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WATER ANALYSIS

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Abstract - Water is one among the supreme valuable natural resources known on earth. It's important to all or any living organisms, most ecological systems, human health, food production, and economic development. During this project, we'll put flow meter before each and each tap and therefore the equipment which utilizes water. NodeMCU microcontroller are going to be wont to take the reading s from the flow meter. This reading is going to be analyzed and therefore the usage of excess water are going to be informed. One 12V electronically operated solenoid valve are going to be used after the cistern to prevent the flow of water if the allowed amount of water has already been consumed. This project is going to be useful in monitoring and management of water utilized in residential and industrial areas.

***Key Words**: (*Solenoid Valve, solar array, Water Uses, Flowmeter.*)*

1. INTRODUCTION

Monitoring water use is that the regular collection of data on the entire amount of water drawn from all sources for any use during a given period. It enables a corporation to know water use patterns and identify potential inefficiencies. Monitoring is additionally essential to setting reduction targets in water use. Monitoring water use is an integral part of an Energy Management System. (For more information on implementing an EMS, please ask "GIIRS EM Resource Guide: Environmental Management System.")

Finally, water costs don't just come from supply and subsequent discharge to sewer. Saving water can cause reductions in electricity, gas, labor and chemicals (because more water usage often requires more heating, pumping and treating)

Water bills when available, use water invoices or receipts from suppliers (utilities) over one or two years to work out your company's water use. This will give baseline usage information from which you'll start determining overall use patterns: can your company explain increases, decreases, or steady levels? Are there seasonal effects? Create a listing of all water using activities4 whether water bills are available or not, determine where, how, and when water is employed in your facilities and buildings. Make sure to include all equipment used. When possible, install sub-meter equipment to assist quantify water use more granularly. Otherwise, you'll estimate usage with methods like such as:

• Measuring flow rates using buckets and a stopwatch

• Estimating volume of daily use from toilets and taps

• Determining the capacity and cargo factor of the cooling system

• Measuring the irrigation area to work out water needs

• Calculating water use of operating equipment per cycle and cycle frequency if your company has an industrial facility, once you determine your inventory, evaluate the results and compare them with your water bills. Are results comparable? If not, attempt to identify what major water using equipment you'll have missed. This process can assist you identify your company's largest water using activities and any major leaks. If water is obtained from different sources (municipal water system, harvesting of rainwater, own wells, etc.), measure or estimate the quantity of water used from each source and add up the volumes.

The Global Water Flow Probe is a highly accurate water velocity instrument for measuring flows in open channels and partially filled pipes. The water velocity probe consists of a protected water turbo prop positive displacement sensor including an expandable probe handle ending during a digital readout display. The water flow meter incorporates true velocity averaging for the foremost accurate flow measurements. The Flow Probe is right for storm water runoff studies, sewer flow measurements, measuring flows in rivers and streams, and monitoring water velocity in ditches and canals.

Basic units of water measurement

There are two basic units of water measurement from a water management perspective. For water that is in motion, cubic feet per second is the unit of measure. For water that is stored or impounded, the acre-foot is how water is measured.

A flow meter (or flow sensor) is an instrument wont to measure linear, nonlinear, mass or volumetric flow of a liquid or a gas. When choosing flowmeters, one should consider such intangible factors as familiarity of plant personnel, their experience with calibration and

maintenance, spare parts availability, and mean solar time between failure history, etc., at the particular plant site. It is also recommended that the value of the installation be computed only.

One of the foremost common flow measurement mistakes is that the reversal of this sequence: rather than selecting a sensor which can perform properly, an effort is formed to justify the use of a tool because it's less costly. Those "inexpensive" purchases can be the most costly installations. This page will assist you better understand flow meters, but you'll also speak to our application engineers at any time if you've got any special flow measurement challenges.

Fluid and flow characteristics

The fluid and its given and its pressure, temperature, allowable pressure drop, density (or specific gravity), conductivity, viscosity (Newtonian or not?) and vapour pressure at maximum operating temperature are listed, together with a sign of how these properties might vary or interact. In addition, all safety or toxicity information should be provided, along side detailed data on the fluid's composition, presence of bubbles, solids (abrasive or soft, size of particles, fibers), tendency to coat, and lightweight transmission qualities (opaque, translucent or transparent).

