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Smart Water Management System Using IoT

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Abstract: Water is usually brought on by an increased quantity of water in a water system, like a lake, river overflowing. Water consumption is highest during the hours that water is used. Water use is lowest during the night. In the proposed smart water management system, a reconfigurable smart water sensor interface device that integrates data storage, data processing, and wireless transmission is designed. The water management system is an implementation for the issue of pollution of water, with increase in the development of technology and advancement in the Internet of Things (IOT) environment, the real time water management system is remotely monitored by the means of storing the data, transmission and processing. The smart water management system consists of design board, sensors, Wi-Fi module and personal computer.

Keywords: IoT, sensors, PIC, MAX232.

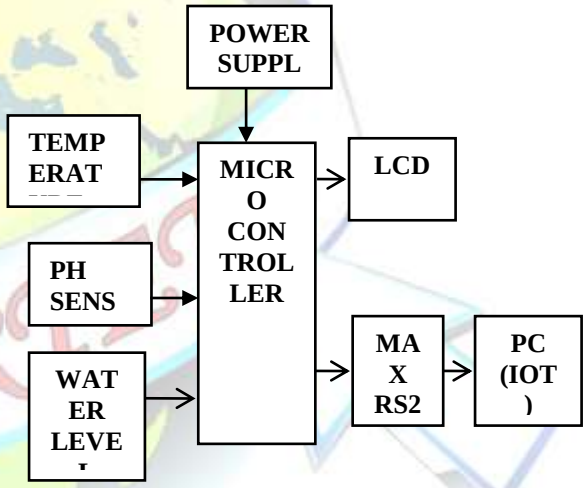
I. INTRODUCTION

Water Management is important since it helps determine future irrigation expectations. Water, once an abundant natural resource, is becoming a more valuable commodity due to droughts and over use. Here are links to articles that address water management subjects such as the optimization of water usage.

Water is exploited by mankind in ever increasing demand for sanitation, drinking, manufacturing, leisure and agriculture. Water Management uses from OMICS Group are an open access journal named as Irrigation and Drainage Systems Engineering which strives to release issues quarterly and is adamant to publish new findings related to the field of Water Management. The mission of the Water Management uses provides a forum for publishing new findings on Engineering principles and technology. Currently our primary research objective is to encourage and assist the development of better and faster measures of engineering activity.

Another water management option is governmental control of water supply. The government distributes water to everyone at an affordable cost. However, government-run systems can be plagued by inefficiencies. Without profits, the government lacks the revenue to improve or even maintain infrastructure. When building new infrastructure, small governments often lack the capital needed.

II. BLOCK DIAGRAM



III.BLOCK DIAGRAM EXPLANATION

POWER SUPPLY

The electrical power is almost exclusively generated, transmitted and distributed in the form of ac because of economical consideration but for operation of most of the electronic devices and circuits, dc supply is required. Dry cells and batteries can be used for this purpose. Now day, almost all electronic equipment include a circuit that converts ac supply into dc supply. The part of equipment that converts ac into dc is called DC power supply. In general at the input of the power supply there is a power transformer. It is followed by a rectifier (a diode circuit) a smoothing filter and then by a voltage regulator circuit. From the block diagram, the basic power supply is consti-

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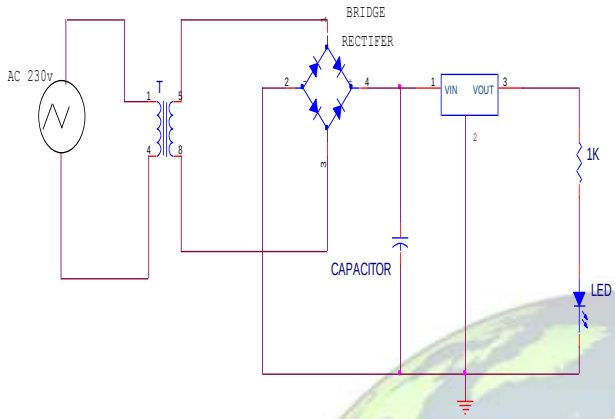
tuted byfour elements a transformer, a rectifier, a filter, and a regulator put together.

