



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 Issue: IX Month of publication: September 2020

DOI: <https://doi.org/10.22214/ijraset.2020.31568>

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Water Management System using Dynamic IP based Embedded Webserver in Real Time

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Abstract: As residential area grows, all the needs of people have to be satisfied for an issue less life especially in case of water. Water Distribution Network is the more important domain for research activities in our country. Its main focus is the distributing water to all channels in a particular place. Various actions performed with this activity are, checking whether all channels gets water supply, evaluating the amount of water flow in appropriate channels, intimation on over consumption by the users, can ensuring the supplied water's good quality. Every area is provided with a centralized water distribution unit which distributes water to all home units in that particular area. Human generation experiences a serious water scarcity. One of the reasons for this is inefficient water distribution. Systems and negligence involved in management of available water.

Keywords: Water distribution system, Dynamic IP, Webserver, Realtime, pH level, Internet of Things.

I. INTRODUCTION

Most of the latest works deals with different techniques of controlling and monitoring of liquid levels in industrial areas and domestic applications. widely this automatic control difficulties can be achieved by two methods, such as mechanical methods. Float ball type liquid level control is a popular method of control still used in practice for normal applications such as overhead tank overflow restricts. Here, we are developing the IP based Embedded Web server. Here we are monitoring the quality of water by using the PH sensor and level of water in the tank is measured using the level sensor and this values are updated to the server by using the IP address of the particular user we can monitor the level of the water and quality of the water.

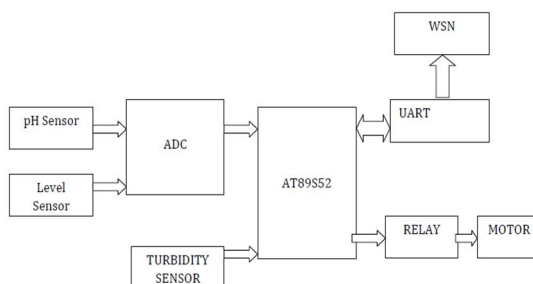
II. pH POTENTIAL LEVEL IN WATER

pH means "power of hydrogen". It is used to measure hydrogen ions molar concentration in the ion. Also it is used to measure of basicity and acidity of the ion. In pure water, the Hydrogen ion molar concentration is 10^{-7} M and the OH^- ion molar concentration is also 10^{-7} M. The molar concentration is more accurate to classify the concentrations of $[\text{H}_3\text{O}]^+$ and $[\text{OH}]^-$. The product of the positive ion concentration and negative ion concentrations is 10^{-14} in all aqueous solutions at 25°C .

III. pH MEASUREMENT AND LEVEL MEASUREMENT BY SENSORS

Here the pH measurements measured by using electrochemical pH sensor. The electrochemical electrodes measuring and detect the changes in the pH value. The reference electrode provides a stable signal for pH value comparison. A high impedance device is also known as a pH meter. This pH meter is used to display the millivolt signal. This can be calculated by pH units. Here the pH sensors measure the pH level in sample solutions by measuring the solution in the activity of the hydrogen ions. This is compared to pure water. The pure water is also known as a neutral solution by using a pH scale of 0 to 14. This level is used to determine the acidity or alkalinity of the sample solutions. Here pH explains of hydrogen ion activity in a liquid.

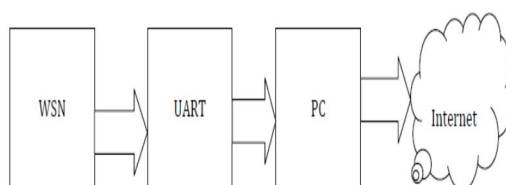
A. Transmitter Section



IV. INTERNET OF THINGS

The (Internet of Things) IoT is a network technology of the physical objects such as vehicles, machines, home appliances, and more devices that devices use sensors and internet communication devices to connect and exchange data over the Internet. The Internet of Things (IoT) depends on a all host of the technologies such as application programming interfaces (APIs) it can connect the devices to the Internet. Someother IoT technologies are Big Data management tools, predictive analytics, Artificial Intelligence and machine learning techniques, the cloud computing, and radio frequency identification (RFID) technologies.

A. Remote System



V. HARDWARE IMPLEMENTATION

The AT89S52 microcontroller, pH sensor, Turbidity sensor, level sensor, UART, Relay, WSN and motor were used to implement the system hardware. In addition Analog to Digital Convertor is used to convert the pH analog value to its corresponding Digital value. For pH value measurement a pH meter were used.

A. AT89S52 8-bit Micro Controller

8-bit Microcontroller with 8K Bytes In-System Programmable Flash memory has the specifications of 10,000 Write/Erase Cycles, UART Serial Channel, 4.0V to 5.5V, Operating Range, Low-power Idle and Power-down Modes, Fully Static Operation, 32 Programmable I/O Lines, Three 16-bit Timer/Counters, Eight Interrupt Sources, Full Duplex, Three-level Program Memory Lock, 0 Hz to 33 MHz clock cycle, , 256 x 8-bit Internal RAM.

