RESEARCH PAPER

Solar Powered IoT-Based Weather Data Acquisition and Monitoring System for Agriculture

B. Parthiban[1*], R.Thiyagu[2*], P. Mohan Raj[3*], M. Gowtham[4*], K. Karthikeyan[5*], P. Meithun Madeshwaran[6*], M. Arunachalam[7*], K. Vignesh Kumar[8*], M. Gunasekaran[9*]

[1*] Assistant Professor, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: parthiban15799@gmail.com

[2*] Assistant Professor, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: thiyagujan03@gmail.com

[3*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: mohanviji6779@gmail.com

[4*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: mgowtham1222@gmail.com

[5*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: keyanopkarthi@gmail.com

[6*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: meithunmadeshwara@gmail.com

[7*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: rajiniarun0910@gmail.com

[8*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: vigneshkumar9248@gmail.com

[9*] UG Scholar, Department of Agricultural Engineering, V.S.B College of Engineering Technical Campus, Kinathukadavu, Coimbatore, Tamilnadu, India. E mail: gunasekaranm6789@gmail.com

*Corresponding Author: parthiban15799@gmail.com

***Abstract*—** The proposed low-cost weather monitoring system is designed specifically for agricultural fields, aiming to provide farmers with fast and accurate environmental data essential for efficient crop management. The core of the system consists of Node MCU microcontroller, which integrates various sensors, including the DHT11 for temperature and humidity, BH1570 for light intensity measurement, and a rain sensor for precipitation detection. These sensors collect real-time data time-time, enabling farmers to monitor the changing weather patterns that have adverse directly affect over the crops. The system is powered by solar panels, for a reliable and sustainable energy source, making it suitable for remote areas. The data thus collected is conveniently displayed on an LCD panel, making it easily accessible to the requirements of the farmers. Additionally, the system incorporates a specialized a buzzer that alerts users during specific weather conditions and attainment of levels threshold, such as high temperatures or excessive rainfall. The built-in features namely, Wi-Fi and Node MCU facilitates in easy data transmission to cloud platforms, enabling farmers to access historical trends and receive notifications through online or mobile applications. The integration of IoT technology enhances the functionality of the system and maintains its compact, cost-effective, and energy- efficient design, making it ideal for a variety of agricultural operations. Additionally, the Arduino IDE Software further supports the implementation of sleep cycles and power-saving routines, vital for extending battery life and ensuring continuous operation, especially during night or cloudy periods. The system transmits the collected meteorological data to web applications using Wi-Fi facilities is helpful in allowing historical analysis of the data and also serves as platform to provide notifications that can be accessed virtually.

Keywords*—Solar-powered weather station, IoT, NodeMCU, DHT11, BH1750, rain sensor, IoT-based weather monitoring, smart agriculture, Node MCU, DHT11 sensor, BH1750 light sensor, rain sensor, Arduino IDE, IoT-enabled farming, and remote agricultural monitoring.*

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I. INTRODUCTION

A. Introduction

A solar-powered weather station using IoT is an innovative device designed to monitor and transmit real time weather data by integrating solar energy and Internet of Things (IoT) technology. This system employs various sensors to measure key weather parameters such as temperature, humidity, rainfall, wind speed, and wind direction. The collected data is then transmitted wirelessly to a central server, allowing users to remotely access and monitor weather conditions via the internet. By harnessing solar power, the weather station operates sustainably and independently, eliminating reliance on traditional electricity sources and reducing operational costs. The IoT integration enables remote control, real-time alerts, and seamless communication with other smart devices, enhancing decision-making for applications in agriculture, disaster management, aviation, construction, and scientific research. Overall, this combination of solar energy and IoT technology creates an eco-friendly, cost effective, and efficient weather monitoring solution capable of providing accurate and continuous environmental data critical for various sectors.

