DESIGN OF WATER LEVEL ACTIVATED ALARM SYSTEM FOR HOUSE WATER TANK

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This Report Is Submitted In Partial Fulfillment of Requirements for the Degree of Bachelor in Electrical Engineering
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Fakulti Kejuruteraan Elektrik
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"I hereby declared that this report is a result of my own work except for the excepts that have been cited clearly in the references"

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“Saya akui laporan ini adalah hasil kerja saya sendiri kecuali ringkasan dan petikan yang tiap-tiap satunya saya jelaskan sumbernya.”

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Tarikh	:	13 / 05 / 2009

"I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)"

Signature : .....

Supervisor's Name : P. M. Dr. Musse Mohamud Ahmed

Date : .....

“Saya akui bahawa saya telah membaca karya ini pada pandangan saya karya ini adalah memadai dari skop dan kualiti untuk tujuan penanugerahan Ijazah Sarjana Muda Kejuruteraan Elektrik (Kuasa Industri).”

Tandatangn : …….

Nama Penyelia : P. M. Dr. Musse Mohamud Ahmed

Tarikh : ……

For my beloved father and mother

Md Yakim Bin Lambak and Halimah Binti Abdullah

For all their support and understanding.

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بِسۡمِ ٱللَّهِ ٱلرَّحۡمَٰنِ ٱلرَّحِيمِ

In the name of Allah, The Beneficent, The Merciful.

Alhamdulillah, all praise is to Allah that I have been able to complete my report for my "Projek Sarjana Muda 2" that is design of water level activated alarm system for house water tank.

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ABSTRACT

This project is inspired to monitor and detect water level when the water filled up in house water tank. When water is filled up with the house water tank, water level must be determined. So, this project is required to design and implement a circuit that detects water level and shows by numbers of the LED and the alarm will function when the water is filled up with the house water tank. The project circuit is also included the specific conductivity mechanism that would show the levels of different numbers of LED when the water is filled up with the house water tank. The specific conductivity varies with temperature, volume and separation distance of the measurement probes. Normally, water tap has a conductance of about 50 uS /cm and 20K Ohm / cm at 25 ° C. The circuit is drawn out as a block diagram, and then entered in a schematic using MULTISIM to simulate for correct functionality. Once the circuit is performed accurately in testing it will be assembled with the actual components on a breadboard and will be verified using laboratory equipment.

ABSTRAK

Projek ini diinspirasikan untuk mengawal dan mengesan paras air apabila air diisi ke dalam tangki air rumah. Apabila air sedang diisi ke dalam tangki air rumah,kandungan air didalam tangki tidak dapat dilihat tidak dapat mengenal pasti paras air tersebut.Jadi,projek ini perlu merekabentuk dan memasang litar yang boleh mengesan paras air dan paras air tersebut boleh ditunjukkan berdasarkan bilangan LED yang menyala seterusnya alat penngera akan berbunyi apabila sampai ke paras air yang dikehendaki.Litar project ini menggunakan mekanisme `*specific conductivity*` yang akan mengesan paras air yang berbezaapabila air memenuhi tangki air rumah. `*Specific conductivity*` beebeza dengan suhu,isipadu dan jarak pembahagian antara alat pengukur.Kebiasaanya, air mempunyai pengalir iaitu 50 uS /cm dan 20K Ohm / cm pada 25 ° C.Litar ini dilukis menggunakan MULTISIM untuk disimulasi untuk mendapat fungsi yang betul.Kemudian,semua komponen yang sebenar digabung dan disusun pada papan litar dan diujikaji menggunakan peralatan makmal.

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AC	Alternating Current
DC	Direct Current
LED	Light Emitter Diode

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CHAPTER 1

INTRODUCTION

1.1 Project overview

This project is used the specific conductivity which varies with temperature, volume and separation distance of the measurement probes. Water tap has a conductance of about 50 uS / cm measured at 25 C^o. This project circuit triggers with any fluid with a resistance between the maximum separation distances of the probes. The circuit has 4050B CMOS hex buffer. All gates are biased off by the resistors connected between the ground and the buffer input. The "common" probe is the topmost probe above probe 1 in the diagram is connected to the positive 5 volt supply. If probe 1 is spaced 1 cm away from the common probe and water tap at 25 C^o is detected between the probes (a resistance of 20k) then the top gate is activated and the LED 1 will light. Similarly if probe 2 at 2 cm distance from the common probe detects water, LED 2 will light and so on. Switch 1 is used to select which output from the hex buffer will trigger the alarm made from the gates of a CMOS 4011B IC.

