

IoT Based Flow Analyzing and Alerting System

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Abstract - The continuous measurement of flow of water released from dam for long period of time is crucial in water resource studies. However the accurate estimation of flow is difficult. Thus a robust and efficient method of measurement is required. In this study an innovative system, the flow analyzing and alerting system used for continuous measurement of water flow. This system uses flow sensor to measure the flow of water and time taken by water to reach a certain destination also measures total distance. The system will store the data on cloud so that it can be accessible from anywhere. The system is reliable and easily accessible. This system will measure the mass flow and analyze the flow.

Key Words: Measurement of flow, Analyzing and alerting system, Flow sensor, Distance and time measured.

1. INTRODUCTION

Dam water discharge is an important hydrological factor in dam for management and control of water resource. However it is very difficult to measure average velocity, distance covered by water and time required to reach certain destination in unsteady flows or during extreme hydrological events such as flooding therefore establishing the method and technology for water flow analysis is a crucial issue.

For continuous measurement of water, the system contain number of nodes placed at different points. In river each node have flow sensors which will measure flow with respect to river bed. All nodes will operate in real time and central station can access data from any node and give the average result. The data will be in tabular format having parameters such as flow rate, velocity, time taken, distance covered etc. All the data will be stored on cloud, so that user can access data from anywhere, if the flow exceeds system will send an alert to user via mail system.

In this paper section 2 discusses about literature survey on flow analyzing and alerting while section 3 discusses on Internet of things. Section 4 discusses implementation of flow analyzing and alerting system, and results obtained through the system are discussed in section 5. Section 6 concludes paper.

1.1 Literature Survey

In many cases, river discharge is indirectly estimated from water level or stream flow velocity near water surface. However these methods have limited applicability. In this study, an innovative system, The Fluid Acoustics Tomography System (FATS), was used for continuous discharge measurement. Operating in unsteady stream flow, "NEW ACOUSTIC SYSTEM" was developed by graduate school of engineering, Hiroshima University, Kagamiyama, Higashi-Hiroshima 739-8527, Japan [1]

The use of acoustic Doppler current profilers (ADCPs) from moving boat is now a commonly used method for measuring stream flow. In 2013 "Measuring Discharge With Acoustic Doppler Current Profiler from A Moving Boat": U.S Geological Survey Technique and methods 3A-22, 72p [2]

In "Continuous Measurement of Flow Rate in a Shallow Gravel Bed River By New Acoustic System" published 24 May 2012, FATS covers the entire cross section of river in single measurement. The flow rates measured by FATS were compared to those estimated by moving boat ADCPs and rating curve (RC) methods [3].

1.2 Internet of Things

Internet of things (IOT) is defined as network of physical object/things- devices, vehicles, buildings embedded with sensors, microcontroller and network connectivity that enables these objects to collect and exchange data. Each device has a unique identification and must be able to capture real-time data autonomously. IOT system consists of sensors, processors, gateways, and applications. It allows the device to be connected to the internet and to each other. The cloud services collect, store and analyze the data collected by the sensor and allow people to take decisions accordingly

2. Implementation

This system makes use of one sensor (flow) for each node and processing module raspberry pi. Therefore sensor captures data in form of analog signal. These signals are sent to raspberry pi module

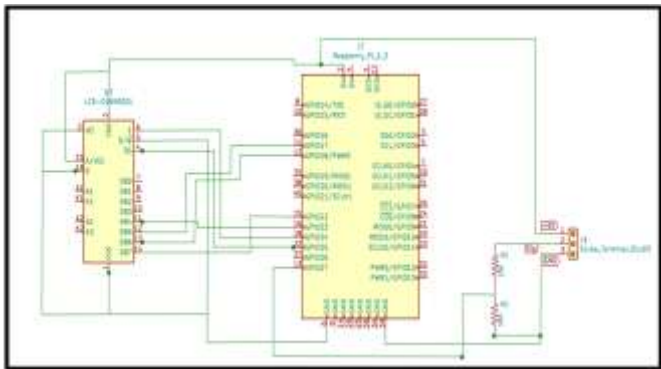


Figure 1: Circuit diagram for flow analyzing system

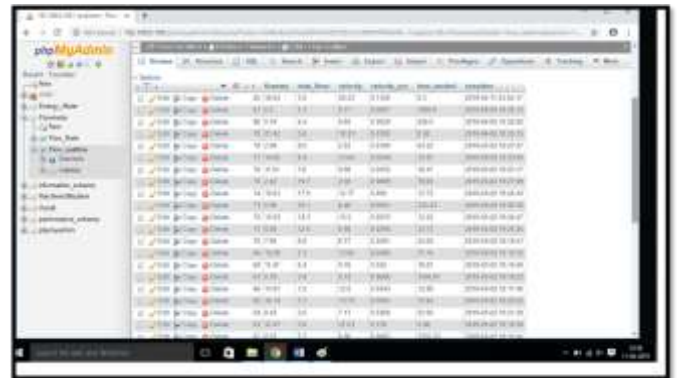


Figure 3: Result in Tabular Format

The Raspberry pi will process digital information analyze it and then further communication is done. The data is stored on cloud and alert is sent if flow increases. The code is written in python and raspberry pi version 3 is used to simulate the code.

The flow analyzing system shown in fig 2 employs sensor to collect data (parameter flow rate). This data is processed through the Raspberry pi microcontroller module and stored on cloud. This data can be accessed by users. The data is collected, processed, analyzed and displayed all in real time.

Python is an interpreted high level programming language for general purpose programming. Created

By guido van rossum and first released in 1991. Python has a design philosophy that emphasizes code reliability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales.

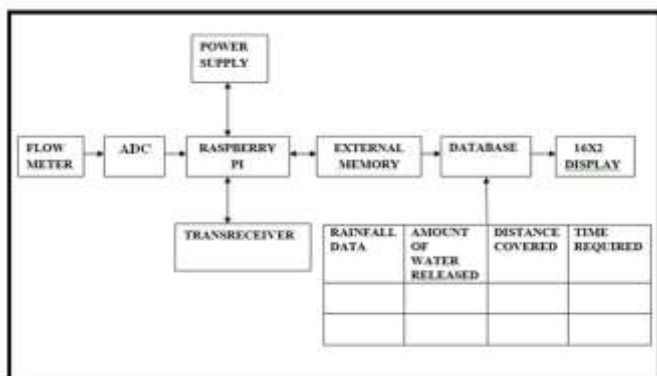


Figure2: Block diagram for flow analyzing system.

Flow sensor is device used to measure volume o mass of gas or liquid. Flow measurement is quantification of bulk fluid movement. Flow may be measured by measuring velocity of fluid over known area. For very large flows, tracer methods may be used to deduce the flow rate.

The result will be displayed and saved in tabular format on phpMyAdmin as shown below;

3. CONCLUSIONS

The low cost, efficient, real-time water flow analyzing and alerting system has been implemented and tested. Through this system the officials can keep track of flow rate of water released and send immediate warnings to public. This can prevent flood situations. Quick actions can be taken to prevent losses occurring due to flood. The system can be easily installed, with base station kept close to dam and task of monitoring can be done.

Internet of things and its services are becoming part of our everyday life, ways of working and business. There is great deal of research on developing crucial building blocks and models for the next generation internet service supported by a plethora of connected things.

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