In the growing twenty-first century, concern over the green energy has tremendously increased. This in turn has brought a

great ray of hopes for the non-conventional form of energy. Amongst the non-conventional forms, the solar energy tops the other forms as the most reliable source of the future. It is calculated that the normal solar plants can convert 15 % of the sunlight into electricity while the more experimental setup like concentrating solar panel can convert up to 40% of sunlight into electricity. Coordinating the existing advanced techniques with data analytics can provide much better results. This brings the requirement of weather parameters storing data loggers. The weather stations are built with complex and rigid sensors increasing the cost with a guaranteed performance. With the introduction of internet, data transfer has been made to the simplest forms. The introduction of IoT is blissful in performing cloud based automation and data transfer much easier than before.

B. Scope of the Study

Real-Time Environmental Monitoring: Deploy a system that continuously captures key environmental parameters—temperature, humidity, light intensity, and rainfall—using sensors like DHT11 and BH1570, providing farmers with immediate data to inform agricultural decisions.

Sustainable Energy Utilization: Utilize solar panels to power the system, ensuring uninterrupted operation in remote agricultural areas without reliance on external power sources.

IoT Integration for Data Accessibility: Implement Wi-Fi-enabled microcontrollers (Node MCU) to transmit collected data to cloud platforms, enabling remote access and analysis via web or mobile applications.

User-Friendly Interface with Alert Mechanism: Incorporate an LCD display for on-site data visualization and a buzzer system to alert users of specific weather thresholds, such as high temperatures or excessive rainfall, facilitating prompt responsive actions.

Power Efficiency and Reliability: Integrate power-saving features through the Arduino IDE to extend battery life, ensuring consistent operation during low sunlight conditions.

C. Objective of this study

- Develop a cost-effective, solar-powered weather monitoring system using Node MCU and environmental sensors.
- Enable real-time monitoring of temperature, humidity, light intensity, and rainfall to assist farmers in efficient crop management.
  Facilitate remote data access and analysis through Wi-Fi connectivity and cloud integration, allowing farmers to make informed decisions based on historical weather data.
- Incorporate alert mechanisms, such as buzzers, to notify farmers of critical weather conditions that may affect crop health.
  Ensure the system's sustainability and suitability for remote areas by utilizing solar energy as the primary power source.

II. RELATED WORKS

The project report surveys earlier work on solar-powered and IoT-enabled weather monitoring. Agung et al., (2023) says the location of Indonesia, which is at the equator, theoretically has the advantage of having sizeable average solar and wind energy potential. This condition is feasible to be used as a source of solar and wind hybrid energy. The advantage of a hybrid system is that when solar and wind production is used together, the system's reliability increases. However, the solar-wind power plant has lacks, especially in output efficiency, which is relatively low because it depends on weather conditions. Weather station technology can be used to complete info graphics about energy absorption for intermittent power generators such as solar and wind. The weather station will later become a parameter for the intermittent power generator activation to weather and climate conditions. In this research, it is proposed to design an weather monitoring station using ESP8266 as a microcontroller, DHT11 as a temperature and humidity sensor, BH1750 as a light intensity sensor, an anemometer as a wind speed sensor, liquid crystal display (LCD) and blynk as an interface for users. After testing, it was found that the average error of temperature reading by DHT11 is 1.52%, the average error of wind speed reading by the anemometer is 0.65%, and the average error of light intensity reading by BH1750 was 2.48%. Testing the monitoring results when compared between LCD and blynk is also appropriate. Based on the test results, the design of weather monitoring station is acceptable and feasible for monitoring weather for intermittent power generators.

Ramani et al., (2020) says that in this paper, a low cost, reliable and deployable solar power weather monitor system for all climate condition is build up. The online monitoring system using sensors gather weather condition and transmit to the system through Bluetooth. The Bluetooth system can be readily accessible to follow real-time weather changes and monitoring the device by using a DC supply or battery. In our proposed model, the solar system automatically monitors the weather conditions and the monitored information's is fed to Arduino. The Arduino microcontroller board is helping to control the temperature, humidity values and also used to monitor the voltage and current values of the solar panel. The solar is continuously providing the voltage to the consumer with
different climate conditions. The different climate changes values are stored by Bluetooth device.

