Water Level and Temperature Control System



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Declaration

It is declared hereby that this thesis paper or any part of it has not been submitted to anywhere else for the award of any degree.

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Certification

This is to certify that this project entitled "**Water Level and Temperature Control System**" is done by the following students under my direct supervision. This project work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering, Sonargaon University (SU) in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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ABSTRACT

The aim of this system is to develop water level and temperature controlling system. The system can control not only water amount but also water temperature with an appropriate value. To construct this system, PIC16F84A microcontroller is used. The main aspect of this system is automatic control of filling tank using level switch sensor. It can be done by means of the position sensor which senses the position of the copper rod. The operations are measuring, heating and filling. Thermistor is used for temperature sensor. The user sets the required temperature by using manually preset control. To fill the water, AC motor is used. The circuit is activated by a start switch and the system is automatically filled the tank and stopped when it reaches the high level. When the water is reached the low level, this system opens heating coil to control set temperature of water. LEDs which use in this circuit are common output types. If water temperature is equal to the setting values, system turns on siren alarm. If water level is high, system is automatically closed to fill water into tank. This system is implemented by using Pic Basic Language.

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LIST OF ABBREVIATIONS

DC	Direct Current
AC	Alternating Current.
LCD	Liquid Crystal Display
ADC	Analog-to-Digital Converter
IR	Infrared Receiver
IC	Integrated Circuit
LED	Light Emitting Diode
PCB	Printed Circuit Board
LCD	Liquid Crystal Display

CHAPTER-I

INTRODUCTION

1.1 Introduction

Liquid level sensing is the main theme of this system that especially considers for the automated operations. The main purpose is to reduce the human interference between machines and it can only be done if machines to operate in sequential steps belonging to the machines each other. An automatic tank filling device which is operated on AC (alternating current), no complex PCBs (printed circuit boards) are needed for the system. Sensing is accomplished by position copper rod sensors. The sensors with the help of the water low level and water high level carries out the operation. When water level is low, system starts to sense water temperature. LEDs which use in this circuit are common output type. If water temperature is equal to the setting values, system turns on siren alarm. If water temperature is less than set values, system opens heating coil to control temperature of water. If the heating water is reached the required temperature, alarm must be rung for closing the heating water.

2. Literature review of the system:-

2.1. Motor

Nowadays, the electronics devices are more powerful and more compact. But the prices are lower than the past model because of the technique of the production. There are various types of motors speed control system.

- Alternating current (AC)motor
- Stepper motor
- Servo motor
- Direct current (DC) motor

2.1.1. Alternating current (AC) motor.

Single phase AC motor is known as a universal motor because this motor can also run with DC current. AC motors are usually sized in horsepower. AC induction motors are commonly used in industrial applications. There are two types of AC motors, depending on the type of rotor used. The first is the synchronous motor which rotates exactly at the supply frequency or a sub multiple of the supply frequency. The magnetic field on the rotor is either generated by current delivered through slip rings or by a permanent magnet.The second type is the induction motor, which turns slightly slower than the supply frequency. The magnetic field on the rotor of this motor is created by an induced current.

2.1. Direct current (DC) motor.

Direct Current electric motors operate under a basic principle of electricity: interaction between two magnetic fields positioned at an angle from each other will attract of repel resulting in movement. [5].

2.2. Water pump

AC pumps use much of the full capacity of the inverter, and come on at unpredictable times. Pumping and running a washer at the same time may require a relay to pause the washer, giving the pump priority when it runs. A submersible deep well pump of 1/3 or 1/2 horsepower with 120 volt motor can pump a 300 foot well and be powered by a 2500 watt or larger inverter [2]. If an AC pump is used, get 110 volt, 1/2 horse maximum, with external starting box. The start box must be relay start control, not solid state control, for non-sine wave inverters. Solid state start works with true sine wave. No surge, or soft-start pumps, like the Grundfos SQ series are best, if depth of water in the well is within their range.