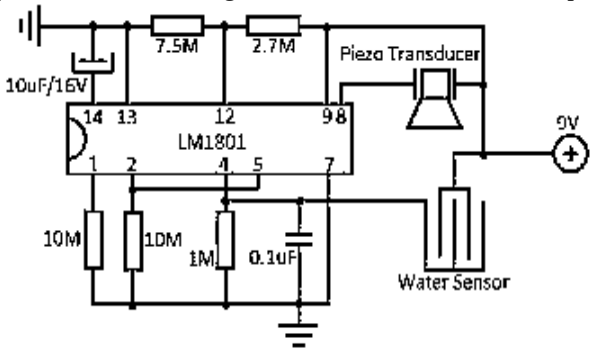


MICRO CONTROLLER (PIC16F877A)

The pic microcontroller pic16f877a is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use flash memory technology. It has a total number of 40 pins and there are 33 pins for input and output. Pic16f877a is used in many.

WATER LEVEL SENSOR

Water Level Sensor is obtained by having a series of parallel wires exposed traces measured droplets/water volume in order to determine the water level. Water level sensors are used to monitor and regulate levels of a particular free-flowing substance within a contained space.



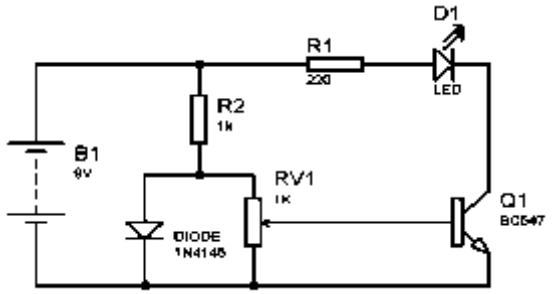
LCD Display

The LCD display is used to show the supplied voltage reading. When the project is powered ON, it first flashes initial messages showing the application. The 16X2 LCD display is connected to the controller board by connecting its data pins to pins 3 to 6 of the controller board. The RS and E pins of the LCD are connected to pins 13 and 12 of the Micro Controller respectively. The RW pin of the LCD is grounded.

WORKING PRINCIPLE OF LCD:

The principle behind the LCD's is that when an electrical current is applied to the liquid crystal molecule, the molecule tends to untwist. This causes the angle of light which is passing through the molecule of the polarized glass. As a result a little light is allowed to pass the polarized glass through a particular area of the LCD. Thus that particular area will become dark compared to other. The LCD works on the principle of blocking light.

TEMPERATURE SENSOR



These types of temperature sensor vary from simple ON/OFF thermostatic devices which control a domestic hot water heating system to highly sensitive semiconductor types that can control complex process control furnace plants. **Temperature Sensors** measure the amount of heat energy or even coldness that is generated by an object or system, allowing us to "sense" or detect any physical change to that temperature producing either an analogue or digital output.

pH SENSOR

pH is the numeric representation of gram-equivalent per liter of hydrogen ion concentration in any solution. It varies between 0 to14. It is the logarithmic measurement of moles of hydrogen ions per liter of solution. Measuring the pH gives the measure of alkalinity or acidity of a solution.

Working of pH Sensor:

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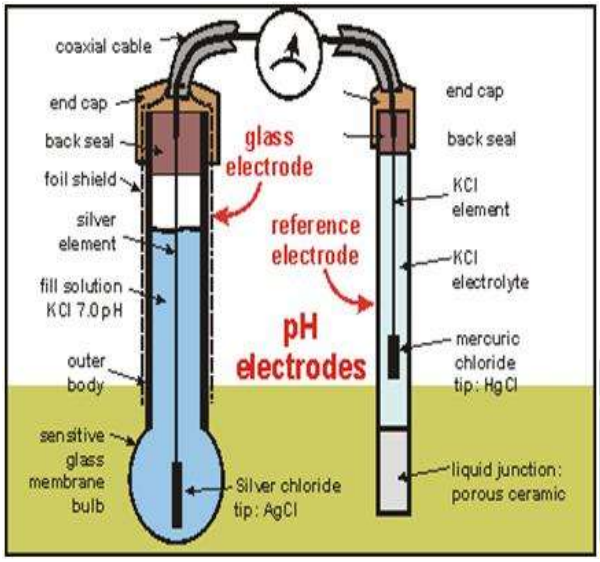