Pravin et al., (2021) says the weather station is a major instrument installed at Solar PV Power Plant. The real time performance of Solar PV power plants can be easily monitored with the help of the weather station. We can use weather data to get insights about plant operations and possible ways to increase plant output. Weather station using Arduino Mega which measured weather parameters like Ambient air temperature, Relative humidity, Air pressure, wind speed, wind direction, Solar radiation, and rain. This weather station specifically developed for Solar PV power plants where measurement of solar radiation, ambient air temperature, and other weather parameters like air pressure, wind speed, wind direction, and rain. The weather station has an onboard display facility to check all parameters and the same weather data are transmitted to the database server via a Wi-Fi (internet) network also stored the data in a memory card. The web application has been developed which shows real-time data at a remote location. So, users can use the same weather data to compare the actual and expected output with the help of this comparison users can take preventive action to get the expected power generation. This weather station

provides both solutions like real-time data logging and sharing the measured weather parameter the same as a commercial weather station. The developed weather station is easy to use, lightweight, and low cost as compared the all-weather station available in the market.

Saidi et al., (2024) presents an enhanced autonomous solar system designed for real-time environmental data acquisition and wireless transmission to a cloud-based server. Utilizing advanced IoT technologies, including an ESP-01 module and Arduino Uno, the system ensures efficient data collection and seamless communication. Various electronic components, such as a step-down module for battery regulation and sensors like DHT22 for temperature and humidity, enhance the system's functionality. In-depth analysis of hardware and software components, as well as implementation of data visualization algorithms, demonstrates the system's capability to accurately capture and transmit environmental data. The proposed system's contributions are significant, offering a reliable and cost-effective solution for real-time environmental monitoring, with applications in agriculture, meteorology, and other fields. The study provides valuable insights into the use of renewable energy sources to address environmental challenges, highlighting the importance of efficient and sustainable energy use. Experimental results indicate a high degree of accuracy in data acquisition and transmission, with minimal energy consumption, thereby underscoring the system's practical viability and effectiveness.

Ghosh et al., (2013) proposed a model which acts as a weather station and a rain detector and is solely solar powered. The model is designed in such a way that it can be used remotely and the readings are displayed on a user friendly LCD display and are displayed as digital numeric values. The weather station includes a remote station for monitoring the weather powered by a solar panel, and a base station to display data. The remote station includes sensors to measure temperature, relative humidity, rain and solar radiation level. The goal in system design is optimizing cost and power.

Popa et al., (2013) Weather monitoring is of great importance in many domains such as: agriculture, military, entertainment etc. There are several solutions for monitoring the weather. The classical solution consists in static weather stations. Another solution is based on wireless sensor networks (WSNs). The third solution uses low dimensions weather stations. This paper presents a weather station made of temperature, humidity, pressure and luminosity sensors embedded in a microcontroller based board. The station is controlled through the SMS service of mobile phones.

kabalci et al., (2013) this paper introduces an instant monitoring infrastructure of a renewable energy generation system that is constituted with a wind turbine and solar panel arrays. There an uncontrolled six-pulse rectifier converts ac output voltages of wind turbine to dc. The hybrid system of renewable energy sources (RES) couples generated voltages of wind turbine and solar panels on a dc-bus and supplies charge voltage to the battery bank. The monitoring platform is based on current and voltage measurements of each renewable source. The related values are measured with the developed sensing circuits and are processed by an 18F4450 microcontroller of Microchip. The processed parameters are then transmitted to a personal computer (PC) over universal serial bus (USB) to be saved in a database and to observe the system instantly. The observing software that is coded with Microsoft Visual Studio. Net platform allows system administrator to monitor generated energy and actual status of each renewable energy source at a glance. The coded visual interface of monitoring software can manage the saved data to analyze daily, weekly and monthly values of each measurement separately.

