Monitoring and Regulation of Drinking Water

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Abstract— *The increasing population and thus the wide expansion of urban residential areas have increased the need for proper distribution of water. This distribution of water in every house within different areas needs the regulation and monitoring for preventing the wastage of water. This paper deals with the Monitoring and Regulation of Drinking water through various application applied through the PIC. At the start the exact idea about regulating the water distribution for different areas with its proposed system is discussed, and then its several implementations using different technologies are discussed.*

Keywords— PIC controller , GSM , LCD display, water flow sensor

I. INTRODUCTION

The growth of residential areas in great extent requires the increase in water supply facility with regulation and monitoring[3].The use of ½ HP to 1 HP pump to extract water directly by connecting the tap supplied to each house results into the unbalanced distribution of water[2].Here GSM is used receive the data[1]. To supply the water equally to each house various application was applied through PIC. Here this module is presented to regulate and monitor the water distribution.

In second section, what are the needs of water distribution system and how it can be achieved is discussed. In section third, methods to regulating and monitoring the supply water is discussed. The conclusion and future scope are discussed in further section.

II. EXISTING METHOD

In the previous method, the water is supplied automatically using relays, PIC controller with increased performance. The performance is monitoring using embedded system. GSM is used to receive the messages. Time shift is used for distributing the water. PLC is also used to connect with computer for monitoring and controlling loads.

Low cost water flow meter which can measure up to 9 litre/minute, avoiding direct contact of flow with silicon sensors.

III. PROPOSED METHOD

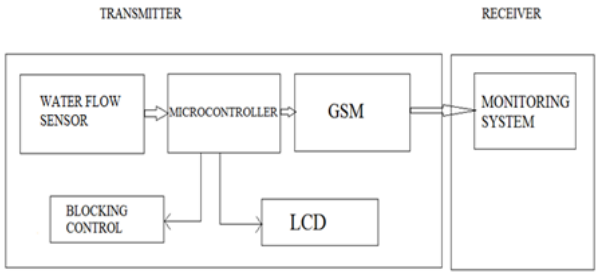

Fig. 1: Block diagram of monitoring and regulation of Drinking water

The system is divided into two main parts: Transmitter and Receiver Section. Transmitter section mainly consist of the sensor circuit, the microcontroller unit,the display unit and GSM module.The sensor circuit contains the hall effect water flow sensor. The sensor provides digital output depending upon the amount of water flow through the sensor . The measured parameters will be displayed in an LCD display. Receiver section consists of laptop or desktop computer which is connected to the internet to monitor the data. Software collects the data coming from the different monitoring devices and present them in a user interface map. Data is also saved for further analysis and regulation.

A. Transmitter Section

1) Water Flow Sensor

The microcontroller receives voltage input corresponding to the flow of water from sensor. The water flow sensor already has an inbuilt signal condition circuit, which makes the correct voltage available for interrupt pin of microcontroller. The microcontroller calculates the amount of water flow corresponding digital output from the sensor and manipulates the data based on pre-programmed code to display useful result on LCD.

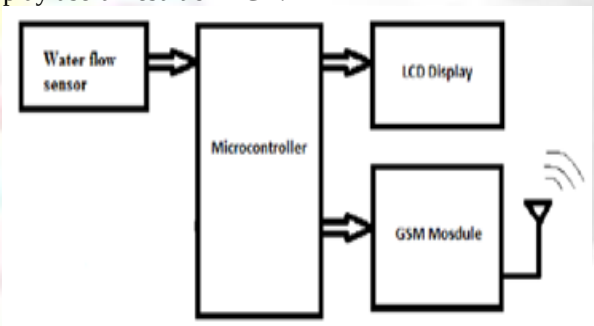

Fig. 2: block diagram of water flow sensor

2) Microcontroller Unit

The microcontroller is the heart of the whole system. Digital sensor is the input of the microcontroller. Display Unit is an Output of the microcontroller. It receives digital signal equivalent to the quantity of water flow to be measured; from the sensor connected to it and conversion and processing through pre-programmed instructions written in C languages to ensure that corresponding measurement made by these sensors are available in forms that are meaningful and useful for human analysis, interpretation and record. The microcontroller PIC16F877A has been used for the measurement of water flow and transmission of data to the receiver. It has 40pin packages. It has 10 A/D converter. The microcontroller uses 4MHZ clock.