2.3 Objectives

Our main objective of this project is to evaluate peoples time and prevant wastage of water. Many times it is noticed that ,when we run out of power or hot water through the motor and fil up the tank a lot of wateris wasted. In this case ,you will be able to get a certain amount of cold water through this projector. And our job is to inspire people through this project.

2.4 Project Organization

In this report, Chapter one covers introduction,Motor, objectives. Chapter two represents theory, description of the part use of project, Timer,Tempareture controller,and other components. Chapter three describes and working principle of the project. In chapter four we have discussed result and discussion, cost estimation, future modification, conclusion.

CHAPTER II

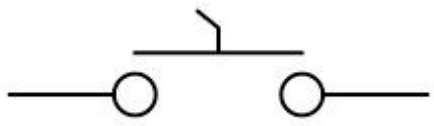
THEORY OF THE PROJECT

2.1 Introduction

This chapter includes the total over view of the device. In this chapter we have followed-up the theory of 2 S Recter switch,Berzar alarm switch,Tempareture Controller,Timer,Main Circuit Breaker,Relay,Floatless Water Level sensors, Vero board, ¼ Solenoid, Adafter,Base relay,RKC controller,Two way Selectors switch and other components. Here we can know that the total system overview of the projects. And we will also know that how the equipment are working with each other.

2.1.1 Two ways Selector Switch

A mechanical switch that can be rotated right, left, or center to open or close the electrical contacts is known as a selector switch. The main function of this switch is to control devices and also to switch between a minimum of two Electrical circuits. This switch is applicable where more than one control option is required; for instance, it needs to be activated for a fixed time, or once activated it needs to be set on a particular option. These switches provide flexible control options in less space to perform various functions. Theselector switch symbolis shown below.



Switch Symbol

The selector switch working principle is to control different currents circuits by turning the knob. These switches include a simple selector switch on the front of the panel, and also combinations of potential contacts inside of the switch.

2.3.1 Temperature Controller:

Introduction to Temperature Control

As the name implies, a temperature controller is an instrument used to control temperatures, mainly without extensive operator involvement. A controller in a temperature control system will accept a temperature sensor such as a thermocouple or RTD as input and compare the actual temperature to the desired control temperature, or setpoint. It will then provide an output to a control element.

Digital temperature controllers are used in a variety of applications, ranging from industrial processes to consumer products. For example, industrial applications such as HVAC systems, food processing, and chemical processing often require precise temperature control in order to ensure quality and safety. On the other hand, consumer products such as refrigerators, air conditioners, and water heaters also rely on temperature controllers to maintain a comfortable environment.

2.2.3 Relay

Time relay is a type of device that can control power flow in a circuit by using an electromagnet. The device includes a coil of wire that is wrapped around an iron core. When power flows through the circuit, it creates a magnetic field in the electromagnet.

This magnetic field can attract or repel another magnet attached to a timer relay switch inside the device. The time relay will allow you to control when this happens by controlling how long the current flows through its coils before stopping.

Electromagnetism is the timer relay working principle. One relay coil is always on, while the other can be turned off and on with an electric signal sent through it from a control device such as a phone or computer system. The “on” coil receives power all the time, making it ready to activate at a moment’s notice.

The “off” coil only receives power when the device is activated, and then it works to pull in an armature that activates the other end of the circuit where electricity flows. When the power is turned off, this armature pulls back to its original position and no longer allows electricity to flow through the circuit.

2.3.3 Float less Water Level Sensors

Float less water level sensors are an efficient method to measure tank level for several reasons.

- Float less design is typically a non-contact technology which eliminates the requirement of material compatibility between the liquid and the float since there is no float.
- Float less design also ensures there are no issues with viscous medias coating floats and causing them to fail.
- Float less level sensors are by default a no moving parts technology, therefore there is no risk for mechanical failures that occur in float-based sensors.
- Float less and non-contact level sensors are smaller by design which reduces shipping cost and transit time compared to large stem and float-based sensors.
- Float less level sensors small design also reduces installation time and the amount of personnel needed to install.

