

# INTELLIGENT WATER HEATING SYSTEM

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## Abstract:

Automation in Solar Water Heaters has begun from past 5-10 years. A slot provided for insertion of immersion water heaters is provided in newly available SWH with evacuated tubes. The users have started using automated hybrid Solar Water Heaters. Our project provides user with more convenient system by allowing system to provide user with hot water at defined temperatures and timings. The user will no more need to daily care for hot water once system is commanded. Also the user can easily set timings and temperature of water, and control/monitor the system from anywhere by just sending a SMS. This makes the system user friendly and effortlessly without much intervention of user.

**Index Terms:** Intelligent water heating system (IWHS), Short Message Service (SMS).

## I. INTRODUCTION

This paper is continues from previously published paper, which in mentioned first in references. This paper includes power calculations of each module in project. Also overall power consumption of project is calculated.

This paper is organised in the following manner. Section II presents power calculations of IWHS, Section III presents Results and Discussions IV includes the conclusion and future work of the system and last section includes References.

## II. POWER CALCULATIONS

1) Pic18f4550:

Supply Voltage = 5 V

Current sourcing = 175mA

Power consumed = 875 mW

2) LCD 16\*2:

Operating Voltage = 4.2 V

Active Supply Current = 120mA

Power consumed = 504mW

3) Relay VK3FF-S-DC5V:

Coil Voltage = 5 V

Coil current = 90 mA

Power consumed = 454 mW

4) GSM G510:

Operating Voltage = 4.2 V

Typical current = 225 mA

Power consumed = 945 mW

5) RTC DS1307:

Operating Voltage = 5 V

Active Supply Current = 2mA

Power consumed = 454mW

**Power consumption of system = 2.788W**

### III. RESULTS AND DISCUSSIONS

The analysis of the data has been tabulated below for  $V_{in} = 5V$ .

**TABLE I.** Experimental data showing output Voltage for Increasing values of temperature.

Temperature			$V_{out}$
64			1.04
63			1.03
Temperature	62	$V_{out}$	1.005
28	61	0.646	0.981
29	60	0.647	0.962
30	59	0.648	0.955
31	58	0.652	0.948
32	56	0.656	0.928
33	55	0.666	0.915
34	54	0.674	0.909
36	53	0.683	0.902
38	52	0.691	0.894
40	51	0.7	0.88
41	50	0.708	0.875
42	49	0.714	0.868
43	48	0.72	0.856
44	47	0.726	0.844
45	46	0.735	0.839
46	45	0.74	0.83
47	44	0.745	0.822
48	43	0.753	0.815
49	42	0.758	0.806
50	41	0.762	0.798
51	40	0.766	0.793
52	39	0.771	0.783
53	38	0.777	0.773
54	37	0.784	0.764
55	36	0.789	0.758
56	35	0.798	0.753
57	34	0.804	0.748
58	33	0.81	0.738
59	32	0.816	0.725
60	31	0.82	0.721
61	30	0.824	0.712
62	29	0.828	0.702
28			0.689

TABLE II: Experimental data showing output Voltage for Descending values of temperature.

