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A NOVEL CONSTRUCTION OF CLOCK-GATING SYSTEM FOR DETECTING WATER-LEVEL OF THE TANK USING POWER DISSIPATION MINIMIZATION TECHNIQUE

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Abstract:
In recent days, across the world, the management of water resources plays a crucial and vital role in many applications including agriculture, industry, and homes, etc.water controlling is a major issue in the industries which contains huge water tanks,which is not an easy task to control the water flow at once.so,it's been a challenge because these type of tanks are used in our homes,social places,industries,dams,huge water projects etc. Nowadays, in the real-world scenarios from the last few years different types of water level controllers are introduced. However, most of the approaches are developed overflow control systems to avoid the over-flow of water tank using Clock-Gating System[CGS] , it consists of NOR-SR[NSR] flip-flop, when water stage in the tank exceeds the required stage. There is one more aspect we need to take in account of minimization of the power consumed is the major issue in the verilog era .As the technology is growing many other electronics reliabilities are in emerging tremendously.There we need to minimize the less power consumption and it required to design of system, that plays widen role. So, to minimize power dissipation is one of the major concerns and less time taking of the system.For that ,here we introduced a noval concern of power dissipation minimization[PDM] is achieved by reducing the time factor of the system.

Keywords: CGS, NSR[NOR-SR flip-flop],PDM[Power Dissipation Minimization]

1. Introduction

A thermionic design was structured for energy saving whose intuition was to automate the control system which was used majorly in agriculture sector for watering huge number of plants with less amount of energy. The design of the power unit in our structure can capable of controlling the water velocity. This can reduce the fluctuation of the farmers in the agricultural works by following an appropriate method in irrigation. However, it still is a challenging task since in a lot of industrial and agriculture sectors, control of the water level is very crucial. To address the mentioned problem, in this work, we proposed a simplex, and efficient self-regulating water status system. The main objective of our work is to auto-regulate the on/off

process of the water container to control the auto-filling method for the overhead container.

By considering present statistics of the water loss due to outpouring of container has a severe consequence on the water calamity, in the existing situation of an engaged world the hand-operated controlling of water in the storage places appear to have a difficult to switch the two states of the motor,which in turn leads to the loss of water , there exists a numerous solutions to forbid using the advanced technology,but sorry to say they haven't figure out the much dominant over the reduction.

A few disadvantages of the present mechanism of the overflow feedback control systems are [7]
(i)Ball Mechanism: losing its mechanism after a period of time.
(ii)Fuzzy logic: requirement of too many complications in setting up the system.
(iii)Radio Frequency Communication: requirement of manual view.

To overcome such disadvantages a novel construction and design of a system which is automated as well as manually controlled (according to the user requirement),we were designed.

2. Existing System

The existing system introduces a self-regulating liquids state system,which can be used either in home water-tanks or in oil and other liquid containers in the industries.The main purpose of this structure is to self-load the switching states and to regulate the containers for controlling the liquid. This structure design is casted on the thought of using a single-inv Set as input NOR S-R flip-flop to perform the required state controlling task with a vision of proper driving factor, and also two simplex distinct level sensors to sense and notice the liquid state in the tank.

There are many designs of automatic level control systems based on a group of different controlling methods. Majority of the suggested constrctions are based on Microcontrollers; as the authors in [8] and [9] used a microcontroller to automate the task of liquid filling in a container , and underground tanks retention systems and has the capability to notice the status of liquid in a container, switching between the two states of the motor consequently and show the condition on a digital display. The researchers in [10] also used microcontroller to come-through the procedure by using wireless state sensors as an alternative to the wired sensors. There are also another controlling instruments and methods were presented as Cosmina Illes and his colleagues in [11] suggested a Programmable Logic Controller (PLC) based level control system design. Also a FUZZY logic control based designs have been introduced by the authors in [6],[7]. A more cost-aware designs using a combination of simple electronic components and ICs was also introduced . Ishwar C. Murmu Laloo K. Yadav in [8] used a group of NAND gates , 555 Timer ,and a NOT gate to perform level controlling functions, while the researchers in [9] used a group of OR gates , Capacitors , Resistors ,and a

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Transistor to construct their control circuit.

