IOT Based Industrial Parameter Monitoring System Using Solar Energy with Sun Tracking System

[1]Ravindra Bombayi, [2]A Daisy Rani,

[1]PG Student, [2]Associate Professor,
[1]Dept. of Instrument Technology,
[1]Andhra University Engineering College, Visakhapatnam, Andhra Pradesh, India

Abstract— **Internet of things is a medium in which observation is carried using wireless transmission collecting the data from sensors attached. IOT allow the client to get the overall opportunity of continuous monitoring and automated controlling through Web. The proposed system uses solar energy as power source. This paper is about a system which provides us with the data of temperature, humidity values and a message "Fire Detected" if the system senses fire. All this data will be transmitted and shown in an analytical view through Web. This system is first in kind to use solar energy and this mechanism includes tracking of more sunlight and able to turn or rotate the solar panel towards more sun light. Solar powered AT Mega 328 controller with open source arduino IDE controls the whole system.**

***Index Terms*—Internet of Things, Sun tracking, Wi – Fi Module, AT Mega 328 Controller.**

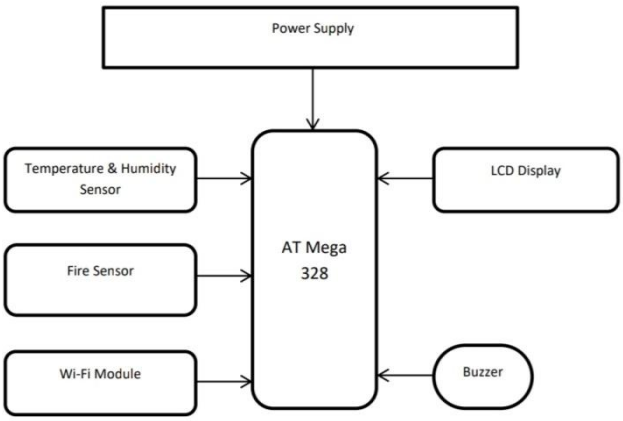
I. INTRODUCTION

Solar energy is the renewable source of energy using solar power we can deliver a system which is independent and energy saving. Wireless transmission plays an important role in industrial automation systems lately. Internet of things includes various types of sensors and related technology with perfect sync. We use ESP2866 Wi-Fi module to transmit the measured data from temperature and fire sensor to a web page to store and monitor. AT Mega 328 is the main processing unit of the system. It contains 32kb flash memory, 1kb ERPROM, 2kb SRAM, 23 General Purpose Registers. Main power source for the system is Solar Power. The generated will be stored in the battery as direct current from the battery using invertor power will be distributed to the system. We designed this system with an ability of tracking down more sunlight placing two light detecting resistors on the panel and the panel is connected to L293d Motor driver to rotate the solar panel for maximum sunlight. The IOT Based Industrial Parameter Monitoring System powered by Solar Power with Sun Tracking system is designed to sense and display the temperature and humidity data, to display "fire detected" and activates alarm when the system detect any fire.

II. PROPOSED SYSTEM

We are working on a system which is solar powered and IOT enabled Industrial Parameter Monitoring System, this is the newest to have renewable energy as power source and sun tracking system. The system monitors various parameters like temperature, humidity and fire. 16x2 LCD display will be integrated to the system to display the values of temperature and humidity, system also detects fire and activates buzzer.

III. BLOCK DIAGRAM



IV. HARDWARE REQUIREMENTS

Arduino UNO

The main module of this system is designed using AT Mega 328 of Arduino UNO. The micro controller features 32kb flash Memory, 1kb EPROM, 2kb SRAM with 20 MHz of oscillator speed. It is an 8-bit 28 pin MVR Micro controller, these 28 general purpose input output pins. These general purpose input output pins are used to interface the AT Mega 328. The arduino integrated

development environment is the software designed to communicate with components of Arduino UNO using the C++ and java language.

Temperature and Humidity Sensor

DTH11 is the temperature sensor we use in the system with operating voltage of 5v. Temperature range is from 0c to 50c, humidity range is from 20% to 90%. It is used as humidity sensor as well. DTH11 is connected to the system itself.

Fire Sensor

Photo diode can be used as fire detector in this system. This photo diode converts light energy into electrical energy. Works on the Principle of the amount of current flow is direct proportional to the intensity of light. This IR Photo diode is designed to work in Reverse bias.

Wi–Fi Module

Esp8266 can be used to enable the internet connectivity to the system and allows client to monitor parameter values. Operating voltage of esp8266 is 3.3v. It has 17 general purpose input output pins. It is based on 32-bit L106 RISC microprocessor core and runs at 80MHz.

Solar Panel

A 300W or 3x100W solar panels are used in the system to charge the 12v Battery. Solar Panel works on the principle of Photo Voltaic Effect. Solar panels are composed with layers of silicon, phosphorus and boron.

Battery

A 12V Battery is installed to provide power supply to the entire system. Current generated at the solar panel is used to charge the battery.

Light Dependent Resistor

Two LDRs are installed on the solar panel facing the sunlight, one LDR is on the east and the other is on West. These two LDRs provide input to the motor driver to rotate the panel towards more sunlight.

Motor Driver

L293D motor driver is used in the system to rotate or turn the solar panel towards more sunlight. Two LDRs installed on the solar panel generates inputs are (1 0) then it rotates panel towards East. When the inputs are (1 1) then solar panel stays at same position. It provides Motor voltage range is 4.5V to 38V. L239D is an 8-Pin driver IC. It is capable of controlling the speed and direction of motor. It works in the principle of H-Bridge. H-Bridge is a setup which is used to run motor both in clock wise and anti-clock wise direction.

