"Smart Immersion Water Heater for Domestic, Commercial as well as Industrial Use"

[1]Khandekar Nagnath Vyankati
[2] Mule Abhinav Praful
[3] Shinde Sagar Ananda
[4] Kulkarni Tejas Suryakant
[5] Jadhav Kishor Pratap

Department of Electrical Engineering
SKN Sinhgad College of Engineering Korti, Pandharpur,413304 Solapur, Maharashtra, India
[1&5] Assistant Professor
[2&4] Student (UG)
[3] Industrialist Amplifier Electronics PVT. LTD. Karda Dist. Maharashtra, India

Abstract: - In modern world electricity is fundamental need of every human being, lots of domestic applications are there mainly electricity is used for lighting, heating pumping or water lifting as well as various domestic, industrial and commercial use etc.

In case of domestic use of electricity mainly used for mixer, grinders, lighting, ironing, hair dryer etc. but electricity is widely used for water heating for various domestic purpose such as bathing, washing (clothes, utensils, kitchen-ware) floor cleaning.etc. In a domestic heating, immersion water heater is widely used for heating of water. It is observed that in a domestic use immersion type of water heater more preferred compared to LPG gas-based water heating/ convectional water heating methods. Also, solar water heating and geezer having their certain own limitation.

While using immersion water heater various limitations regarding electricity & human safety are encountered.

Key word: - Temperature sensor, Switch gear device. IOT, , LCD display, Heating element, Electrical energy, Audio alert, GSM based alert SMS.

I. INTRODUCTION

In case of domestic use of electricity mainly used for mixer, grinders, lighting, ironing, hair dryer etc. but electricity is widely used for water heating for various domestic purpose such as bathing, washing (clothes, utensils, kitchen-ware) floor cleaning.

It is observed that in a domestic use immersion type of water heater more preferred compared to LPG gas-based water heating convectional water heating methods. Also, solar water heating and geezer having their certain own limitation.

II. Problem Statement

It is observed that immersion water heater is used for water heating purpose, in domestic commercial (Restaurants, Lodging, hostels, Hospitals Etc.). But various problems are observed such as;

1) Over heating of water

2) Electrical accidents

3) Heating of water is not as per required temperature due to various electrical and some ambient/atmospheric condition.

4) Loss of electrical Energy/power due to excessive heating, careless handling.

5) Various problems due to careless handling of Immersion water heater by workers/persons.

III. Objectives: -

Objective of this paper are

1) Using ESP32 Wi-Fi Module and GSM technology developing a Smart Immersion water heater.
2) To calculation of real time electrical parameter v.z. voltage, current, power, energy consumption.
3) To develop automatic power control techniques based on water temperature, water level in heating chamber.
4) To develop GSM based communication system.
5) To develop over all smart control system for overall coordination among above various smart control techniques related to water/liquid heating process by using electrical immersion water heater.

IV. LITERATURE REVIEW

[1] **Smart Electric Heating Device**
Pardeep Kumar, Muskan Mahajan, Chanchal Chauhan
Energy losses can be over come by controlling the timer or re setting it with the help of the knob. with the help of water level sensor the protection of the electric heating element and worker/personal Anyone can use this heating element easily as the protection is provided and chances to happening of short circuit is less. The Electric heating of the heating element is improved as the timer is being used in this system.

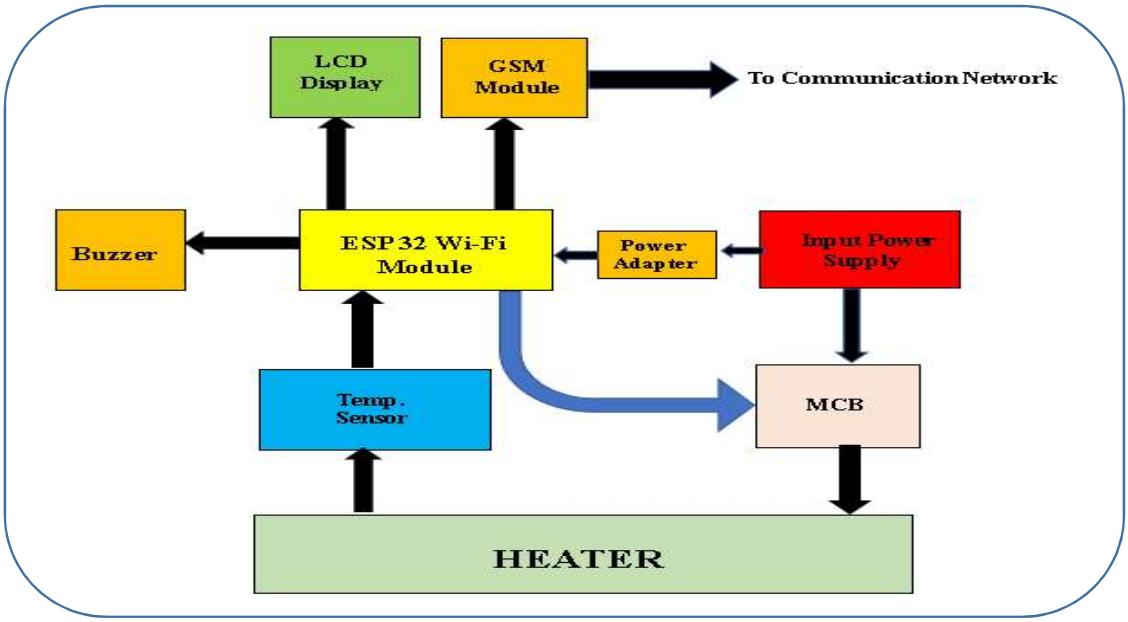
[2] **Smart Water Heater System Monitoring And Controlling Using Arduino Board**
Khalifa Dai Elnour
As paper names smart water heater, the project requires several inputs and gives several outputs. Firstly, we powered our electronics circuit by using directly from the computer .

