SOLAR THERMAL ENERGY STORAGE DEVICE AND MONITORING PARAMETERS USING IOT

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Abstract:

Solar water heater is one of the most popular methods to utilize the solar energy. Solar water heater accounts for 80% of the solar thermal market. But the limitation of solar thermal energy is that we can only use it in day time. So to overcome this limitation we can use the solar heating setup with additional setup of PCM (Phase Change material). The property of PCM is that is changes its phase during heat addition and store the heat in the form of latent heat and when temperature decreases it again changes the phase and release the heat energy. In this paper we will analyse that this method is how much efficient. The following paper deals with the experimental investigation of effectiveness of a parabolic collector and its results have been verified experimentally.

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INTRODUCTION

In our technical education the project work plays a major role. Every student is put in to simulate life particularly where the student required bringing his knowledge, skill and experience of the project work.

II. OBJECTIVE

Provide heated water during night time Using PCM material. i.e. Store heat in Phase Change Materials (PCM). and supply the same when needed. Since we usually say that solar energy is free energy but the installation cost is high. The solar energy also cannot be captured fully. Some of it get scattered in atmosphere also and some get reflected.

The purpose of the project work is to check the feasibility of solar water heater and current scenario. of awareness in people about renewable energy sources.

III. SYSTEM ANALYSIS

This work includes, design and development of a small heat exchanger, in order to establish the effectiveness of using paraffin wax as a suitable PCM in solar Water Heater enables substantial energy savings, as the sun shining on 1m² of roof replaces 100 l of heating oil or 100 m³ of natural gas (approximately 1 000 kWh) a year. Supplying a washing machine or dishwasher with this hot water also cuts out the by these appliances to heat the water and shortens the washing cycles. Water heating system.

The paraffin wax is incorporated in the heat exchanger, which acts as thermal energy storage device.

. IOT REQUIREMENTS

• The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber physical system, which also encompasses technologies such as smart grids, virtual power plants, smart homes and smart cities. Each thing is uniquely identified through its embedded computing system but is able to interoperate within the existing internet infrastructure

• A lot of technologies to interact with living things but IoT enables to communicate with non-living things with comfort manner. IoT is a convergence of several technologies like ubiquitous, pervasive computing, Ambient Intelligence, Sensors, Actuators, Communications technologies, Internet Technologies, Embedded systems etc.

• **Comparing ARDUINO board with other controller**

• Well known, controllers to us are 8051, pic 16f/18f, ARM7, msp430, other latest boards like Intel Galileo Gen 2 etc. Out of all these ARDUINO is the best.

• We require two UARTS, but pic 16f/18f and 8051 has only one UART.

• Whereas ARDUINO has two UARTS as required, one in hardware and other in software. • Msp430 has 3 UARTS but it is very costly than ARDUINO. ARDUINO is even less in cost as compared to other controller.

• Other boards like Intel Galileo gen 2 are very very costly and complex to handle.

• The best part of Arduino usage is that its programming is very easy as compared to other devices.

• For the new start by students it's very feasible and easy to use.
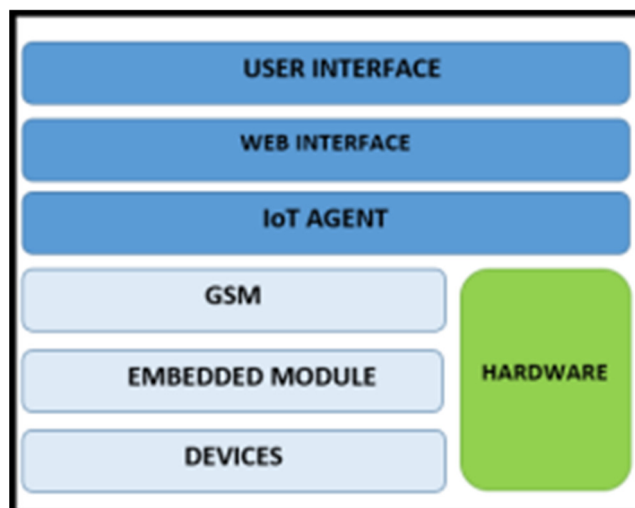
After the segmentation, the expected display of the hand prints is involved in pre-processing. Operations like noise removal, resizing, normalization and enhancement fall under this phase to provide better image quality and consistency and make it robust. The system

proceeds to Feature Extraction after pre-processing. Here are some keywords that are used in the API. Understanding of these terms will make the API documentation easier to understand.

Channel – Channel can be said as a stream of data. It identified by a numerical channel ID using which data can be inserted or retrieved using Thing Speak APIs.

- **Field –** Each channel is having 8 fields which can hold any type of data. For eg. you may store temperature, humidity, RFID data (alphanumeric) in each channels.

- **Status –** It is short status message to augment the data stored in a channel

  • **Location –** In addition to above 8 fields we can store gps location or coordinates. For eg. we can store the location of the place from where the data is coming. It is having latitude, longitude and elevation.

- The expected output, in case you want to show the different possibilities of how to do practical signs. This entire process has a structured architecture which ensures efficient and accurate translations of sign language gestures. The training database makes the system learn with time and variety of signers. This allows for better representations to achieve high recognition results. At a high level, this architecture serves a communication bridge between sign language users and non-signers using image processing and recognition.

V. MODULES

• Thing Speak account for this project. • First of all, user needs to create an account on ThingSpeak.com, then Sign In and click on 'Get Started'.

• Now go to the 'Channels' menu and click on the 'New Channel' option in the same page. • Now you will see a form for creating the channel, fill the Name and Description as per your choice. Then fill 'Temperature' in 'Field 1' field. Tick the check box

'Make Public' option below the form and finally Save the channel. Now your new channel is ready.

- Now click on 'API keys' tab and note the Write and Read API key, here we are only using Write key. You need to copy and paste this key in the

• code (see below).
• Now user need to upload the program to ESP8266 using Arduino IDE.

• After uploading, open "PRIVATE VIEW" icon in Thing Speak website and observe the monitored temperature value on graph as shown below.

VI.OUTPUT
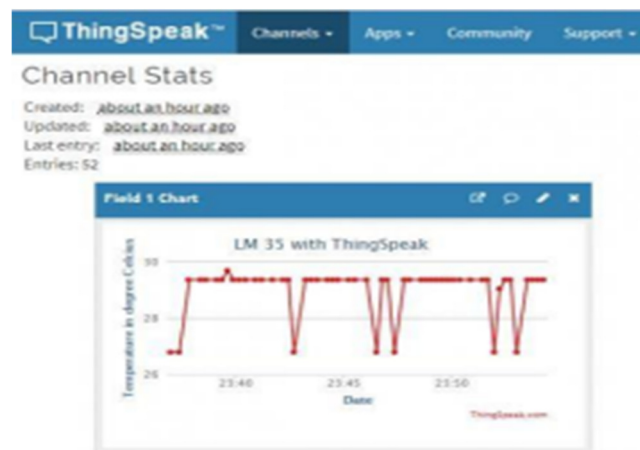
IOT Working

VII. CONCLUSION

Integrating PCM in solar water heating systems is of great benefit. With appropriate parameter selection and integration of a PCM in the heat exchanger of a solar water heating system, hot water can be maintained with a consistent temperature near the melting temperature of the PCM for an extended period of time. It was found that the PCM based solar water heating setup have high potential to replace solar water heating setup without PCM to enhance the thermal efficiency of solar water heating setup.

IX. REFERENCES

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