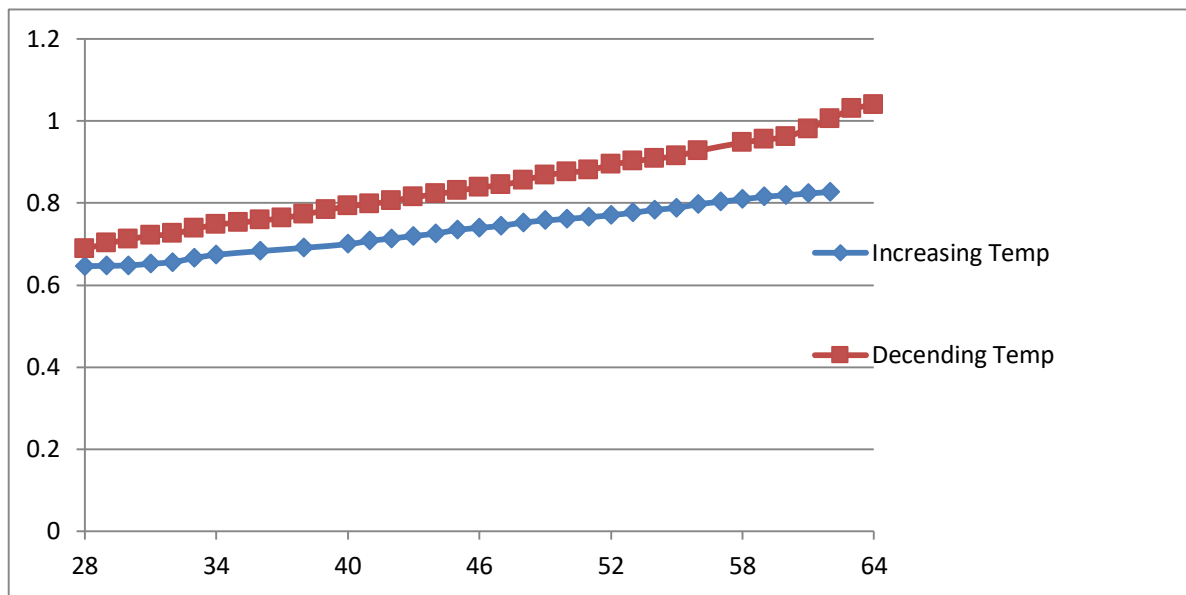


Fig: Graph of Temperature vs Voltage

We have performed an experiment for testing sensitivity of sensor circuit used in project. Threshold values for relay switching are also obtained from this experiment. A graph of linear voltage is obtained for increasing as well as decreasing temperature values. Thus sensor circuit using PT100 works linear for various temperatures ranges

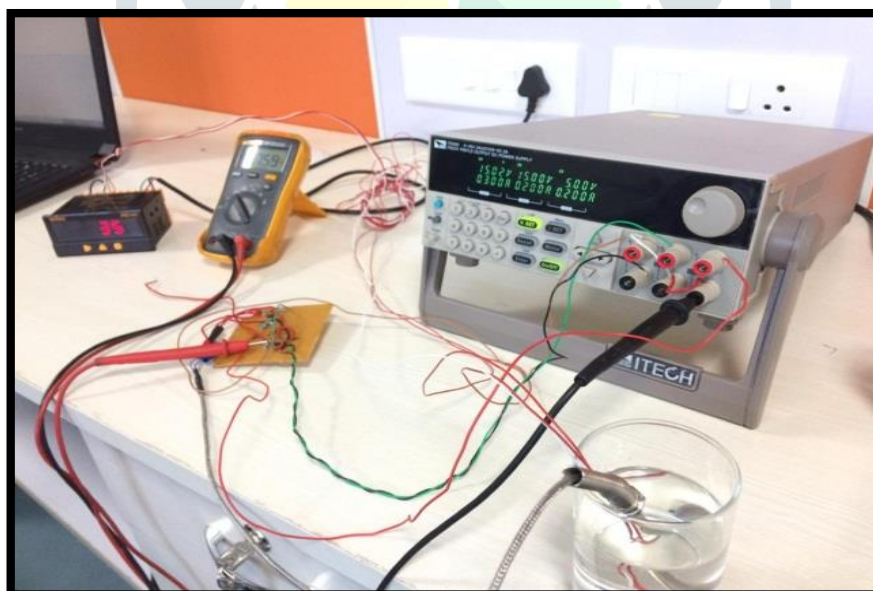
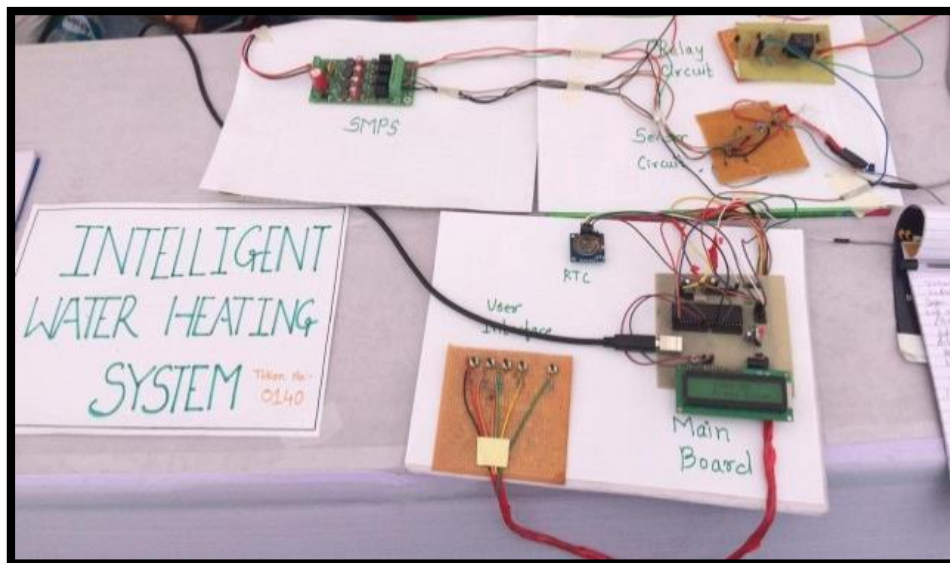


Fig: Experiment and testing of sensor circuit

#### IV. CONCLUSION AND FUTURE WORK



*Fig: Electronic parts assembly of system*

A wide water temperature sensing (from  $-200$  to  $+850$  °C) is available. The switching of Solid State Relay is accurate. A sufficient tolerance gap is provided for threshold of time and temperature. The overall system is affordable for common residences. The energy consumption is also reduced by using a hybrid mode (using a solar water heater and an electric heater), where the preheated water by the solar water heater is used. As a result, the electricity expenses of the electric heater are also curtailed. The system promotes an effective use of Renewable energy as well.

#### REFERENCES

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