2. LITERATURE REVIEW

1. Surface roughness effects on discharge coefficient of broad- crested weir 2014 to imcsfigate the effects of surface roughness sizes on the discharge coefficient for a broad crested weirs. By using experimental work three models of broad crested weirs were constructed from wood, each with different value of length. The flow rate was measured by a volumetric tank.

2. Effect of types of weir on discharge 2014 to present an analysis on effect of types of weir on discharge. By using experimental work. The experimental studies were performed in an open channel. The velocity is determined using the current meter. The depth of flow is determined using a point gauge. To improve the accuracy of flow depth. Average =dings from point gauge is obtained.

3. Bed resistance investigation for Manning's and Chozy's coefficients 2016 to investigate the coefficient f discharge for different beds and comparing Chczy's and Manning's coefficient. By using experimental work. By using weirs. Flumes. Sluice gates and notches.

4. The Discharge Coefficient for a Compound Sharp Crested V-Notch Weir 2015 to investigate the discharge coefficient for a compound V notch weir. By using experimental work Experiments were performed in a flat rectangular laboratory flume. Started by testing the duration time of runs using distinctive weir models and diverse discharges. The test methodology were as per the following: I ffhe selected weir model was fixed carefully in the flume in its place

3. COMPONENTS USED

i] Solar panel:

Solar panel is use to convert light energy into the electrical energy based on a phenomenon called photovoltaic effect. The joint between these two semiconductor is called the "P-N junction" Sun light striking the photovoltaic cell is absorbed by the cell. The energy of absorbed light generates particles with positive or negative charge (wholes and electrons), which move about or shift freely in all directions within the cell.

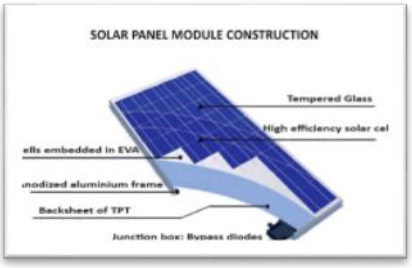

Fig. 1 solar panel

ii] Water flow meter:

Accurate flow measurement is an important step both within the terms of qualitative and economic points of view. Flow meters have proven excellent devices for measuring water flow, and now it's very easy to create a water management system using the renowned water flow sensor YF-S201. For example you'll make a robotic cocktail dispensing machine, and may use this sensors to accurately measure components like Soda, Water, etc.

YF-S201 1/2 inch Water Flow Sensor sits in line with the water line and contains a pinwheel sensor to live what proportion water has moved through it. There is an integrated magnetic Hall-Effect sensor that outputs an electrical pulse with every revolution. YF-S201 1/2 inch water flow sensor has only three wires and it are often easily interfaced between any microcontroller and Arduino board. It requires only +5V Vcc and provides pulse output, the sensor must be tightly fitted between water pipeline.

iii] Lead acid storage battery:

The battery which uses sponge lead and lead peroxide for the conversion of the energy into electric power, such sort of battery is named a lead acid battery. The lead acid battery is

Fig. 2 lead acid battery

most ordinarily utilized in the facility stations and substations because it's higher cell voltage and lower cost.

iv] Node MCU:

Fig. 3 Node MCU Esp 12

NodeMCU is an open source firmware that open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit).The term "NodeMCU" properly speaking refers to the firmware instead of the associated kits. Both the firmware and prototyping board designs are open source.

The firmware uses the Lau scripting language. The firmware is based on the Eula project, and built on the Espresso Non-OS SDK for ESP8266. It uses many open source projects, like lua-cjson and SPIFFS. Due to resource constraints, users got to select the modules relevant for his or her project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

V] Water Valve:

Fig. 4 Water valve solenoid 12v

12V DC Solenoid Water Air Valve Switch (Normally Closed) – 1/2″ controls the flow of fluid (liquid or air) and acts as a valve between high-pressure fluid! This liquid valve would make an excellent addition to your robotic gardening project. There are two ½" (Nominal NPT) outlets. Normally, the valve is closed. When a 12V DC supply is applied to the 2 terminals, the valve opens and water can erupt.