These studies provide the background for the present project, which combines solar power, low-cost sensors, NodeMCU-based processing, local LCD display and ThingSpeak cloud storage in a compact agricultural weather-monitoring arrangement.

III. PROPOSED METHODOLOGY

Existing weather-monitoring systems commonly employ instruments such as thermometers, barometers, wind vanes and rain gauges. The project report notes that many conventional arrangements use analog measurement followed by physical recording and later transmission of weather information. The report divides the monitoring setup into power supply, weather sensing, monitoring and storage functions.

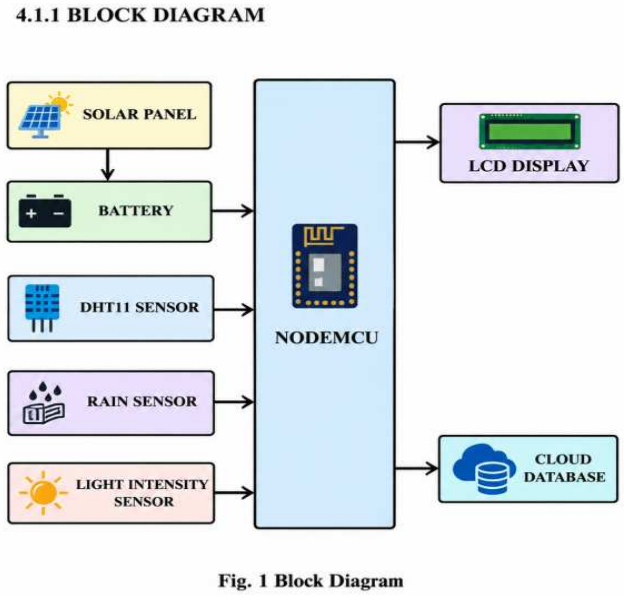


Fig. 1. Block diagram of the proposed solar-powered weather monitoring system

A. System Architecture

The system receives environmental inputs from the DHT11, rain sensor and light-intensity sensor. NodeMCU processes the sensor readings and provides local information on the LCD while communicating with the cloud through Wi-Fi. The solar panel charges the battery, which supplies the controller and sensors.

The resulting arrangement is intended to operate independently of conventional mains electricity in remote agricultural locations.

B. Working Principle

The humidity, temperature and rain sensors are interfaced with the NodeMCU. The project report states that sensor selection considers accuracy, power consumption and rigidity

for outdoor operation. The DHT11 provides temperature and humidity values, the rain sensor detects rainfall, and the light-intensity sensor provides ambient-light information. The collected measurements are displayed locally and recorded on the ThingSpeak IoT cloud so that the user can view stored information remotely.

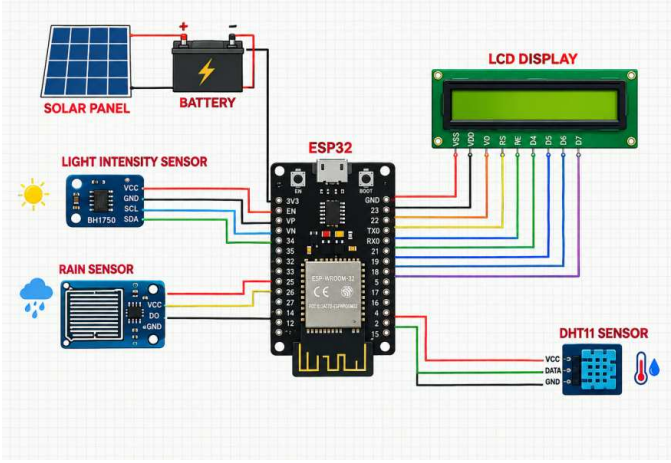


Fig. 2. Circuit Diagram

The design description emphasizes power conservation. It states that sensor sampling is intended to occur at 30-second intervals, with the system sleeping between periods to extend battery life. The report further states that significant changes can trigger transmission of the sensor data to the cloud through Wi-Fi.

