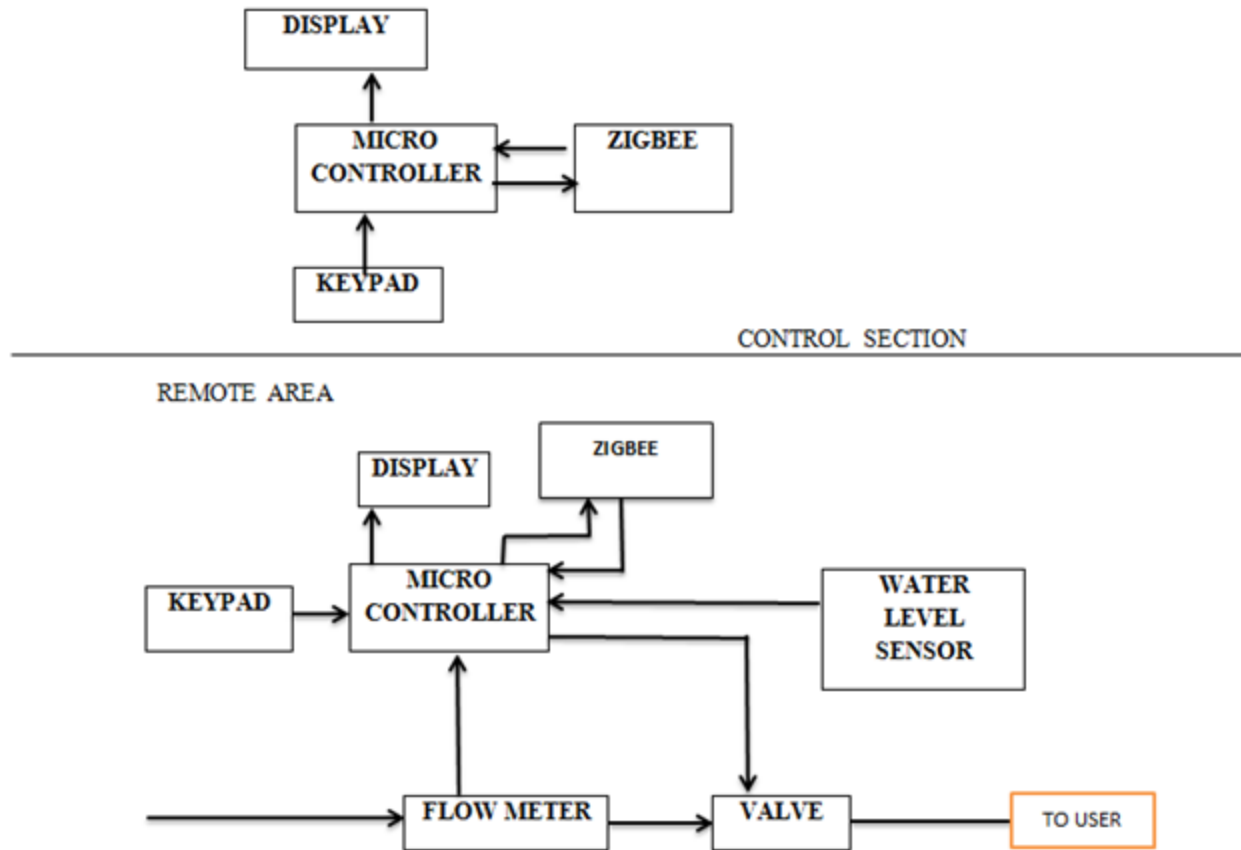


Fig-1: Block Diagram of the instrument

3.1. Procedure

There are two sections in this system, remote (user) section and the control (water distribution center) section. In the remote section, the flow of water to the home is carried out. The flow meter will sense the flow of water, and it is passed to the user through the electric solenoid valve. The flow meter is given to the PIC microcontroller. The set point is given to this system is 1 liter. So after 1 liter of water is passed through the flow meter, the valve will automatically shut off. The water flow sensor will pass the signal to the microcontroller in pulse form. The water level sensor is also placed in the tank to indicate the level of water. There are three levels used: high level, middle level, and low level, which are used for the simplicity of the user. If more water is needed, then the amount of water in liters is pressed on the keypad. If we need 5 liters extra, then key number 5 is pressed and the # key is pressed to pass the signal. Zigbee will pass the signal to the control section. If the control section allows, then they will pass the return signal. If they allow 3 liters, then we will get 3 liters extra, and the valve will shut off after the value is reached. The LCD display in the remote section will display the actual flow of water in liters, the level of the tank, the extra water allowed by the control section, and the keys pressed for sending the signal. In the control section, it displays the signal passed from the remote section in liters and the key pressed for sending the signal.

3.2. Instrument Description

a. Water flow meter

It consists of a plastic valve body, hall-effect sensor, and rotor. The rotor rolls when the water will flow across it. And the hall-effect will sense the rotor motion and give the output in the pulsating form.

- Compact, Easy to Install.
- Min. Working Voltage: DC 4.5V
- Max. Working Current: 15mA (DC 5V)
- Working Voltage: DC 5V~24V.

b. Water level sensor

IC 555 timer is used here for indicating the level. Its output goes high when voltage at the second pin is less than 1/3rd of VCC. When the water level goes down the 2nd pin gets disconnected from the water thus the voltage will go below 1/3rd of VCC and the output is high.

- Supply voltage: 4.5-15V
- Maximum Power dissipation: 600 mW
- Operating Temperature: 0-75°C

c. Electric solenoid valve

This is a normally closed G1/2 12VDC electric solenoid valves with barbed inlet and outlet ports, great for projects involving low viscosity fluid control.

