Automization of Solar Water Heater Pipeline System

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Abstract:-The existing solar water heating systems are studied with their applications. Nowadays, hot water is used for domestic, commercial and industrial purposes. Various resources i.e. coal, diesel, gas etc, are used to heat water and for steam production. Solar energy is the chief alternative to replace the conventional energy sources. The solar water heating system the technology to harness the plenty amount of free available solar thermal energy. The solar thermal system is designed to meet the energy demands. The size of the systems depends on availability of solar radiation, temperature requirement of customer, geographical condition and arrangement of the solar system, etc. Therefore, it is necessary to design the solar water heating pipeline system as per above parameters. The available literature is reviewed to understand the construction, arrangement, applications and sizing of the solar water heater system.

Keywords:-Solenoide valve, Temperature sensor(PT-100),Relays,PIC16F877A.

I.   INTRODUCTION

The sun is the most important source of energy available today.Solar is safe alternative which can replace current fossil fuels like coal and gas for generation of electricity that produce air, water and land pollution.Solar power can restrict climate change as it produces no carbon emissions.Solar energy is suitable for heating and electricity generation using photo voltaic cells.there is big issues regarding solar water heater system like wastage of initial cold water coming from pipes as well as changes in temperature water etc.Henceautomization of solar water heater pipeline system proposed method that user gets convenient temperature water & also reuse of initial cold water.Solar water heating collectors capture and retain heat from the sun and transfer this heat to a liquid. Using "greenhouse effect" the solar thermal heat is trapped, the ability of a reflective surface to transmit short wave radiation and reflect long wave radiation. Heat and infrared radiation (IR)are produced when short wave radiation light hits a collector's absorber ,which is then trapped inside the collector.Fluid, usually water, in contact with the help of absorber it trapped heat to transfer it to storage.
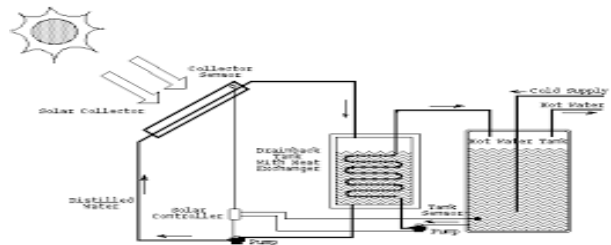
II.   RELATED WORK

In this system microcontroller used is pic 16F877A it is used because microcontroller is having inbuilt ADC and 8 channels can be connected to it.display 16/2 is interfaced to the pic controller a suitable power supply is required that is5V is generated and given to pic controller and other asseserise as a part or the key area is maintaing the temperature of the desired water.

So PT 100 temperature sensor is used at the outside where the outlet of solar water is passing through a pipe.

In this system set point of water temperature is set and accordingly the incoming water temperature is checked set point of desired water temperature is set and accordingly the incoming water temperature checked from temperature 1 if temperature is less that is generally it is observed that at the first stage of solar water outlet the water is at cold level generally the water is wasted. In this case if water temperature is less than the set temperature than automatically water pump sets that water and it refed to the water main tank in case the temperature is at the rang that is adqueted rang of temp then outlet valve is open outlet water is given to the user in case if temperature is more than set temperature then the mixing of cold water is required and at the mixer stage on time bases valve on/off of mixing of cold water solar valve is operated on time bases and again temperature of mixed water is checked. If that temperature is within the range of the set1 then again the discharge of the outlet is given.

Thus this system is absolutely comfortable and it saves the water and use user friendliness to the user.
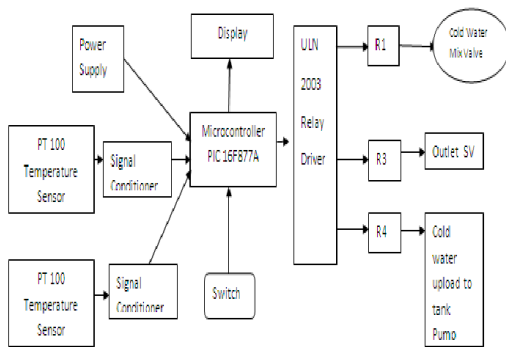
Proposed system