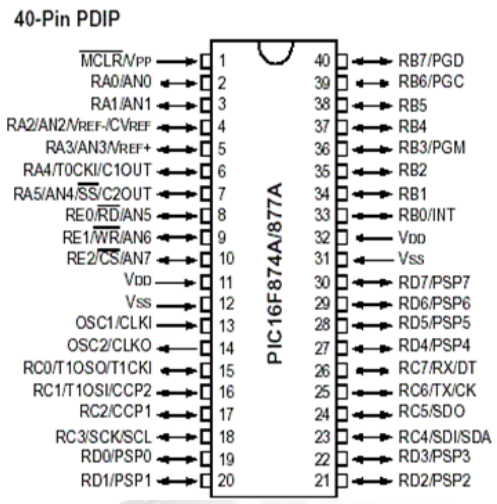

Fig. 3: Pin diagram of PIC Controller

3) LCD unit

The 16 x 2 LCD display is capable of displaying different characters and symbols. It is used to display the measured parameters such as pressure, temperature, relative humidity, amount of water flow and dew point temperature.

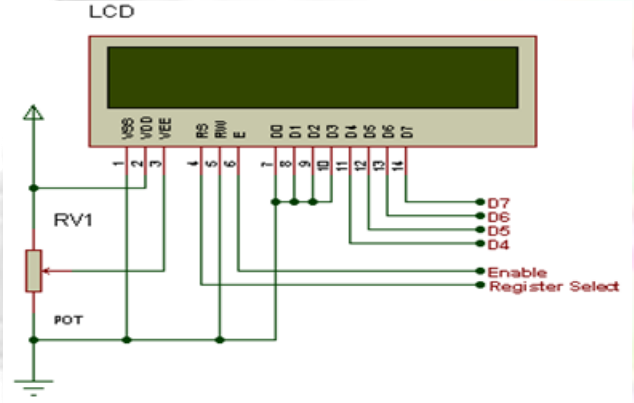

Fig. 4: 16×2 LCD display

It consists of 14Pins-Vss, VDD, VEE, RS, EN, RW, D0, D1, D2, D3, D4, D5, D6, D7 The data pins from the microcontroller is connected to D4-D7 pins as the output data is of 4 bit length. A Positive supply is given to the VDD and a Negative supply is given to the VSS pin. A POT is connected across the VEE ,which can be used to change the brightness of the LCD by varying the POT . Usually 10K POT is used in LCD Circuit .The RW pin is used to switch between Read and Write option . If the bit is set to 0, then it performs write operation and if the bit is set to 1 , it performs Read operation .

4) GSM

A GSM network consists of several functional entities whose functions and interfaces are defined. The GSM network can be divided into following broad parts. The Mobile Station (MS),The Base Station Subsystem (BSS), The Network Switching Subsystem (NSS), The Operation Support Subsystem (OSS). The added components of the GSM architecture include the functions of the databases and messaging systems: Home Location Register (HLR), Visitor Location Register (VLR), Equipment Identity Register (EIR), Authentication Center (AuC), SMS Serving Center (SMS SC), Gateway MSC (GMSC), Chargeback Center (CBC), Transcoder and Adaptation Unit (TRAU)The MS and the BSS communicate across the Um interface, also known as the air interface or radio link. The BSS communicates with the Network Service Switching center across the A interface. In a GSM network, the following areas are defined:

- Cell: Cell is the basic service area: one BTS covers one cell. Each cell is given a Cell Global Identity (CGI), a number that uniquely identifies the cell.
- Location Area: A group of cells form a Location Area. This is the area that is paged when a subscriber gets an incoming call. Each Location Area is assigned a Location Area Identity (LAI). Each Location Area is served by one or more BSCs.