[3] Design And Implementation Of IoT Based Smart Water Heating System
1Mrs.A.R. Patil, 2 Miss. Ritika Herwade, 3Miss. Kajal Bhosale**.**
1 Assistant Professor, Department of Electronics Engineering, D.K.T.E.'s Textile And Engineering Institute, Ichalkaranji.
We implemented our proposed system, where the water temperature is measured with temperature sensor. This information is analyzed and maintained automatically with the help of our project. The below figure is obtained in the ubidots cloud platform, where user can access this data for further use. Where there is a temperature value display of solar water, and two other switches for turn On/OFF of geyser and automatic valve. This switches are for the manual mode otherwise in automatic mode this switches are turned on and off by the program itself.

[4] **Design and Development of a Solar Powered Smart Heater. Ifeoluwa David Solomon, Oluwole Abiodun Adegbola**
In this paper solar power DC water heater discussed in this paper , temperature sensor LM 35 used to sense the temperature . along with various controlling devices.

V. RESEARCH METHOD

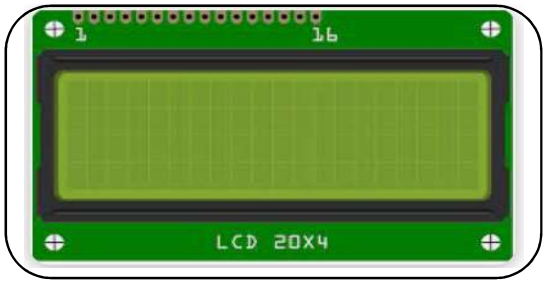
Block Diagram: -



Important Components: -

1) LCD

Liquid Crystal Library used to control LCD displays, by 4-data Pin. Now a days I2C is used to interface the LCD, because it uses less number of connection and comparatively higher efficiency, without facing any error in data. Connection; Pin GND- Ground, Pin VCC- +5V DC, SDA-GPIO-22 SCL-GPIO21.



2) ESP 32 Wi-Fi Module

ESP 32 Wi-Fi module it provides Bluetooth connectivity for integrated circuitry.
It consist of single core Tensilica Xtensa LX6 microprocessor.
It operates with system clock rate of over 240 MHz . helps to high data processing speed. Having some use full features such as Tensilica Xtensa LX6 single core 32 bit processor ,wireless Wi-Fi connectivity v4.2
BR/EDR, Memory Unit with 448 KB ROM & 520KB RAM, External Flash and SRM, Security as per IEEE 802.11 Standards Security features.

3) DS18B20 Temperature Sensor.

DS18B 20 Digital temperature gives 9 to 12-bit degree Centigrade temperature measurement and gives audio signals for upper and lower trigger points. It communicates by one data line.it has unique 64 bit serial code which provides multiple function with through same communication data line.

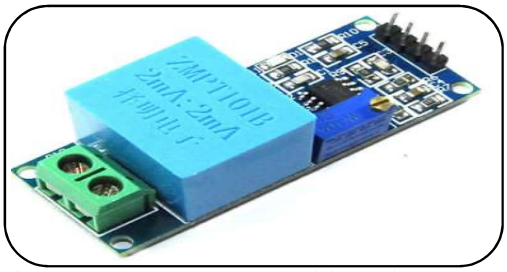
4) GSM Module: -

A GSM module is a special electronics circuitry which provide slot to insert SIM card and operates over a prepaid subscription, to the mobile operator, as a mobile phone.
i.e. GSM Module can be used like a phone.

5) MCB: -

The Miniature Circuit Breaker can be used for low Voltage as well as High Voltage level. Depending on its rating and class.
In case of MCB Air medium used as the arc quenching media. a stack of insulated parallel metal plates that help to quench arc early as possible.