B. Turbidity Sensor

This is used to measures the turbidity of sea or fresh-water samples in the Nephelometric Turbidity Units (NTU). The standard unit is used by lot of water collection organizations and agencies. It is small size, portable design and simple setup. It makes easy to use at the classroom or collection site. Its specification

Ranges are 0 to 200 NTU, Resolution: 0.25 NTU, LED wavelength: 890 nm, StablCal Formazin Standard 100 NTU, $\pm 5\%$ of readings above 25 NTU, ± 2 NTU for readings under 25 NTU accuracy levels. Turbidity is an worldwide recognized criterion for analysis the drinking water quality. The Turbidity Meter is an optoelectronic instrument. This assesses the turbidity by measuring the scattering of light passing to the water sample contains the colloidal particles such as watertank or lake, pond and well areas. This sensors is also used to measure the suspended solids in water, and by measuring the light transmitted amount through the water. These are used in waste water, river and stream gaging, control instrumentation for settling ponds, laboratory measurements, and sediment transport research.

C. UART

Universal Asynchronous Receiver/Transmitter. It is not a communication protocol like SPI and I2C. It is a physical circuit in a microcontroller 8051. It is a stand-alone Integrated Circuit electronic device. The main function of UART main function is to transmit and receive the serial data for short distance and low cost communication purpose.

D. WSN: Wireless Sensor Network (WSN)

It refers to a group of dedicated sensors for recording and monitoring the physical conditions of the environment. It organizing the collected data at a central location place. This Wireless Sensor Network measure environmental conditions like sound, temperature, pollution levels, humidity, wind, and so on.

VI. SOFTWARE IMPLEMENTAION

Here Keil Compiler, Visual Basic and Embedded C softwares are used to design the software.

A. Embedded Web Server

Web server software that is built into hardware. Basically, all network devices have embedded Web servers software (having HTTP servers). This provides a control panel for configure the device for working. The primary advantage is that hardware vendors only have to write one program based on Internet standards, control panel utility is accessible from any hardware web browser. An embedded Web server having a small website, except that the embedded web server is not on the Web. But some Web servers can be accessed by remotely via the Internet connections. To provide reporting, index, and debug tools on the development stage of the software. To give a thin client interface service for a application of traditional. To implement this related work protocol for the acquisition and distribution of information to display in the regular interface of possible a web service application, and possible using data format for XML application. To develop a web application. The HTTP has some advantages to using to perform the above methods: HTTP is a well studied cross-platform protocol and there are mature implementations freely available. The Hyper Text Transfer Protocol can be seldom blocked by internet routers and firewalls devices. This routers forward the packet based on the Internet Protocol(IP) addresses arrival. HTTP clients (Web browser is an example) are always available with all recent computer systems.

B. Keil Compiler

The Keil Compiler for the 8051 microcontroller. It provides more features compare than another 8051 C compiler. It allows you to write 8051 microcontroller applications in C languages. This compiler once compiled, have the speed and efficiency of computer assembly language. This Compiler translates C programme languages source files into relocatable objects which contains all symbolic information for debugging. The object file, the compiler generates a listing file which include cross reference information and symbol table.

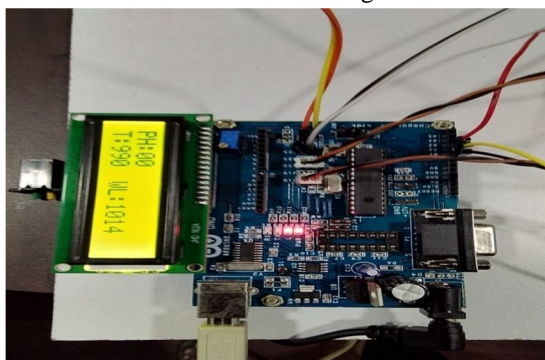
C. Hypertext Transfer Protocol (HTTP)

Hyper Text Transfer Protocol (HTTP) is an application-layer protocol used primarily on the World Wide Web. HTTP uses a server – client model here the client will be web browser and this can be communicates with the web server software that hosts the website for their applications. The browser uses HTTP, which is carried over Transmission Control Protocol / Internet Protocol (TCP/IP). This TCP/IP used only for wired short distance communication to communicate to the server and retrieve Web content for the user. HTTP is a world widely used protocol. It has been normally adopted over the Internet browser because of its simplicity and accessibility. It is a stateless and connectionless protocol. So here using User Datagram Protocol (UDP) for wireless communication.

VII. SYSTEM IMPLEMENTATION

A. Features of the Proposed System

Here to control the level of pH, a monitoring and controlling the system is designed. IoT software concept is used for implementation purpose. We are WSN communication for sending information about tank level and quality of the water. Here they are using bi directional data communication because datas can send and receive at a time. By using the turbidity sensor for checking the condition of the tank whether any algae(in future bacteria and virus can also check) is present that can be identified using the turbidity sensor. The automatic ON/OFF control of the motor is done using the internet of thing.



a) Quality monitoring device output



b) Float ball type liquid level control device.

VIII. CONCLUSION

This paper deals with the design of water management system using dynamic ip based embedded webserver in real time. The Internet objects (IoT) concept is proposed to build a system. This allows the real-time controlling and monitoring the level of pH in water. Both hardware and software parts are working fine.

IX. FUTURE WORK

As a future work, this system can be used to a keen control of the environmental pollution, air pollution, soil pollution, industrial and agricultural production. This type of technique further be extrapolated to Smartphone (equipped with image processing or any bio optic devices) for taking results at low cost and within a short duration of time. The portability factor can add up a commercial value to the innovative solution of the device.

X. ACKNOWLEDGEMENT

I am verymuch thankful to my parents, college guide and co-guide for their constant support.

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