Fig. 1:- Block Diagram of Automization of solar water heater pipeline system
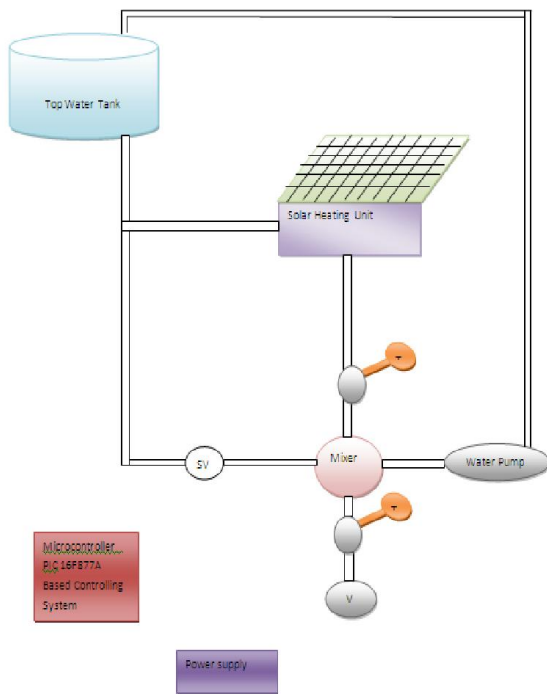
III. Mechanical Arrangement:

Fig.2:- Mechanical Arrangement

A. PT 100 temperature sensor

Fig. 3:- PT100 Temperature sensor

- Platinum Resistance thermometers offers excellent accuracy over a wide temperature range i.e. from -50 to 250 C.
- Standard sensors are available from many manufacturers with various accuracy specifications and numerous packaging options to suit most applications.
- Unlike thermocouples, it is not necessary to use special cables to connect to the sensor.
- PT100 has a resistance of 100 ohms at 0 deg C and 138.4 ohms at 100 deg C.
- The relationship between temperature and resistance is approximately linear over a small temperature range.
- For precision measurement, it is necessary to linear the resistance to give an accurate temperature

➢ *Features*

- PT element is used for high-precision measuring and monitorings of temperatures in a wide range of applications , where it is important to avoid measuring errors.
- Very good linearity of the temperature resistance characteristics curve. The value of resistance increases linear according to the increasing temperature.
- The temperature sensors are produced on ceramic base chip with thin film.

B. LCD Display

Fig.4:- LCD Display

LCD indicates different mode settings & set point adjustment. Also 16 characters are divided to indicate speed output. The LCD Display used here is 16 characters by 2 line display. The 16 characters in both lines are equally divided to indicate commands and speed. In sub routines 'Enter Speed' and 'Current Speed' message, set Speed value is indicated on screen.

In our project LCD is interfaced with the port-0 (D0-D7) i.e. from pin number 32 to pin number 39. In other words the data-bus D0-D7 is connected to port-0 of IC 89s52. Pin RS is directly connected to Pin11 of controller and one more another important pin EN (LCD enable) is directly connected to pin 14 of the controller. On the other hand pin R/W of LCD is connected to ground. The LCD interfacing is done here for indicating various display messages for the user.

A. The interfacing is given in detail which is as follows

In this equipment the LCD which is used is 16X2 type i.e. 16 characters per rows and two rows. The function of LCD is to display the status of events performed by the respective circuit or to display those resulting parameters which have to be displayed on the screen as per user requirement.

16x2LCD - it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

C. Relay

Fig. 5:- Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on/off So relays can have two switch positions and most have double throw (changeover). Relays allow one circuit to switch a second circuit which can be completely separated from the first.

The coil of a relay passes a relatively large current typically 30mA for a 12V relay but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts. They produce a brief high voltage (spikes) when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage, you must connect a protection diode across the relay coil.

➢ *Features*

• The ULN2003 is known for its high current, high voltage capacity.

• The drivers can be paralleled for even higher current output. Even further, stacking one chip on top of another, both electrically and physically, has been done.

• Generally it can also be used for interfacing with a stepper motor.
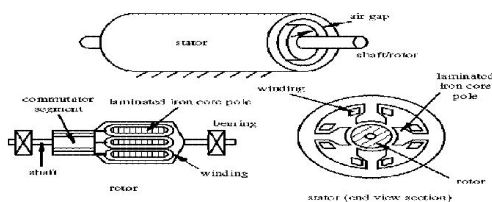
D. DC Motor

Fig6. DC Motor

DC motors convert electrical into mechanical energy. They use permanent magnets and loops of wire inside DC motor. When current is applied, the wire loops generate a magnetic field, which reacts against the outside field of the static magnets. The interaction of the fields creates the movement of the shaft/armature. Thus, electromagnetic energy becomes motion. Mostly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. A DC motors speed can be controlled by using either a variable supply voltage or by changing the strength of current in its field windings. DC motors are used in tools, toys, and appliances. Larger DC motors are used in propulsion of electrical vehicles, elevator and hoists, or in drives for steel rolling mills.

IV. CONCLUSION

The sun is the most important source of energy available today. Solar is safe alternative which can replace current fossil fuels like coal and gas for generation of electricity that produce air, water and land pollution. Thus this system is absolutely comfortable and it saves the water and use user friendliness to the user.

V. ACKNOWLEDGMENT

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