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SOLAR WATER HEATER TEMPERATURE CONTROL

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Abstract: - The solar collector's output over its entire working life is 79.94 percent and 498,225kWh, respectively. Reduced reliance on grid supply and/or fossil-fuel based generator sets during hot water demand A proper harnessing of solar (radiant) energy is a potential solution to adequate and sustainable electricity supply problems in most developing countries. Because of our overreliance on fossil-fuel-based oil, carbon dioxide (CO2) emissions into the atmosphere have increased exponentially, causing extreme environmental pollution and ozone layer depletion. The solar collector's output over its entire working life is 79.94 percent and 498,225kWh, respectively. Reduced reliance on grid supply and/or fossil-fuel based generator sets during hot water demand A proper harnessing of solar (radiant) energy is a potential solution to adequate and sustainable electricity supply problems in most developing countries. Because of our overreliance on fossil-fuel-based oil, carbon dioxide (CO2) emissions into the atmosphere have increased exponentially, causing extreme environmental pollution and ozone layer depletion This paper aims to adapt a readily available radiant energy supply to solar water heating and determine potential economic advantages for Covenant University campus inhabitants who use it in domestic applications. The microcontroller-based active solar water heating system (ASWHS) is designed to absorb radiant energy via solar collectors and store it as hot water in a water tank through a direct current (DC) circulation pump operated by a standalone photovoltaic (PV) system. The design also includes an auxiliary electric heater that is used only when radiant energy is insufficient. The importance of the ASWHS for domestic water heating is demonstrated through a case study. The ASWHS with a high payback period of 15 years records the maximum design efficiency and expected energy periods; and the ASWHS' lower unit cost (US$0.01/kWh) makes it more economically viable than the grid supply's unit cost (US$0.18/kWh) for the same amount of energy consume.

Keywords-*ASWHS, CO2 emissions, microcontroller, solar energy, solar collector, unit cost.*

I INTRODUCTION

Solar water heaters are devices that use the sun's energy to heat water. Solar water heaters use renewable, unlimited, and free solar energy instead of natural gas, fossil fuels, or electricity to heat water. Solar water heaters are known for their high performance, as collectors can consume up to 60% of the solar radiation that reaches them. The solar water heater has been used in different parts of the world since its inception, and its domain of use is increasingly expanding as technology improves and costs fall. Solar water heaters save 13% of energy and carbon in the European Union. Furthermore, solar water heaters have a number of properties that make them superior to other heating systems.

Solar energy has the disadvantage of being a highly volatile power source. Overheating of solar water heaters occurs as heat can no longer be dissipated due to reaching the optimum temperature. Further more, overheating is more likely to occur where 1) we use the incorrect device type, and 2) our lifestyle and load shift (for example going on a vacation). Over the summer, the water in the collectors can quickly reach boiling point, causing undue pressure and possibly damaging the lines connecting the collectors to the water tanks. The temperature pressure relieve valve is insufficient since it is quickly broken after several overheating events, and its failure is costly in terms of both money and time. Further more, overheating is a significant issue that may result in power overload for water tanks (resulting in damage), calcification, shortened system life, and high maintenance costs. However, these risks are minor in comparison to the primary safety risk of high water temperatures.

One of the most common issues with solar water heating systems is overheating. Since most solar heaters emit roughly twice as much heat in the summer as they do in the winter, this is the case. Heat transfer fluids can decay, scaling can intensify, premature component loss can occur, and waste water can result from system overheating. We're looking for a temperature control device that can regulate the temperature and prevent residential solar water heaters from overheating. Weather instability, household demand, and diverse types of solar water heaters all pose challenges in achieving this. In order to prepare for tomorrow's weather when deciding on a temperature set point, our architecture uses weather forecast for

the first challenge. In the case of household demand, the machine can approximate the real household demand over time in order to account for it in temperature control. The ability to monitor temperature while ensuring supply is dependent on weather and demand forecasts. To account for model uncertainty, our specification makes no assumptions about the device that will be covered.

Objectives & Benefits of project.

1)This project's aim is to regulate the temperature of a solar water heater device. determine the value of using a temperature control device to improve the operation of a microcontroller and other advanced system

2)In particular, this initiative aims to reduce water waste by controlling temperature.