B. Receiver Section

It mainly consists of laptop or desktop computer which is connected to the internet. The monitoring station can be communicated to the PIC microcontroller which is placed at the consumer side through TCP(Transfer Control Protocol) and IP(Internet Protocol) address.

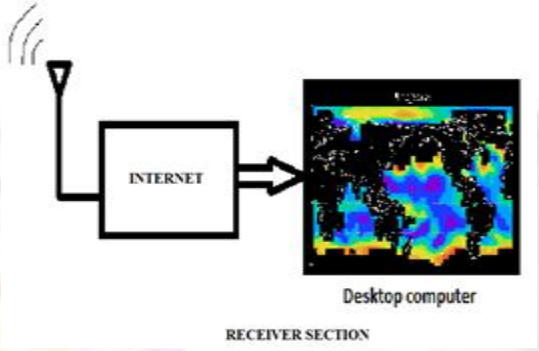

Fig. 4: Receiver section

C. Simulation Work

The software used for this simulation is Proteus. Proteus VSM for PIC contains everything you need to develop, test and virtually prototype your embedded system designs based around the Microchip Technologies™ PIC10 & PIC16 series of microcontrollers. The unique nature of schematic based microcontroller simulation with Proteus facilitates rapid, flexible and parallel development of both the system hardware and the system firmware. The mikro C program is used for counting , displaying and regulation. The simulation shows that the counting process on the LCD display. The message will be displayed on the virtual terminal.

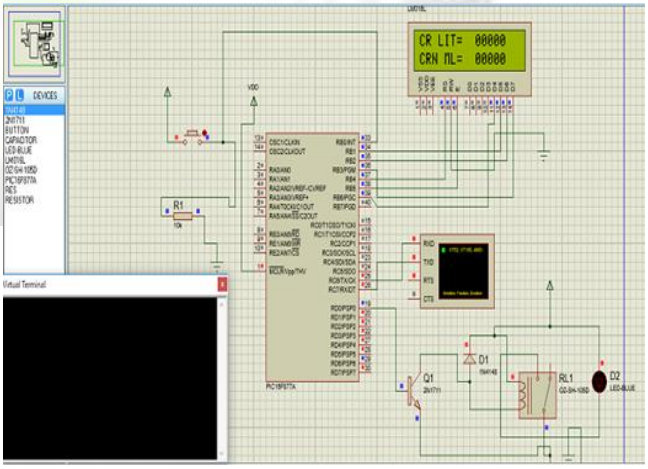

Fig. 5:

D. Simulation Result

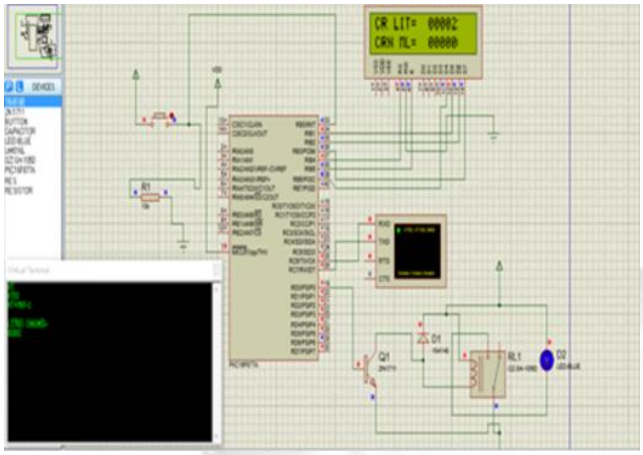

Fig. 6: simulation output for monitoring and regulation of drinking water

IV. CONCLUSIONS

Extensive growth of population development and technology has leads to the need of proper utilization of natural resources especially water. Thus our proposed system is the first step toward prevention and proper utilization of water. To reduce the wastage of water, monitoring and regulation is successfully implemented.

The module of monitoring and regulation of drinking water with PIC controller focuses on the entities such as proper supply, flow control, regulation, monitoring using protocols is concluded with the future aspects of real time implementation in the municipal corporation where there is more usage of water to avoid scarcity of water in many areas.

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