Float Less Level Sensors for Liquids can be broken down into a few main sensing technologies, Radar, Capacitance, and Ultrasonic to name a few.

Radar non-contact level sensors work by sending out short microwave signals toward the liquid via the sensor. The microwave signal then hits the liquid surface and bounces back toward the sensor. The sensor utilizes the time-of-flight principle which uses the known speed of the microwave, and the time it took for the signal to return, divided by two (since it had to travel down to the liquid and then back up to the sensor) to determine the distance between the liquid level and the sensor. Since most level is based on the height of the liquid, not the height of the non-liquid (air), the air height is subtracted from the total tank depth to determine the liquid level!

Capacitance level sensors work by using two electrodes within the sensor that form a capacitor. The capacitor will then process capacitance based on the dielectric constant of the liquid as it encounters the sensor. The liquid media will have a higher dielectric constant than the air in the tank and will thus increase the capacitance. This increase in capacitance triggers the sensor to change outputs and thus detect liquid level.

2.3.3 Main Circuit Breaker

is full of circuit breakers, running from top to bottom of the service panel. For the sake of convenience, the breakers are usually numbered and mapped, with the odd-numbered breakers running down the left side of the panel, and the even-numbered circuits along the right. But sitting atop both rows of branch circuit breakers there is a single larger circuit breaker that is usually located dead center in the panel. In most installations, this larger breaker is located at the top of the panel, but depending on how the main service panel has been installed, it could be at the bottom, or even at one end of a panel mounted sideways.

This large circuit breaker is known as the Main breaker, and it plays a crucial role in the electrical system by offering the means of disconnecting power to the entire circuit breaker panel and hence shutting off power to the entire house.

2.3.4 AC/DC Adapter switch

An AC-to-DC power supply adapts electricity from household mains voltage (either 120 or 230 volts AC) to low-voltage DC suitable for powering consumer electronics. Small, detached power supplies for consumer electronics are called AC Adapter variously power bricks, wall warts, or chargers.

CHAPTER III

DESIGNE & FEBRICATION

3.1 Introduction

In this chapter fully cover with discuss design and fabrication of this project. Here we will discuss about developed block diagram and briefly describe about the circuit description and also learn about working principle. Total project flow chart is also available in this chapter