The electrode is placed inside the beaker filled with a solution whose pH is to be measure. The glass bulb welded at the end of the measurement electrode consists of lithium ions doped to it which allows the hydrogen ions from the unknown solution to migrate through the barrier and interacts with the glass, developing an electrochemical potential related to the hydrogen ion concentration. The measurement electrode potential thus changes with the hydrogen ion concentration. On the other hand, the reference electrode potential doesn't changes with the hydrogen ion concentration and provides a stable potential against which the measuring electrode is compared. The potential difference between the two electrodes gives a direct measurement of the hydrogen ion concentration or pH of the system and is first pre-amplified to strengthen it and then given to the voltmeter.

MAX232

Max232 is designed by Maxim Integrated Products. This IC is widely used in RS232 Communication systems in which the conversion of voltage level is required to make TTL devices to be compatible with PC serial port and vice versa. MAX232 comes in 16 Pin Dip and many other packages and it contains Dual Drivers. Max232 is one of the versatile IC to use in most of the signal voltage level conversion problems.

IoT

The main focus falls on designing a novel IDM system which involves the 'things' in IoT (human user and different devices such as computing and smart devices, sensors, actuators etc.) and expresses the communication between them. Based on that analysis, we derive the user and system requirements. A use-case scenario is defined to describe how the system is applicable in a real-life situation.

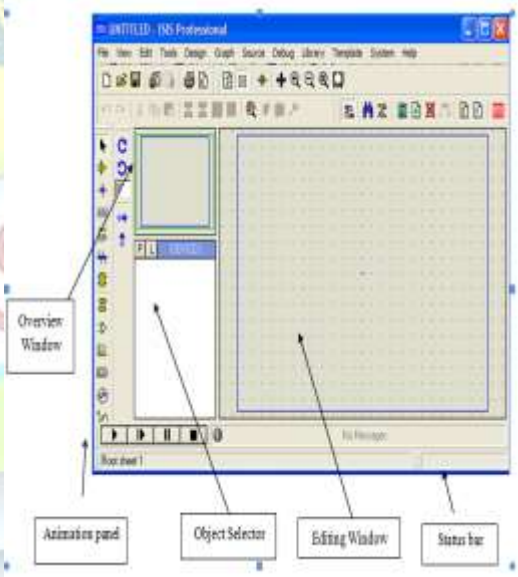
IV. Software Description

1. PROTEUS SOFTWARE DESCRIPTION

This chapter describes the design and current implementation of the Proteus dependability manager and object factory. The application requirements and the type of Aqua applications that are currently supported by Proteus are also described.

2. THE PROTEUS ENVIRONMENT

Proteus PIC Bundle is the complete solution for developing, testing and virtually prototyping your embedded system designs based around the Microchip Technologies TM series of microcontroller. This software allows you to perform schematic capture and to simulate the circuits you design.



A screen shot of the Proteus IDE

3. Debugging the Program (Simulating the Circuit)

In order to simulate the circuit point the mouse over the Play Button on the animation panel at the bottom right of the screen and click left. The status bar should appear with the time that the animation has been active for.

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V. CONCLUSION

By using a WI-FI MODULE, the interfacing is done between transducers and the sensor network on a single chip solution wirelessly. For the monitoring process, the system is achieved with reliability and feasibility by verifying the four parameters of water. The time interval of monitoring might be changed depending upon the necessity. Ecological environment of water resources is protected in this research. The time is reduced, and the cost is low in this environmental management.

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