C. Proposed System Features

The proposed arrangement provides real-time environmental monitoring, sustainable energy utilization, remote IoT data access, a user-facing LCD display, a buzzer alert mechanism and power-efficiency features. These functions are intended to support agricultural decision-making while keeping the system compact and suitable for remote deployment.

IV. SYSTEM COMPONENTS

A. NodeMCU

NodeMCU is the central controller used for sensing, processing and Wi-Fi communication. The project report describes NodeMCU as an open-source prototyping platform associated with the ESP8266/ESP32 family. The ESP8266 implementation provides Wi-Fi connectivity and is widely used in IoT applications. NodeMCU is an open-source firmware for which open-source prototyping board designs are available. The firmware and prototyping board designs are open source. NodeMCU ESP8266 and NodeMCU ESP32 are becoming very popular and are almost used in more then 50% IoT based projects today.

The firmware uses the Lua scripting language. The firmware is based on the eLua project and built on the Espresso if Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented.

The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna. The choice of the DIP format allows for easy prototyping on breadboards. The design was initially was based on the ESP-12 module of the ESP8266, which is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications.



Fig. 3. Node MCU

B. DHT11 Sensor

This DHT11 Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor capability. It is integrated with a high-performance 8-bit microcontroller. Its technology ensures the high reliability and excellent long-term stability. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance.

Each DHT11 sensors features extremely accurate calibration of humidity calibration chamber. The calibration coefficients stored in the OTP program memory, internal sensors detect signals in the process, and we should call these calibration coefficients. The single-wire serial interface system is integrated to become quick and easy. Small size, low power, signal transmission distance up to 20 meters, enabling a variety of applications and even the most demanding ones. The product is 4-pin single row pin package. Convenient connection, special packages can be provided according to users need.

The DHT11 sensor provides the current temperature is humidity readings. The DHT11 gives out analog output and is connected to the analog input of the Arduino micro-controller A0. The dht11 sensor has 3 pins. Along with temperature and humidity the other values that are calculated or derived from the dht11 sensor is the dew point, heat index etc. The dew point is the temperature at which air in the atmosphere freezes to become water droplets and the heat index is the heat felt by the human skin from the environment. This is important in places with high humidity. Even though the temperature maybe lowers, the body still feels warm. This is due to the high humidity in the air. Humidity is the moisture content in the air. High humidity in the air generally makes one to sweat or perspire.

C. Rain Sensor

The rain or water sensor is used to detect rainfall or water presence. Its sensing board uses conductive tracks and produces analog information, with a digital output available when a configured moisture threshold is exceeded.

Pin Description

- Pin1 (VCC): It is a 5V DC pin
- Pin2 (GND): it is a GND (ground) pin
- Pin3 (DO): It is a low/ high output pin
- Pin4 (AO): It is an analog output pin



Fig. 4. Rain Sensor

D. BH1750 Light-Intensity Sensor

The BH1750 light intensity sensor breakout board from rhydo LABZ. BH1750 is a digital Ambient Light Sensor IC with IIC bus interface. This IC is most suitable to obtain the ambient light data for adjusting LCD, Keypad backlight etc. Photo diode on BH1750 detects the light intensity, which is converted as voltage output with the help of an integration-OPAMP. The built in AD converter finally gives out the 16bit digital data. Internal logic of BH1750 avoids the need for any complicated calculations, as it directly outputs meaningful digital data in Lux (Lx).

The address of the device depends on the logic state of the address pin. There is an on board pull down on the address pin, so with no connection it defaults to the low address (0x23). PCB jumper (J1) allows easy configuration of the address pin; if J1 is closed the address pin will be pulled high, and the address will be 0x5C.

Address of the module can also be controlled over the input signal on ADD pin, keeping the jumper (J1) open. The DVI pin has an RC delay on it, delaying it enough to allow a proper power-on reset. The I2C interface, address and DVI pins are brought out on a breadboard compatible berg strip, makes it easy to use with your Arduino or any other microcontroller.