Buzzer

A Piezo-Electric buzzer is used as alarm in the system. It is an audio signal device with operating voltage of 5V. It is powered through DC Voltage. It can generate different sounds based on design.

LCD Display

We use a LCD Display device to show the Output. It is a 16x2 Display, which displays 16 characters per line and those lines are two in number. Temperature and Humidity values will be displayed.

V. SOFTWARE

Arduino UNO is an Open-Source Platform. It uses Arduino Integrated Development Environment or Arduino software. The Arduino IDE contains a text editor, a message area, a text console, a toolbar with buttons for common functions. It is used to upload programs and communicate with Arduino Hardware. The total Programming is developed in C, C++ and Java. This programming includes every task.

VI. WORKING

We have seen a system which is particularly used to sense the required parameters and monitors those parameters with the help of IOT. This type of systems requires external power source. Our designed system replaces external power source with solar energy. The system "IOT Based Industrial Parameters Monitoring system with Powered by Solar Energy with Sun Tracking system" is used to sense and collect the data of both the temperature and humidity and transfers to the system in order to maintain those parameters. Another additional ability of this system is with the help of IR photo diode detect the fire and activates alarm. The system is unique in which we have two segments to look after

- Industrial Parameter Monitoring System
- Solar Energy with Sun Tracking System

Industrial Parameter Monitoring System

The system is designed to monitors these types of parameters like temperature, humidity and fire, these sensors and detector is controlled by Arduino with AT Mega 328 micro controller with the CPU speed of 20 MHZ. DHT11 is the sensor used in the system to sense the temperature and humidity values range from 0c to 50c Temperature and 20% to 90% Humidity. The data collected by this sensor module is given to the controller and thus through ESP8266 Wi – Fi module, collected data will be Shown in the Output display. IR Photo diode is used as a fire detector, this photo diode calculates using the light, change in the intensity of light IR Photo diode generates an electric pulse and thus fire is detected, if the photo confirms any Fire the then input is given to the controller to activate alarm and to the display to show "*FIRE DETECTED*".

Solar Energy with Sun Tracking System

Solar has become more efficient and reliable source of renewable energy lately. We took a step of interfacing this system with solar power along with sun tracking system. Solar Panel generates the charge with the help of photo voltaic effect. It generated DC current and will be stored in a battery. We interfaced LDR on the both sides of Solar to track the position of Sun. These LDRs are

connected to a DC Motor, and gives inputs to motor drive to rotate or to hold still. In this way we are able to track the sun Position to generate maximum light.

VII. SIMULATION & RESULT

All the modules are tested and fitted in a specified place to perform the task. The Hardware kit is shown below. The user can communicate with all the modules through things peak, an online web page is opened and used for the analysis. The sensors used in the system sends the data to the LCD Display and to the Wi-Fi Module to upload it to the cloud. Temperature and humidity values are displayed and whenever fire is detected then it displays "fire detected".

Figure 1: Temperature

Figure 2: Humidity

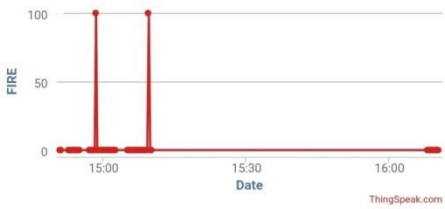


Figure 3: Fire

VIII. CONCLUSION AND FUTURE SCOPE

The system IOT Based Industrial Parameter Monitoring System Powered by Solar Energy with Sun Tracking performs all the assigned tasks. It uses solar energy as main power source and sun tracking allows the power supply module to generate required voltage. It measures and displays the values of temperature and humidity. It notices fire particles and notify about the occurrence of fire. The data collected by the system is transferred to the cloud to monitor the parameters through thing speak. The goals of this project were outlined keeping in mind the timeline and resources that were attainable. However, the initial design can be subjected to many improvements. Initially the design represents a miniature scale model which can be modified into a much larger scale. Furthermore, accuracy can be improved by utilizing dual axis design versus single axis.

IX. ADVANTAGES

- Monitor the Parameters closely.
- Transfers the real time data of the parameters through web.
- Power saver.
- Uses Solar Energy as a Power Source.

X. APPLICATIONS

- Heavy Industries.
- Domestic Uses.
- Used in Rural areas where there is no Power supply.

REFERENCES

[1]. T. Vasudeva Reddy, D. Karnakar, V. SaiKumar (2018), ‘ IOT Based Industrial Parameters Measurement and Monitoring ’ , International Journal for Research in Engineering Applications & Management (IJREAM) Volume - 04, Issue – 01, ISSN Print 2454 - 9150.

[2]. Kallappa, B. B. Tigadi (2016), ‘ Industrial Safety Parameters Monitoring in IOT Environment ’ International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering. Volume 5 Issue 6, ISSN Print 2320 – 3765.

[3]. Deekshith K, Dhruva Arvind, Nagaraju H, Bhaskar Reddy (2015), ‘ Solar Tracking System ‘ International Journal of Scientific & Engineering Research. Volume 6, Issue 9, ISSN Print 2229 – 5518.

[4]. G Rajyalakshmi, T. Thaj Mary Delsy, D. Jamunarani, V. Amalarani, P. Kalyan Sai Chakravarthy, (2020) ‘ Industrial Parameter Monitoring and Alarming System Using IOT ‘ International Conference on Mathematical Science (ICMS2020). ISSN 1742 – 6596.

[5]. Pravin Balbudhe, Ameya Mulik, Vineet Mulik, Kanchan Patil, Komal Sontakke (2020) ‘ Arduino Based Solar Tracking System ‘ Journal of Emerging Technologies and Innovative Research (JETIR). Volume 7, Issue 5, ISSN 234 - 5162.