3.2 Block Diagram

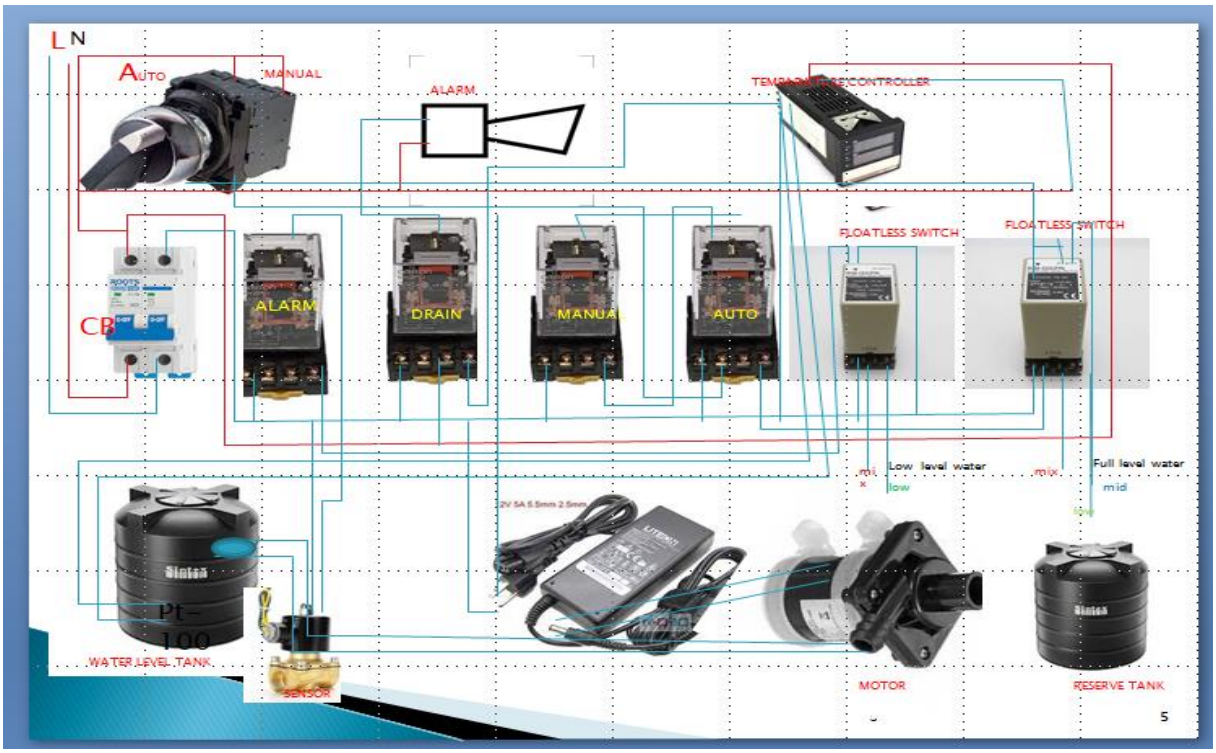
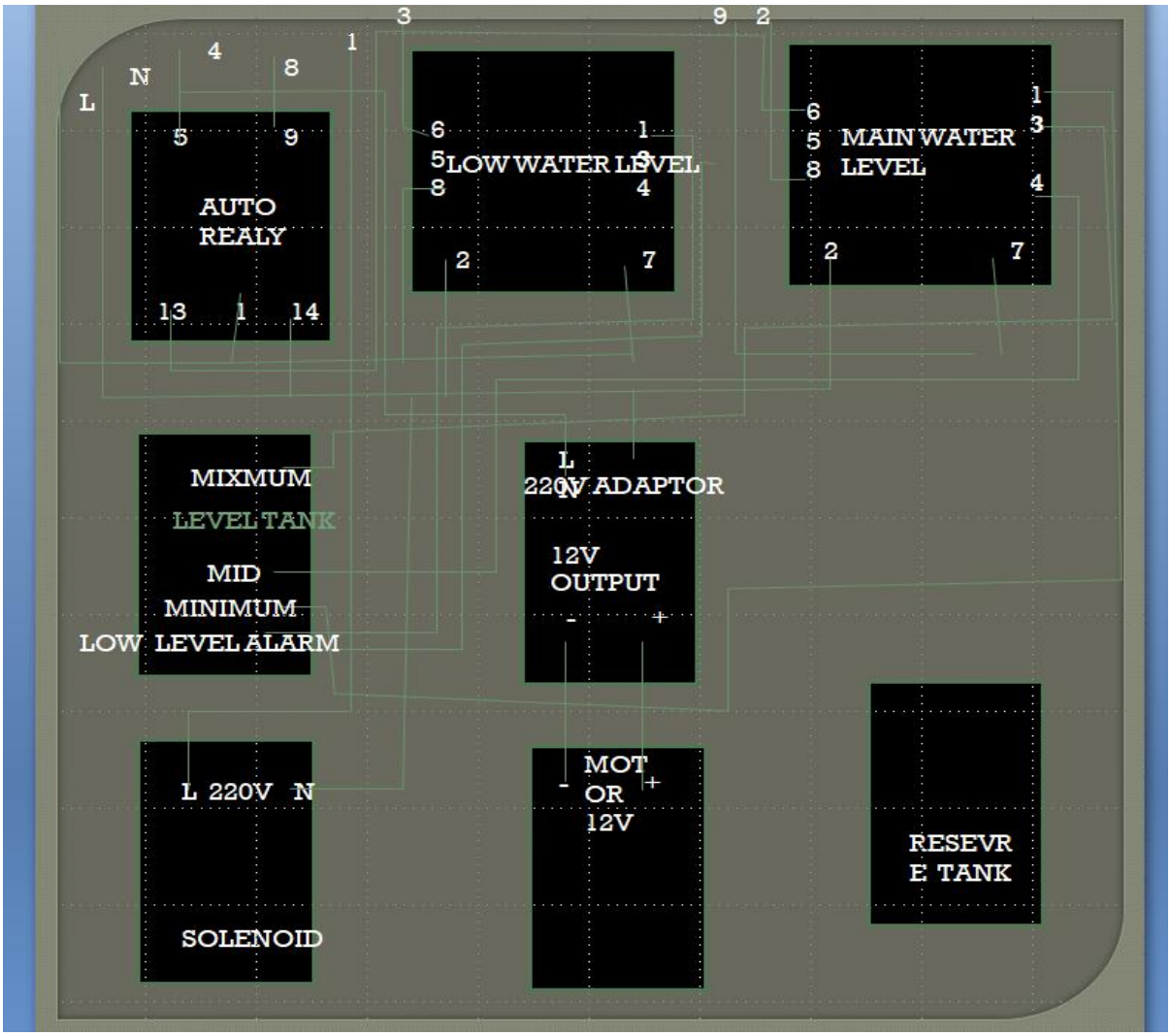


