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Design of a Water Environment Monitoring System Based on IOT Using Embedded Linux

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ABSTRACT:

In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper we present a design and development of a low cost system for real time monitoring of the water quality in IOT(internet of things).the system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, PH, level indicator of the water can be measured. The measured values from the sensors can be processed by the core controller. The raspberry PI can be used as a core controller. Finally, the sensor data can be viewed on internet using cloud computing. Here DC motor is also connected to the processor for pumping purpose.

Keywords: Raspberry Pi processor, pH sensor, Level sensor, temp sensor, IOT technology, DC motor.

I.INTRODUCTION:

Nowadays drinking water is the most precious and valuable for all the human beings, drinking water utilities faces new challenges in real-time operation. This challenge occurred because of limited water resources growing population, ageing infrastructure etc. Hence therefore there is a need of better methodologies for monitoring the water quality. Traditional methods of water quality involve the manual collection of water sample at different locations, followed by laboratory analytical techniques in order the character the water quality.

Such approaches take longer time and no longer to be considered efficient [1]-[5]. Although the current methodologies analysis the physical, chemical and biological agents, it has several drawbacks: a) poor spatiotemporal coverage b) it is labor intensive and high cost (labor, operation; and equipment) c)the lack of real time water quality information to enable critical decisions for public health protection. Therefore, there is a need for continuous online water quality monitoring. The online water monitoring technologies have made a significant progress for source water surveillance and water plant operation. The use of their technologies having high cost associated with installation and calibration of a large distributed array of monitoring sensors.

The algorithm proposed on the new technology must be suitable for particular area and for large system is not suitable. By focusing on the above issues our paper design and develop a low cost system for real time monitoring of the water quality in IOT environment. In our design raspberry PI B+ is used as a core controller. The design system applies a specialized IOT module for accessing sensor data from core controller to the cloud. The sensor data can be viewed on the cloud using a special IP address. Additionally the IOT module also provides a Wi-Fi for viewing the data on mobile.

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II. RELATED WORK:

2.1 BLOCK DIAGRAM:

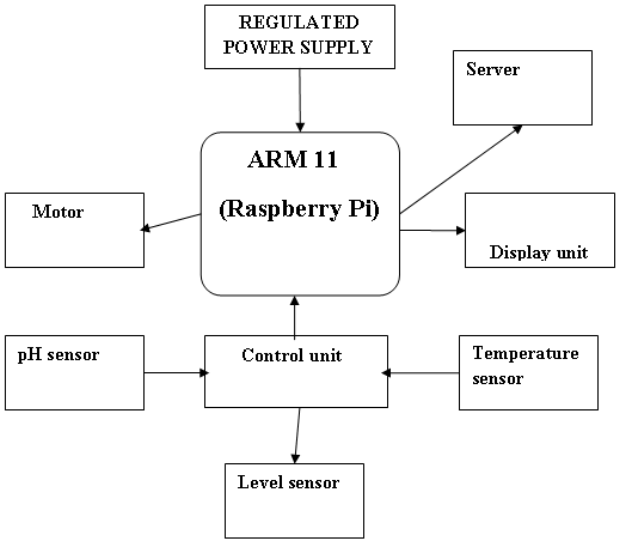

Figure-1: Block diagram of Project

2.2 EXISTING METHOD:

Many systems have already been developed based on the topics of remote monitoring and security either separately or jointly. In existing system we just monitoring the water level based on water level we will give the intimation to the metropolitan areas.

2.3 PROPOSED METHOD:

The objective of the paper is to present a conceptual model of a microcontroller based we will monitor the water quality and also contamination detection. Here in this proposed system we are using different sensors for quality measurement and also contamination detection. The proposed method is used to overcome the drawbacks present in existing method. Embedded Linux operating system and embedded web server run on the main controller to manage various types of equipments including sensor networks, so on. We are connecting different sensors to monitor the conditions of water. The block diagram of Proposed Method is shown below. This system makes use of ARM11 architecture, different types of sensors.

III. HARDWARE COMPONENTS:

3.1 RASPBERRY PI PROCESSOR:

Figure-2: Raspberry Pi diagram

The Raspberry Pi board involves a processor and snap shots chip, Random Access Memory (RAM) and more than a few interfaces and connectors for external devices. Some of these instruments are main others are optional. It operates in the identical method as a ordinary pc, requiring a keyboard for command entry, a show unit and a vigor give. considering that raspberry Pi board operates like pc it requires 'mass-storage', but a tough disk pressure of the variety observed in a ordinary pc is not relatively in maintaining with the miniature dimension of Raspberry Pi.