- Normally closed
- Durable
- Stainless steel inlet filter
- Working voltage: 12VDC
- Max operating temperature: 120°C
- Operating pressure range: 0.02 – 0.8 MPa

d. MAX 232

It is used to make the zigbee modem compatible with the microcontroller. Microcontroller is CMOS logic and the zigbee is TTL logic. To make direct communication between the microcontroller and zigbee is not possible. For make the system compatible it is used.

- Multiple Drivers and Receivers
- 3-State Driver and Receiver Outputs
- Superior to Bipolar
- Operate from Single +5V Power Supply (+5V and +12V—MAX231/MAX239)

e. PIC 18F4520

It is used for the controlling purpose. It has to 4 input output port and has internal analogue to digital converter. It is used for mainly used for the communication with the other system i.e. zigbee.

High current sink/source 25 mA/25 mA

Three external interrupt pins

Low power consumption:

- < 1.6 mA typical @ 5V, 4 MHz
- 25 μ A typical @ 3V, 32 kHz
- < 0.2 μ A typical standby current

f. ZigBee

Indoor/Urban: up to 100' (30 m)

Outdoor line-of-sight: up to 300' (100 m)

Transmit Power: 1 mW (0 dBm)

Transmitter Current: 45 mA (@3.3 V)

Receiver Current: 50 mA (@3.3 V)

Power-down Current: < 10 μ A

g. Power supply

It is designed in such a way that it gives regulated 5Vdc supply and 500mA current.

3. ADVANTAGE

The main advantage of the smart water metering system is its low power consumption. It is used to save the water for the future use. The system is user friendly. We can save the energy due to the actual usage of water. Due to the use of zigbee, communication is carried out to the wide range.

4. CONCLUSION

Smart water metering system overcomes all the drawbacks of ordinary water metering. The main advantage of smart water metering system the water will be delivered as per the requirement and can avoid wastage. The system can be manufactured simply and is cheap. Due to the use of zigbee and PIC micro-controller it leads to low power consumption. It is user friendly device. We can view the level of tank and flow of water. This system is built for the water meter, we can also built the smart system for electricity meter and for gas meter. The main goal of our system is to save the energy. The future scope is we can place the sensor to know how much person are presently there in the home and directly give the water according to the person. So the system will be more accurate and cannot send false signal.

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