BH1705 has 3 measurement modes corresponding to different sensitivity levels (0.5lx, 1lx and 4lx). The Resolution Mode is recommended as it provides the best noise rejection. Output logic level of the IIC bus can be switched between 3V3 and 5V levels with the help of PCB jumper (J2). Finally, with the level conversion circuitry, 3V3 regulation and the well calibrated BH1705, this breakout board would make a good basis for a light meter projects, especially as they gives an output in lux directly, with acceptable accuracy and with a response that looks to be a better match to that of the human eye.

E. LCD Display and Buzzer

The LCD provides local visualization of measured weather parameters. The buzzer acts as an audio signaling device and is intended to alert the user when specified weather conditions or threshold levels are reached.

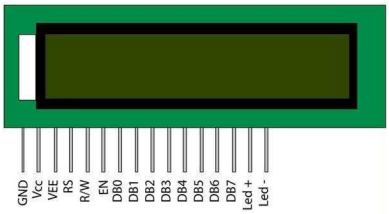


Fig. 5. LCD Display

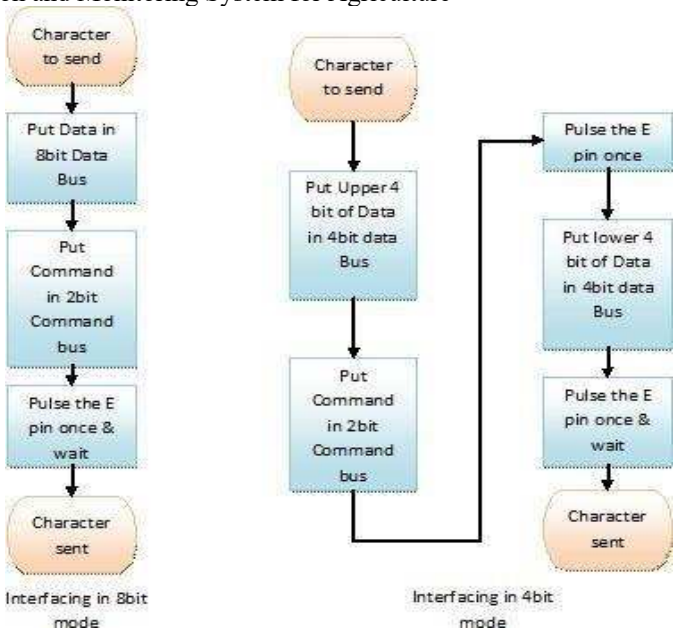


Fig. 6. Flow chart of interfacing LCD display

F. Power and Software

The power section consists of a solar panel, battery and associated power-conditioning arrangement. The software is implemented using the Arduino IDE with Embedded C. The report describes power-saving routines as a means of extending battery life during low-sunlight conditions.

V IMPLEMENTATION

A. Power Supply

This is a simple approach to obtain a 12V and 5V DC power supply using a single circuit. The circuit uses two ICs 7812 and 7805 for obtaining the required voltages. The AC mains voltage will be stepped down by the transformer, rectified by bridge and filtered by capacitor to obtain a steady DC level. The 7812 regulates this voltage to obtain a steady 12V DC. The output of the IC1 will be regulated by the 7805 to obtain a steady 5V DC at its output. In this way both 12V and 5V DC are obtained.

B Block Diagram

Initially small step down transformer is used to reduce the voltage level 230V AC into 12V AC. The output of the transformer is a pulsating sinusoidal AC voltage, which is converted to pulsating DC with the help of a rectifier. This output is given to a filter circuit which reduces the AC ripples, and passes the DC components. 7812 regulator is used to converts 12V DC study voltage. And 7805 regulator is converts constant 5V DC voltage. 5.5 DHT11 SENSOR This DHT11 Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor capability. It is integrated with a high-performance 8-bit microcontroller. Its technology ensures the high reliability and excellent long-term stability. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance. Each DHT11 sensors features extremely accurate calibration of humidity calibration chamber. The calibration coefficients stored in the OTP program memory, internal sensors detect signals in the process and we should call these calibration coefficients. The single-wire serial