The valve works with the solenoid coil which operates electronically with DC 12 volt supply. As it is a normally closed assembly, it opens the flow of fluids as soon as it is powered ON and stops/blocks the flow when the supply voltage removed.

vi] IC LM2596:

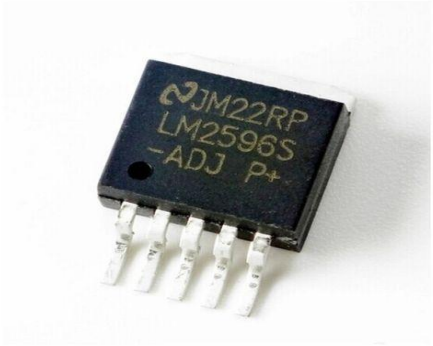

Fig. 5 IC LM2596 5v

The LM2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of three .3 V, 5 V, 12 V, and an adjustable output version. Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation, and a hard and fast frequency oscillator. The LM2596 series operates at a switching frequency of 150 kHz, thus allowing smaller sized filter components than what would be required with lower frequency switching regulators. Available during a standard 5-pin TO-220 package with several different lead bend options, and a 5-pin TO-263 surface mount package. The new product, LMR33630, offers reduced BOM cost, higher efficiency, and an 85% reduction in solution size among many other features. See the device comparison table to compare specs. Start WEBENCH Design with LMR33630.

vii] Transistor:

It is basically an NPN bipolar junction transistor (BJT). The word transistor may be a combination of two words, transfer and resistor. So, the essential purpose of transistor is transfer of resistance. A transistor is generally used for

amplification of current. The larger current at the emitter and collector are often controlled by the tiny amount of current at the bottom . BC547 are often used commonly for amplifiers and switches. Similar to all the opposite transistors BC547 has also three terminals e.g. collector terminal, base terminal and emitter terminal respectively. The amount of current flowing from base to the emitter controls the quantity of the present flowing through the collector. BC547 is typically used for amplification and switching purposes. Its maximum current gain is around 800. A fixed DC voltage is required for its proper operation in desired region. Proper voltage supply is known as biasing. BC547 is biased during a way that it's partially on for all the applied inputs, for the amplification purpose. The input signal is amplified at the base and then transferred to the emitter.

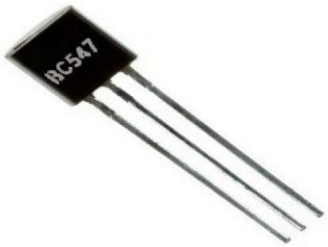

Fig. 5 Transistor BC547

viii] Relay:

Fig. 6 Relay SPDT 5V

If you are from the electronics field, this word must be prevalent and if you are not, let us tell you all about it!

Relays are the switches which aim at closing and opening the circuits electronically also as electromechanically. It controls the opening and closing of the circuit contacts of an electronic circuit. When the relay contact is open (NO), the relay isn't energize with the open contact. However, if it is closed (NC), the relay isn't energize given the closed contact. However, when energy (electricity or charge) is supplied, the states are prone to change.

Relays are normally utilized in the control panels, manufacturing and building automation to regulate the facility along side switching the smaller current values during a negative feedback circuit. However, the supply of amplifying effect can help control the large amperes and voltages because if low voltage is applied to the relay coil, a large voltage can be switched by the contacts.

If preventive relays are being used, it can detect overcurrent, overload, undercurrent, and reverse current to ensure the protection of electronic equipment. Last but not the least; it is used to heat the elements, switch on audible alarms, switch the starting coils, and pilots the lights.