3. Proposed System

Here we are introducing one of the novel clock gating system ,here clock signal is not connected directly to the clock part of sequential device .In previous or existing paper they connected through an intermediate clock block (555 timer) which is working as clock gating system.Where we are defining clock gating logic for the Flip-Flop and it receive clock pulses only when it requires to be operated.

So if the logic is true, it will be getting clock and if the logic is false, the clock will be blocked for that duration for that device. Thus it minimizes power dissipation by ensuring that only the effective clock pulses and by avoiding or blocking the not required clock transitions.The solid diagram of clock gating system is figured below

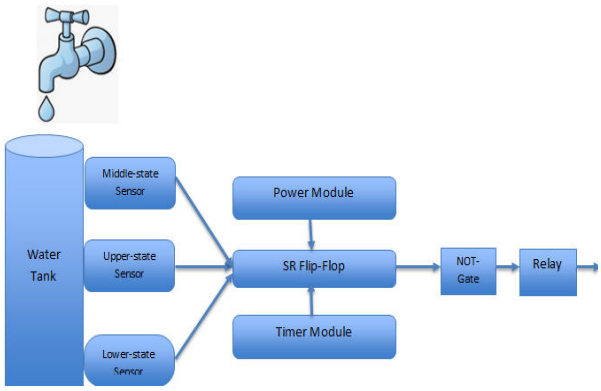

Fig 1..Block Diagram of Proposed System

Here in this paper we are going to design a novel technique of water level control system for decreasing the time factor of the duty cycle.Our proposed system consist of following modules

I. Sensor module
II. Power supply module
III. Clock Gating System[CGS]
IV. Relay

I. Sensor Module:

The liquid-state sensor is for sensing the liquid levels in the tank. There are a numerous methods of water state sensor used to identify the point-level of a water. Where three sensor are called top level, middle level and bottom level.The sensor consists of discrete level Some various kinds utilize a magnetic float, which rise and fall according to the water in the water tank. At sometime the water, and by delay, the sensor will detect to reach a particular state, a reed magnetic switch is activated .One of the most frequently used water level sensor is shown fig. below

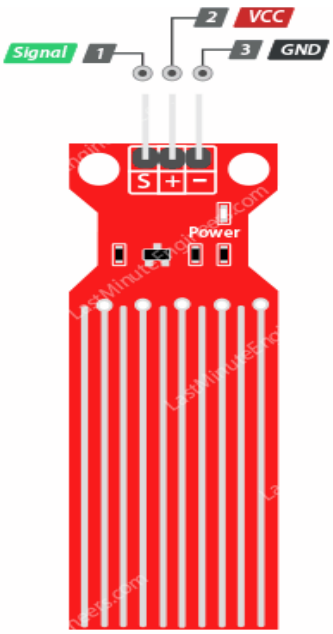

Fig 2.Water level sensor

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The first pin is the signal pin,it is an analog output that will be attached to one of the analog inputs. The second pin is +Vcc ,it supplies power for the sensor. It is recommended to power the sensor with between 3.3V – 5V. Here we have to understand analog output alters based on the particular voltage is given to the sensor. The third pin is a ground connection ,connected to ground pin of the power supply.

II.Power Supply Module:

The power supply module is a default unit to the circuit board to provide 0 to 5Volts dc.It is required not only to operate sensors operation but also for clock gating system and relay.

III Clock Gating System[CGS]:

In this technique ,the clock signal is not connected directly to the clock, and it is applied to the sequential device (i.e to Flip Flop).Here 555 timer is working as Clock Gating System[CGS].Where the flip-flop receives clock pulse only when it requires to be operated.So if the logic is true ,it will be getting block and if the logic is false,the clock will be blocked for that duration for that device.Thus,it minimises power dissipation by ensuring that only the effective clock pulses and by avoiding or blocking the not required clock transitions.So the clock duration $T=\ln 2[R_1+2R_2]$,Where R_1=11.4Kohm, R_2=1.5Kohms and C=100μF ,they gives minimum time constant.

