Design and Development of Automatic Water Flow Meter

A. Sai Ramya1, Alekhya Deepthi2, Balachander3, Hema4, Kameswara Rao5

1Assistant Professor, Dept of ECE, Raghu Institute of Technology, Visakhapatnam, AP, India.
2B.Tech Scholar, Dept of ECE, Raghu Institute of Technology, Visakhapatnam, AP, India.
3B.Tech Scholar, Dept of ECE, Raghu Institute of Technology, Visakhapatnam, AP, India.
4B.Tech Scholar, Dept of ECE, Raghu Institute of Technology, Visakhapatnam, AP, India.
5B.Tech Scholar, Dept of ECE, Raghu Institute of Technology, Visakhapatnam, AP, India.

Abstract: The main aim of this project is to develop a prototype of a low cost water flow meter, which measures to water flow rate of water passed through the pipeline of a house. This involves supplying water according to the consumer requirement. In this, we use a water flow sensor which is used to measure the quantity of water. By using this type of intelligent water flow meter one not only get required amount of water but also automatically switch off the pump if required so that power will be saved. Pump gets off after the amount of time set by the user. The system is fully user friendly. Accurate flow measurement is an essential step both in the terms of qualitative and economic points of view. Various types of flow meters are available in the market, but these are having high cost of maintenance. The whole system comprises of PIC 16F877A microcontroller, YF-S201 water flow sensor, relay, A water pump, 5V power supply, LCD and some passive components.

Keywords: LCD, Waterflow Sensor, PIC16F877A Micro Controller, Mikro ‘C’ IDE Software, Proteous Simulation Software, Embedded C Programming.

I. INTRODUCTION
Sustainability of available water resource in many reason of the world is now a dominant issue[1]. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Water is commonly used for agriculture, industry, and domestic consumption. Therefore, efficient use and water monitoring are potential constraint for home or office water management system[2]. Automatic water level monitor came into existence because of human error and inconsistence that is associated with manually operated water pumping machine[3][4]. This is because it takes time for individual who is manually operating the water pump to turn off the pumping machine and this may cause water spillage and at times the individual might not know that the water level has drop so low until the tank is completely empty[5]. This was the problem that leads to the development of the ideal of an automatic water level control and automatic pump short down[6]. In this paper, develop a prototype of a low cost water flow meter, which measures to water flow rate of water passed through the pipeline of a house. This involves supplying water according to the consumer requirement.

II. BLOCK DIAGRAM OF THE SYSTEM

Fig1. Block diagram of automatic water flow meter.

A. System Design and Development
The selection of a microcontroller plays very important role in any embedded system. According to the need of the system a microcontroller is chosen. Here in this system in order to design a low cost automatic water flow meter PIC 16F877A microcontroller is used[7]. We have designed and developed a low cost water flow meter mainly for irrigation purposes &Households to deliver only the correct amount of water as per requirement to the irrigation fields & households. It can also be useful in detecting catastrophic problem due to plugging/hose break so that this can be corrected before wastage of water and flooding occurs in crops. Microcontroller is used to monitor the sensor with LCD is interfaced to display the flow rate of water[8]. Here we have determined flow rate by change in velocity of water. Velocity depends on the pressure that forces the through pipelines. As the pipe's cross-sectional area is known and remains constant, the average velocity is an indication of the flow rate[9].

\[ Q = V \times A \]  \hspace{1cm} (1)
Where, $Q$ is flow rate/total flow of water through the pipe, $V$ is average velocity of the flow and $A$ is the cross-sectional area of the pipe.

### III. TECHNICAL SURVEY

#### A. Mikro ‘C’

In those two softwares Mikro ‘c’ is used to write the program and after that we run this program. When the program executed successfully then automatically it creates .HEX file. This hex file is dumped into the PIC micro controller.

#### B. Proteus

- Proteus 8 is a single application with many service modules offering different functionality (schematic capture, PCB layout, etc.). The wrapper that enables all of the various tools to communicate with each other consists of three main parts.
- Proteus 8 consists of a single application (PDS.EXE). This is the framework or container which hosts all of the functionality of Proteus. ISIS, ARES, 3DV all open as tabbed windows within this framework and therefore all have access to the common database.
- The common database contains information about parts used in the project. A part can contain both a schematic component and a PCB footprint as well both user and system properties. Shared access to this database by all application modules makes possible a huge number of new features, many of which will evolve over the course of the Version 8 lifecycle.
- Together with the common database the maintenance of a live netlist allows all open modules to automatically reflect changes. The most obvious example of this is wiring in ISIS producing rashest connections in ARES but it goes much further than that. The new Bill of Materials module contains a live viewer and the 3D Viewer and Design Explorer are also linked into the live netlist.
- The relationship between Schematic Design and PCB Layout involves a shared database and is far more integrated. We therefore have a single project file rather than separate design and layout files. You can create a new project or import a legacy schematic/layout via the options on the home page.

### IV. RESULTS AND DISCUSSIONS

#### A. Steps to Get Result

1. After selecting all the devices, now devices needed to be placed on the circuit sheet (Grey sheet) and wiring before the simulation can be run by following these steps.

   - Click on **[ ]** and select a first device that will be placed.
   - Place mouse to wherever the device is preferred to be place and then click the left button of the mouse. The device will be place. If it needed to be moved. Click the right button of the mouse on the device symbol to select the part and then hold the left button of the mouse and move the symbol to wherever it is needed to be places.
   - Like above fig 4 we pick the components, which are useful to complete the required circuit. Then we do the connections as we want.
   - To wire the device together, click at the source pin of the device and then move mouse cursor to the destination pin of the device. In this step the black line will be appear and it will be the wire of the circuit after click mouse on the destination pin of the circuit.
   - After completion of all the connections double click on pic micro controller then a window should be appear which is as shown below.
Fig4. Design of the system.

6. In this window we set the crystal frequency 20MHz. and browse the hex file, which is generated when we run the program in mikro ‘C’ software. Then click on ‘ok’ button.
7. Now the simulation S is ready to be run by clicking on to run and to stop.
8. After run the program, it starts display according to our program. The display is as shown in below fig 5.

Fig5. Display.

Fig6. Automatic water flow meter.

V. CONCLUSION

In summary, a technique to measure flow rate of water in irrigation pipelines is introduced. Though the use of YF-S201 sensor has been in studied in many areas but here we have seen the benefit of using YF-S201 sensor in measuring the flow rate of water within the irrigation pipelines. Application of sensor in this field proves to be a good system that can detect the leakage in the pipelines if we observe the flow rate of water regularly, saves water as excess water would not be delivered to the crops which may also damage it and at last but most important that is in the terms of cost the system proves to be a low cost with many of the benefits as compared to the other products available in the market. So development of low cost water flow meter can replace the other high cost water flow measuring meters available in the market. This system eliminates the manual mistakes in flow rate measurement. Also it is more accurate in comparison to other types of meters. This system is more attractive, as it provides automatic operation with great accuracy and the most too cheap method to measure flow rate of water in agriculture, household purposes and in industries.

VI. REFERENCES