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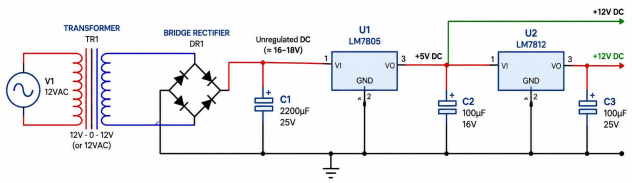


Fig. 7. Power supply block diagram

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VI. RESULTS AND DISCUSSION

A. IoT Monitoring Output

The report presents a ThingSpeak-based monitoring output containing four channels corresponding to temperature, humidity, rain status/level and light intensity. The web interface provides live updates, while the report states that the information can also be pushed to an Android application for remote access.

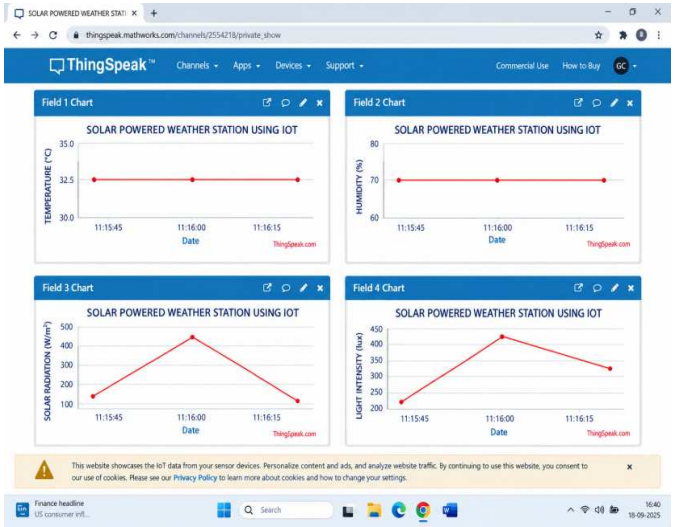


Fig. 8. Example ThingSpeak output shown in the project report

The example output image included in the project report shows temperature and humidity traces together with rain-level and light-intensity plots. The displayed sample values provide a demonstration of the data flow from the sensing unit to the cloud monitoring interface rather than a statistical validation dataset.

B. Benefits and Limitations

The reported advantages include reduced electricity consumption, low maintenance requirements, use of solar energy without direct pollution during operation, environmental sustainability, real-time remote monitoring, wide coverage and scalability, and improved operational efficiency for solar-related applications.

The project report also identifies limitations including the expense of solar-energy storage, technical complexity, data-processing challenges, network-security risks and equipment reliability. These limitations are relevant when extending the prototype to long-term field deployment.

C. Implementation Notes

The source report uses the term BH1570 in parts of the abstract and scope, while the component section and program use BH1750. This manuscript uses BH1750 because it is the device named in the component details and source program. The report's design description specifies 30-second sampling and sleep periods, whereas the included program contains a 1000 ms delay in its main loop; the two descriptions should therefore be treated as different source statements rather than silently reconciled.

Table 1. Main System Components

Component	Function	Interface / Role
NodeMCU	Processing and Wi-Fi communication	Controller / IoT
DHT11	Temperature and humidity	Digital sensor
Rain sensor	Rainfall/water detection	Analog/digital
BH1750	Ambient light intensity	I²C
LCD	Local display	User interface
Buzzer	Weather alert	Audio indication
Solar panel + battery	Power generation/storage	Power subsystem
ThingSpeak	Cloud storage/monitoring	Remote access

VII. CONCLUSION

The project demonstrates a solar-powered IoT weather-monitoring architecture for agricultural use. The combination of NodeMCU, DHT11, rain sensing, BH1750 light measurement, LCD visualization, solar power and ThingSpeak cloud storage provides a compact approach for collecting and accessing environmental data. The report positions the system as a cost-effective and energy-efficient option for remote monitoring. Future development identified in the source includes advanced analytics and machine-learning methods for weather prediction and irrigation planning, a dedicated mobile application, automated irrigation or ventilation control, multiple interconnected weather stations, and improved power management and energy storage.