3.2 TEMPARETURE SENSOR:

In this project, in order to monitor the temperature continuously and compare this with the set temperature preprogrammed in the microcontroller, initially this temperature value has to be read and fed to the microcontroller. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

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The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

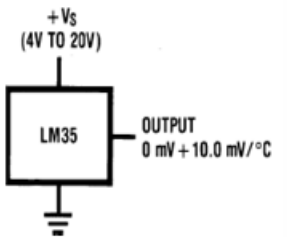

Figure-3: Temperature sensor

3.3 PH SENSOR:

The probe is a key part of a pH meter. It is a rod like structure usually made up of glass. At the bottom of the probe there is a bulb which contains the sensor. The bulb should never be touched by hand and should be cleaned with the help of an absorbent tissue paper, being careful not to rub the tissue against the glass bulb in order to avoid creating static. To measure the pH of a solution, the probe is dipped into the solution. The probe is fitted in an arm known as the probe arm. For very precise work the pH meter should be calibrated before each measurement. For normal use calibration should be performed at the beginning of each day. The reason for this is that the glass electrode does not give a reproducible e.m.f. over longer periods of time Calibration should be performed with at least two standard buffer solutions that span the range of pH values to be measured. For general purposes buffers at pH 4.01 and pH 10.00 are acceptable. The pH meter has one control (calibrate) to set the meter reading equal to the value of the first standard buffer and a second control which is used to adjust the meter reading to the value of the second buffer.

A third control allows the temperature to be set. Standard buffer sachets, which can be obtained from a variety of suppliers, usually state how the buffer value changes with temperature. For more precise measurements, a three buffer solution calibration is preferred. As pH 7 is essentially, a "zero point" calibration (akin to zeroing or taring a scale or balance), calibrating at pH 7 first, calibrating at the pH closest to the point of interest (e.g. either 4 or 10) second and checking the third point will provide a more linear accuracy to what is essentially a non-linear problem. Some meters will allow a three-point calibration and that is the preferred scheme for the most accurate work. Higher quality meters will have a provision to account for temperature coefficient correction, and high-end pH probes have temperature probes built in.

IV. RESULTS:

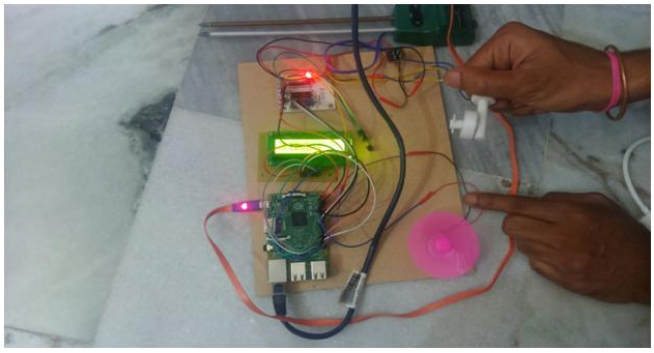

Figure-4: Hardware of the project

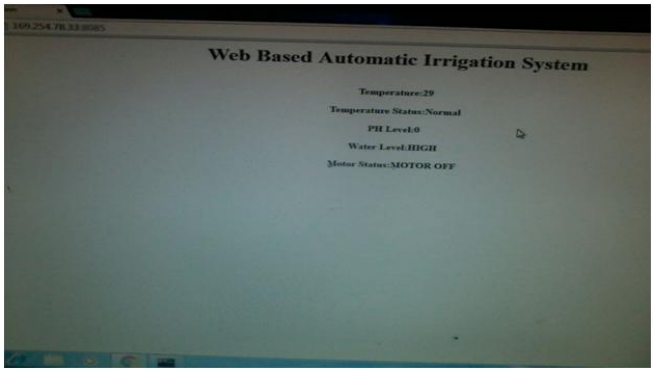

Figure-6: Output on web server

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V. CONCLUSION:

The project **"Design of a Water Environment Monitoring System Based on IOT using embedded linux"** has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM11 board and with the help of growing technology the project has been successfully implemented.

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