4. BLOCK DIAGRAM AND DESIGNED CIRCUIT

I) BLOCK DIAGRAM

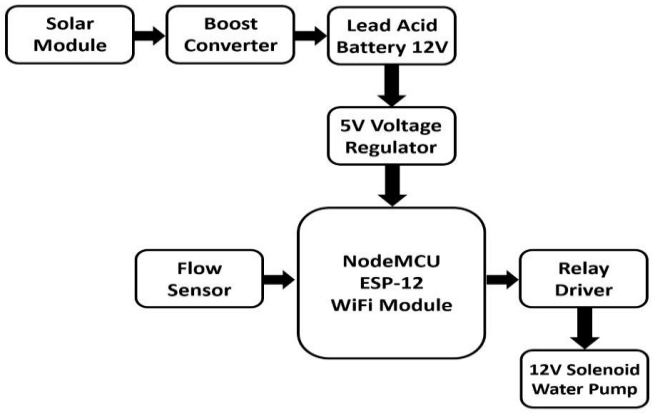

Fig. 7 block diagram

II) DESIGNED CIRCUIT

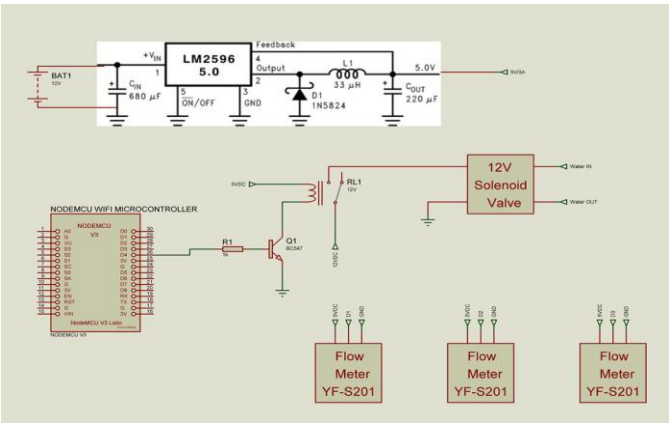

Fig. 8 designed circuit

5. METHODOLOGY AND WORKING

1. In this project it will be measure the use of water in our daily routine by using the flow meter.
2. As the water will flow from our tap, which we are using in our home or in industrial use, as the water using from a particular tap will start using for any purpose.
3. How much water is flowed form the tap is measured by the electromagnetic current sensing flow meter and this measured data will store on the memory chip by help of microcontroller.
4. After measuring of the used water, the complete use of water in complete day data will store on the memory chip, this data will help us to analysis the water uses of the particular tap or of home or of industry or of public place or of institute or any hotel etc.
5. By studying this date, we can see the demand of water, by improving the water saving habits, we save penny of water from one tap, as consideration of multiple taps we can save more water, this water saving could be limit less.
6. By using Arduino, we can handle multiple operations in our system, where we can control the water supply valve by using the solenoid valve, this can switch off the main water supply.
7. This data will provide on mobile device in number form or in graphical form, which will help or to understand the water usage.

6. APPLICATION

- Monitoring water usage
- Domestic use for monitoring water usage
- Industrial use for monitoring water resources
- Household use for analysis of water usage
- At public transport station for analysis of water usage
- The system can ON/OFF the water pump
- In Hotels for analysis of water usage
- The monitoring system can be used to make a monthly survey
- In education institutions for analysis of water usage

7. CONCLUSIONS

Effective monitoring system will enable the corporate in identifying the issues from rock bottom line and helps in establishing effective system by eliminating errors. Proper evaluation of the system enables the auditors to scale back the audit risk.

After conduct this, we can say that value of flow rate and the flow rate %error are not follow the theoretical results. From the idea , the foremost accurate flow meter may be a venturi meter. So, it means the foremost efficiency flow meter features a less value of flow %error. In this, the value of flow rate % error for venturi meter is higher than the orifice meter. For the first recommendation for this is make sure that there is no bubble in the pipeline. The existence of bubble may cause the less accuracy of flow meter. The second is confirm there's no small particles within the fluid because a number of the devices are very sensitive to those particles. Besides that, during record the manometer reading, confirm the position of eyes is parallel to the extent of reading.

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