1.2 Objectives of the project

1. To design the water alarm system with indicator
2. To explore the specific conductivity as level technologies.
3. To use water's ability to conduct electricity
4. To build the house water tanks for home appliances.
5. To design the switching circuit that with the desired water level to trigger the alarm.
6. To monitor the level of water in a bath or cold storage tank.

1.3 Problem statement

Nowadays, the house water tank is very important to keep water for daily use and in emergency cases like when the main pipe leaks. So, water level indicator is important to monitor the level of water in a bath or cold storage tank and to determine volume of balanced water in the tank. This project is to create water activated alarm system that use 240 Vac 50 Hz and with specific conductivity as the level technology. The water activated alarm system also can be used to monitor the level of another liquid in cold storage tank where temperature of the liquid is 25 C^o .So,the water level activated alarm system not only used for water but its can be use for another liquid.

1.4 Scope of the project

1. To study the specific conductivity method
2. To design the circuit and combine it to create water activated alarm system uisng the specific conductivity method.
    a. Regulator circuit
    b. Water level control circuit
    c. Synchronyse the project circuit with the tank
3. To do analysis and experiment on the circuit and prepare a full report

1.5 Thesis Outline

Chapter 1 briefly summarizes the project background and problems statements as well as it elaborates the objective and scope of the project.

Chapter 2 explains about the literature review. In this chapter it contains information about the water level detector. Beside that it has some information about the components that used for this project

. Chapter 3 explains about the project methodology. In this chapter it contains the progress of the project. The project methodology which is the most important part that describes the flow of the project is also discussed in detail in this chapter.

Chapter 4 discusses about the theory that is to be used in this project. Theory in this project involved about the specific conductivity, the filter, the voltage regulator, the gate logic and another related theory.

Chapter 5 explains about the hardware developments. In this chapter, the hardware components which are use in this project are explained in detail. Some results from simulation using MULTISIM 10 has been shown.

Chapter 6 shows the testing results after testing for the project circuit. Some results and analysis have been recorded in this chapter.

Finally, in Chapter 7 the conclusion of the project is discussed and necessary recommendations are stated clearly.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will discuss the literature review according to the Water Level Activated Alarm system that is used in the residential and industrial areas. Summary of Commonly Used Water Level Technologies also discussed in this chapter based on their descriptions, advantages and disadvantages. Water Level technologies are very important to discuss when designing the water level activated alarm which depends on the type of liquid, size of the tank and the tank. This chapter as show the operation and the circuit diagram in the residential and industrial areas. This is important to compare the Water Level Activated Alarm system advantages and disadvantages.

2.2 Water Level Indicator

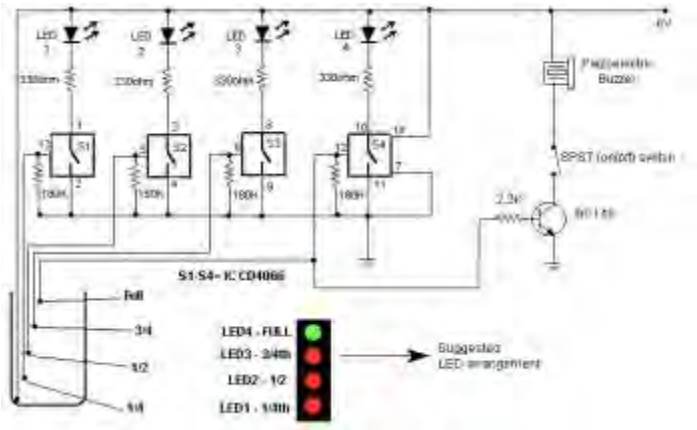

Figure 2.1: Water level indicator circuit diagram

This circuit not only indicates the amount of water present in the overhead tank but also gives an alarm when the tank is full. The circuit uses the widely available CD4066, bilateral switch CMOS IC to indicate the water level through LEDs.When the water is empty the wires in the tank are open circuited and the 180K resistors pulls the switch low hence opening the switch and LEDs are OFF. As the water starts filling up, first the wire in the tank connected to S1 and the positive supply are shorted by water. This closes the switch S1 and turns the LED1 ON. Similarly the LED 1, the LED 2, LED 3 and LED 4 light gradually when the water continues to fill the tank. The number of levels of indication can be increased to 8 if 2 CD4066 ICs are used in a similar fashion. When the water is full, the base of the transistor BC148 is pulled high by the water and this saturates the transistor, turning the buzzer ON. The SPST switch has to be opened to turn the buzzer OFF. [12]