Fig-1: Block Diagram of the project

3.3 Circuit Diagram



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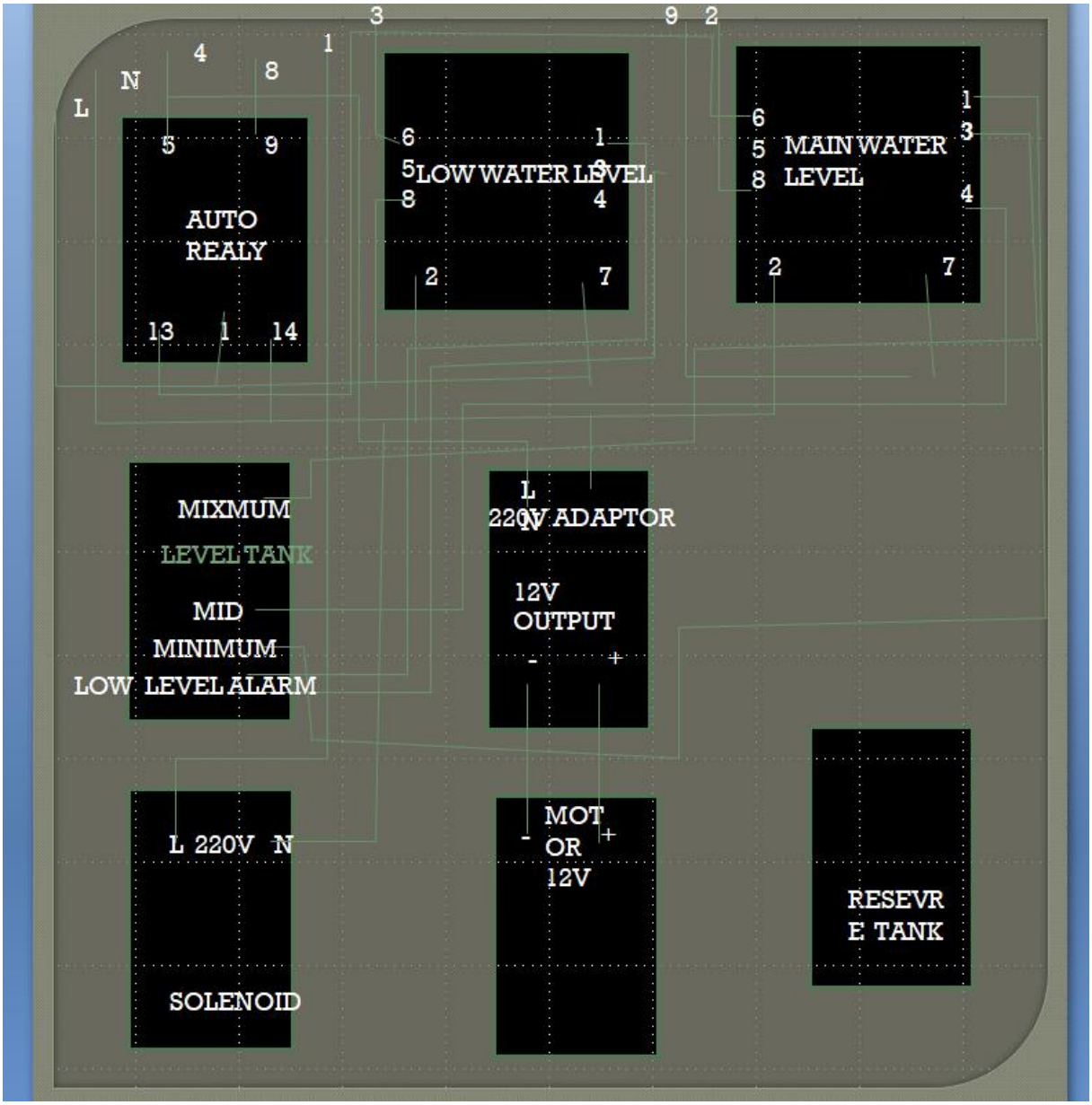