3) Providing advanced microcontroller system

4) Save energy and prevent water waste

5) Mannual efforts are zero)

6) for a solar water heater for the home

7)Completely automated framework

Requirement's:-

1) Rectifier

2) voltage regulator 7805

3) Filter

4) Microcontroller AT89C525

5) LCD

6) DHT 11 Temperature Sensor

7) Relay

8) LED

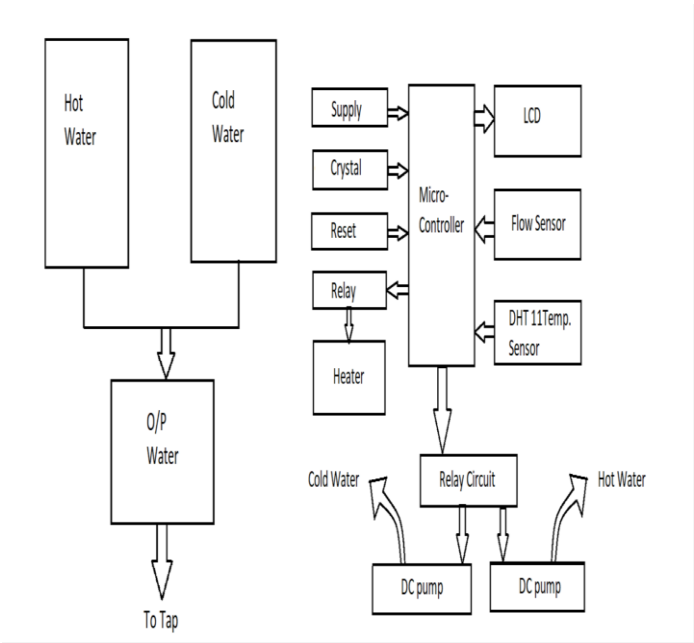
9) Resistor

10) Capacitor

11) Dc Pump

12) Crystal Oscillator

II SYSTEM BLOCK DIAGRAM



Working

The block diagram of solar water heater temperature control is shown in above figure.In this Block diagram we use supply voltage is 12 volt . Again we convert this 12 volt into 5 volt by using power circuit.This 5 volt supply is given to the 8051 microcontroller.The programme stored in AT89C52 microcontroller on that programme basis AT89C52 microcontroller will work.Crystal oscillator is used for giving institution to the AT89C52 Microcontroller and execute microcontroller operation.Reset circuit is used to reset the AT89C52 microcontroller. The output of reset circuit is given to the AT89C52 microcontroller.

Relay is used is SPDT type,the output of microcontroller is given to the relay.The output of relay is given to heater.By using heater water is heated.LCD is used is 16*2 type.The temperature of water is showing on that Lcd display so we know that what is the temperature of water.DHT 11 sensor is temperature sensor.by using this sensor we know the current temperature of water.The output of DHT11 sensor is given to 8051 microcontroller. The output of relay circuit is given to the DC pump.On the basis of temp & relay circuit DC pumps are operated.

Advantages:

1. Most efficient energy saving system.
2. Avoid wastage of water.
3. Time saving.
4. Microcontroller based solar system makes solar water heater more safe.
5. Easy operation.

6. Fully automatic system.

7. Less costly.

III APPLICATIONS:

This Microcontroller based solar system used for various applications like

1. Small & large hotels.

2. College hostel.

3. Hospitals.

4. For residential purpose

IV CONCLUSION

The temperature control unit that was designed and implemented is capable of solving the overheating problem that all solar water heaters have. This would achieve the goal of reliably protecting such systems under various weather conditions without the need to access them. Once installed, the temperature control unit will automatically protect the system even if no family members are present.

This temperature control system is significant because it combines overheating safety with weather forecasting and future household demand forecasting. This safeguard is still mindful of the temperature of the solar water heater. As a result, once the solar water heater reaches an unsafe temperature, the temperature control system will automatically secure the device without any user interference.

V FUTURE SCOPE

We all know that solar energy is the most important part of human life in the future.That is why the number of solar projects is increasing.By using the solar water temperature control project, we can easily control water temperature without manually effort.We do not need to adjust water temperature manually.In this project, we have used a level indicator.With the help of this level indicator, we can set how much amount of water we need.

Water wastage is also eliminated as a result of this. We all know that water is the most essential aspect of human life. The project setup is often used to regulate the temperature of an electric heater. The most uneconomical aspect of an electric heater is the electricity bill. By changing the temperature of the water in the heater, we can conserve electrical energy. As a result, the energy bill is lowered, and the user benefits from hot water.

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