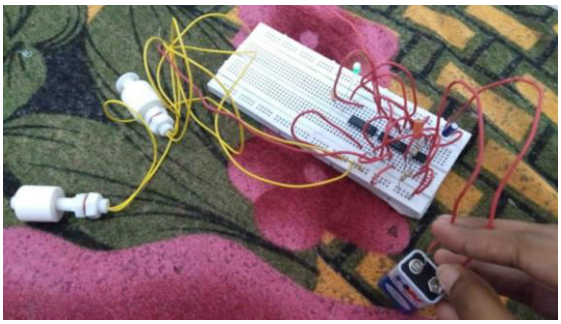
The operation of the clock gating is as shown in table

Sl No	Set(S	Reset(R)	Status of Sensor/Water level indication in Tank
1	0	0	ON
2	0	1	INVALID
3	1	0	SAME STATE
4	1	1	OFF

Relay:

Relay is used to monitor the tank continuously by pulling the water level into contact until the water is at the lowest state of the container or at the highest state of the container. Indirectly here current principle is working i.e it's working as the conductor of electricity.

Hardware of Clock Gating System:



Hardware schematic of clock-gating-system[CGS] is hown below

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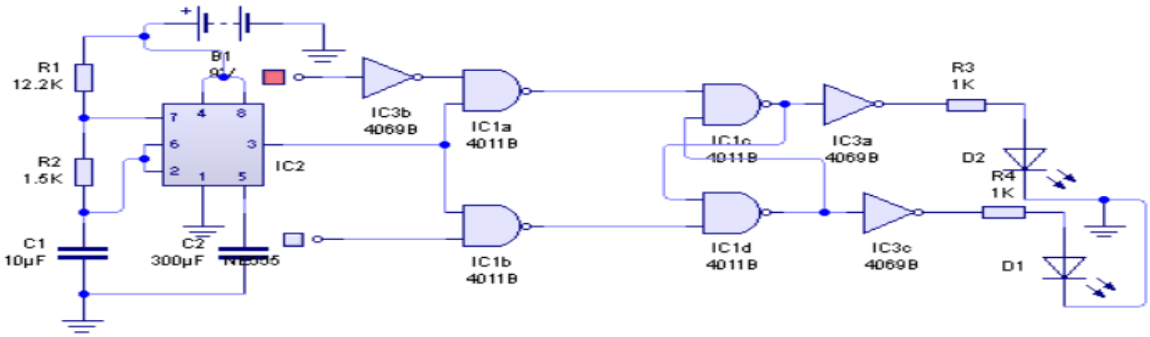

Fig 3. Schematic Clock Gating System

There we checked the clock gating system in various softwares like Multisim, CMOS Technology and in PCB mode as shown in below.

1. In Multisim:

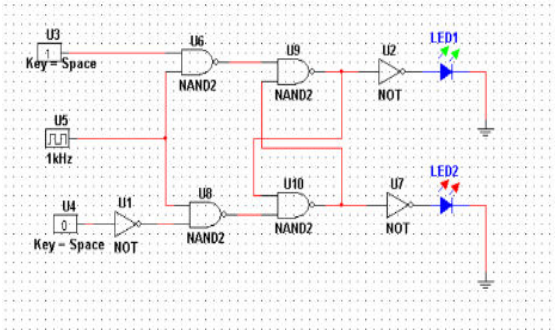

Fig 4. NOR-SR Flip-Flop in Multisim

2. Using CMOS Technology:

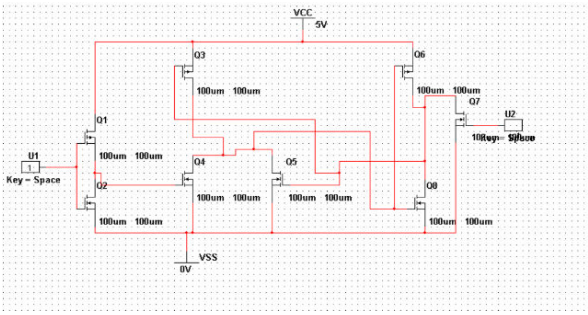

Fig.5.CGS using CMOS Technology

3. In PCB Wizard:

Automatic routing completed,100 percent of the net connections were successfully routed. All the four conditions were satisfied in the printed circuit board(PCB) also.