Fig-2 : Circuit Diagram of the project

3.4 Image of the Project



Fig: 3.6.:Real image of the project

3.5 Used Materials

1. Pump motor dc 12 V - 1 pcs
2. ¼ Solenoid valve - 1 pcs
3. Adepter - 1 pcs
4. Float less switch - 2 pcs
5. Float less base switch -2 pcs
6. DP Breaker - 1 pcs
7. Relay AC 220 v - 4 pcs
8. Base relay - 4 pcs
9. Berzar alarm switch - 1 pcs
10. RKC controller - 1 pcs
11. PT 100 - 1 pcs
12. Two way selector switch - 1 pcs
13. Wires- As needed
14. Cables clip - As needed

3.6 Conclusion

In this chapter we have discussed the circuit discription, flow chart also show the real image of the project and others. In the later part of this paper we discussed the result & discussion of the project to make the concept clear to anyone.

Chapter IV

RESULT & DISCUSSION

3.7 Introduction

This chapter contains the results obtained and discussion about the project. We have also covered discussions about advantages, disadvantages and limitation of current version of the protection system.

3.8 Result

- Our project is expanding with the development of the country. In this people are able to save their time and cost and rely on country technology.

3.9 Advantags of Water level and tempeature controller Alarm system.

- A water level controller helps save money by limiting the waste of water and electricity. These devices accurately regulate how much energy is used to protect against any unnecessary water/electricity usage. Over time, the money saved is quite substantial.

3.10 Disadvantagesof Water level and temperature controller Alarm system.

- The disadvantages are that it is difficult to install and can be quite expensive as well.

4.0 Cost Estimation

Table:4.1: Cost Estimation

SI	Particulars	Specification	Qty.	Unit Price	Total Price
1	RKC controller		1	-	-
2	¼ Solenoid valve		1	-	-
3	Adapter		1	-	-
4	Float less level switch	220 V/Ac	2	-	-
5	Float less switch		2	-	-
6	Pump motor	24V/DC	1	-	-
7	DP Breaker		1	-	-
8	Relay	220V/AC	4	-	-
9	Base relay		4	-	-
10	Buzzer switch		1	-	-
11	Two-way selector switch		1	-	-
12	PT 100		1	-	-
13	Cable & Others	As needed		-	-
				Total	

4.1Applications

Water level and temperature control system is a very important technologies at present. Following are the most common applications of water and temperature will be technology.

4.3 Future Work

Currently we have developed water level and temperature control systems. Now our job is to educate the city and its citizens about the benifits of this technology and ensure its use by all.

4.4 Conclusion

This project is very important for all of us, which saves our time and waste. As a result of the spread of technology,especially in the cities and villages, everyone is able to live an open life. The biggest tool behind us is the spread of the use of technology,such as water level and temperature control