6) ZMPT101B VOLTAGE SENSOR



ZMPT101B AC Voltage Sensor, most suitable voltage sensor, provided where accurate measurement of AC voltage is highly required.

7) Power Adapter: -

An AC adapter or AC/DC adapter used to convert the AC to DC Power.
When it is used with battery operated devices , Power adapters usually charge the battery as well as powering the equipment.
Adapter having different rating, as per our requirement we can design it.

VI. Working: -

By switching the power supply of System we can get reading of Supply Voltage level, Current Reading, previous energy consumption reading, water level, Temperature of (Water/ liquid) inside the heating chamber.

By switch on power supply of heater we can start the heating process by manual as well as automated mode.

by observing the LCD display for at any time after starting of heating process. we can get reading of Supply Voltage level, Current Reading, Energy consumption reading, water level, Temperature of (Water/ liquid) inside the heating chamber.

If the water/liquid inside chamber get heated up to preset temperature level, as per our need. Temperature sensor continuously monitors the temperature and feed to the processor, processor will compare it to preset temperature level and display it on LCD.

If the temperature level sensed by the sensor equal to the Preset value, then processor will generate the command signal and fed to the buzzer, and also to the trip circuit, then trip circuit will disconnect the heater from supply by tripping the MCB.

Simultaneously signal will be fed to the GSM Module, it will send the real time alert SMS to the registered cell phone number.

This real time SMS have information about current state of heater; such as Voltage, Current, Pf, Power Consumption, Energy Consumption, temperature, level of water inside chamber.

If the temperature of water/ liquid falls below the set value, then once again power supply will be continued and the heating process will be continued up to the set temperature level but this will require operator command signal do the same, otherwise heating will not be restarted.

This real time monitoring of plant LCD display can be accessed by Android mobile application also. (Mobile APP)

Various problems such as

1) Over heating of water

2) Electrical accidents

3) Heating of water is not as per required temperature due to various electrical and some ambient/atmospheric condition.

4) Loss of electrical Energy/power due to excessive heating, careless handling.

5) Various problems due to careless handling of Immersion water heater by workers/persons.

can be easily overcome. By using this device, we can overcome above problems up to great extent.

By using mobile APP., we can do the overall coordination smartly.

Which is the one of idea to welfare of human being.

VII. Conclusions

From this paper it is observed that, how to smartly monitor the immersion water heater with the help of ESP32 & GSM technology.

By real time monitoring of various electrical parameter of heater; we can avoid Excessive heating of water/liquid, also can reduce the wastage of energy, it also helps to take precaution against the electrical accidents.

Also it is observed that, from this paper, smartly, net electrical power & Energy consumption can be measured. which helps to develop some strategy to reduce wastage of Energy, thereby we can reduce Energy Consumption bill.

VIII. References

1] "Motor protection from theft by using artificial intelligence and GSM technology."
1 prof. Khandekar Nagnath Vyankati 2 prof. Kishor p. Jadhav 3 prof. Avinash a. Suryagan
Vol-9 Issue-6 2023 IJARIIE-ISSN(O)-2395-4396

[2] "Smart Monitoring of Remotely Located Dustbin in Urban Area."
1 Prof. Khandekar Nagnath Vyankati
2 Prof. K. P. Jadhav
IJRCSIT,ISSN N0.2319-5010,Vol.-6,Issue-1, Oct.2023

[3] "Outage Management in Multi-Microgrid
Distribution System for Reliable Operation"
Mr.Khandekar Nagnath V.
ME student at SND COE & R Centre, Yeola, Maharashtra (India)
Vol-6 Issue-6 2020 IJARIIE-ISSN(O)-2395-4396

[4] "Robust analysis of pid controlled inverter system for grid interconnected variable speed wind generator"
1Prof. Kherdekar P.D,2Prof. Khandekar N.V
1Assistant Prof, Electrical, Aditya Engineering College, Beed, Maharashtra, India

[5] Smart Electric Heating Device
Pardeep Kumar, Muskan Mahajan, Chanchal Chauhan
(IJITEE) ISSN: 2278-3075 (Online), Volume-9 Issue-5, March 2020

[6] Smart Water Heater System Monitoring And
Controlling Using Arduino Board
Khalifa Dai Elnour https://doi.org/10.21203/rs.3.rs-1929361/v1
This work is licensed under a CC BY 4.0 License

[7] Kesarwani, Kanishak, S.M. Pranav, Tanish Nikhilesh Noah, and K.V.N. Kavitha. 2016. Design of Temperature Based Speed Control System Using Arduino Microcontroller 14 (S3): 753–760. www.sadgurupublications.com.

[8] Samuel Ndueso John, Charles Ndujiuba, Oladeinde Ifedayo Oluwaseyi, Ibeanu Charity Onyinye, "Design and Implementation of a Microprocessor based Temperature Controller with Real Time Display", International Conference Comp., Energy, Net. , Robotics and Telecom, pp.14-18, 2012.