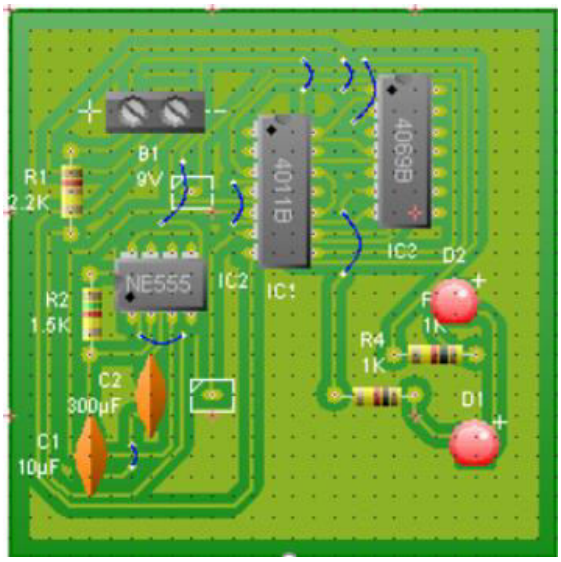

Fig 6.Using PCB Wizard Software.

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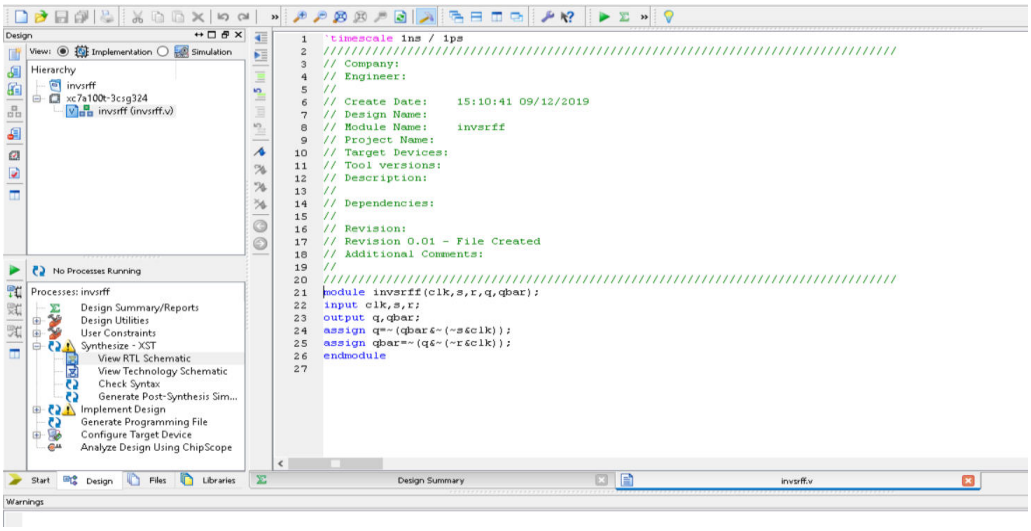
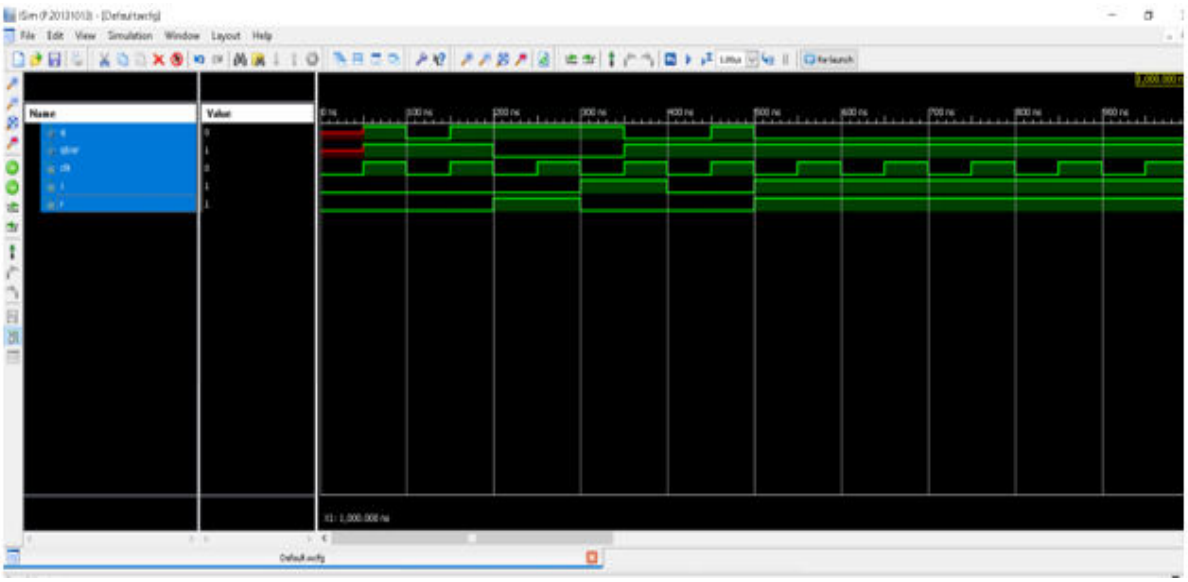
4.In Xilinx:



Result:

Here ,we are manifest the only one output among even ,we had checked the result of the same system,i.e output waveforms of Xilinx code.All the four flipflop conditions were satisfied .The third wave in this picture is clock



4. Advantages of CGS :

1. Decrease in the Time taken
2. Decrease in Complexity
3. Low Cost
4. Easy to Implement
5. It can also be easily Integrated with other systems it may be industrial or household

5. Conclusion: In this paper ,we designed one of the very less expensive way and accurate water level control system. Where we used the N-SR flip-flop to establish the water level control mechanism. It is very efficient as we calculate the time constant. This system gives very innovative advantages even we compare other systems.

References

[1] Beza Negash Getu, Hussain A. Attia, "Automatic Control of Agricultural Pumps Based on Soil Moisture Sensing", Proceedings of the IEEE AFRICON 2015 Conference, pp. 667-671, 2015.

[2] Beza N. Getu, Nasser A. Hamad, Hussain A. Attia, "Remote Controlling of an Agricultural Pump System Based on the Dual Tone Multi-Frequency (DTMF) Technique", Journal of Engineering Science and Technology (JESTECH), vol. 10, no. 10, pp. 1261-1274, 2015.

[3] BezaNegashGetu, Hussain A. Attia, "Remote Controlling of Light Intensity Using Phone Devices", Research Journal of Applied Sciences Engineering and Technology (RJASET), vol. 10, no. 10, pp. 1206-1215, 2015.

[4] Hussain A. Attia, BezaNegashGetu, "Design and Simulation of Remotely Power Controller", International Journal of Applied Engineering Research (IJAER), vol. 10, no. 12, pp. 32609-32626, 2015

[5] Hussain A. Attia, BezaNegashGetu, "Design and Simulation of Remotely Power Controller", International Journal of Applied Engineering Research (IJAER), vol. 10, no. 12, pp. 32609-32626, 2015.

[6] R.L. Boylestad, L. Nashelsky, Electronic Devices, and Circuit Theory, Upper Saddle River, New Jersey: Prentice-Hall, 2012.

[7]Automated Water Tank Overflow Control Unit Integrated with Mobile Application, International Journal on Information Sciences and Computing(IJISC) Vol.9 No.2 July 2015.

[8] Ogbidi Joseph Abang, " Construction of automatic water level controller for both overhead and underground tanks" ,August 2013.

[9] Ejiofor V. Ebere, Oladipo O. Francisca, "Microcontroller based Automatic Water level Control System ", International Journal of Innovative Research in Computer and Communication Engineering , Vol. 1, Issue 6,

[10] S. M. Khaled Reza, Shah Ahsanuzzaman Md. Tariq, S.M. Mohsin Reza "Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue" Proceedings of the World Congress on Engineering and Computer Science 2010 Vol I WCECS 2010, October 20-22, 2010, San Francisco, USA.

[11] Cosmina Illes, Gabriel Nicolae Popa ,Ioan Filip, "Water level control system using PLC and wireless sensors ".