The project successfully demonstrates the design and implementation of a solar-powered, IoT-based weather monitoring system tailored for agricultural applications. By integrating sensors such as DHT11 (temperature and humidity), BH1570 (light intensity), and a rain sensor with the Node MCU microcontroller, the system efficiently collects and transmits real-time environmental data. The use of solar panels ensures sustainable and uninterrupted operation, even in remote locations without grid power. Data visualization on an LCD and real-time alerts via a buzzer enhance user accessibility and responsiveness.

The system's IoT capabilities allow for remote data access and historical analysis, empowering farmers to make informed decisions for effective crop management. Overall, the solution is compact, cost-effective, and energy-efficient, making it highly suitable for diverse agricultural environments thus the complete information is provided about the weather monitoring by using the solar panel. The project results are obtained for the different irradiation to analyze the performance of a solar panel. From the hardware implementation, temperature, humidity, and rain level are obtained
practically and power values are tabulated. The ultimate aim of this analysis is to find out the weather conditions by using sensors. The system can also be improved by incorporating advanced data
analytics and machine learning algorithms, which would allow for the prediction of weather patterns and the optimization of irrigation schedules and crop planning. Developing a dedicated mobile
application would make it easier for farmers to access real-time and historical weather data, receive instant notifications, and visualize environmental trends directly on their smartphones.

Furthermore, the system could be linked to automated control mechanisms, such as irrigation or ventilation systems, to enable immediate responses to changing weather conditions. Expanding the network to include multiple interconnected weather stations across larger farming areas would facilitate broader data collection and regional analysis. Finally, implementing more sophisticated power management strategies and enhanced energy storage solutions would ensure reliable operation even during extended periods of low sunlight, making the system even more robust and sustainable for long-term agricultural use.

VIII PROGRAM

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
#include "ThingSpeak.h"
#include "DHT.h"
#include <ESP8266WiFi.h>
#include <BH1750.h>
BH1750 lightMeter;
#define DHTPIN D3
#define DHTTYPE DHT11 DHT
dht(DHTPIN, DHTTYPE);
#define SECRET_SSID "Iot" // replace MySSID with your WiFi network name
#define SECRET_PASS "[REDACTED]" // replace MyPassword with your WiFi password
#define SECRET_CH_ID 2026795 // replace 0000000 with your channel number
#define SECRET_WRITE_APIKEY "[REDACTED]" // replace XYZ with your channel write
API Key char ssid[] = SECRET_SSID; // your network
SSID (name) char pass[] = SECRET_PASS; // your
network password
int keyIndex = 0; // your network key Index number (needed only for WEP) WiFiClient
client;
unsigned long myChannelNumber = SECRET_CH_ID;
const char * myWriteAPIKey = SECRET_WRITE_APIKEY;
String
myStatus = "";
void setup(){
Serial.begin(9600);
Wire.begin();
pinMode(A0,INPUT);
lcd.init();
lcd.backlight();
lcd.setCursor(0,0);
  lcd.print("WEATHER MONITORING");
  lcd.setCursor(0,1);
lcd.print("SYSTEM FOR AGRI ");
WiFi.mode(WIFI_STA);
ThingSpeak.begin(client);
  if(WiFi.status() != WL_CONNECTED){
  Serial.print("Attempting to connect to SSID: ");
Serial.println(SECRET_SSID);
  while(WiFi.status() != WL_CONNECTED){
 WiFi.begin(ssid, pass); // Connect to WPA/WPA2 network. Change this line if using open or WEP network
  Serial.print(".");
delay(5000);
lcd.clear();
break;
  }
    Serial.println("\nConnected.");
}
  dht.begin();
lightMeter.begin();
    Serial.println(F("BH1750 Test begin"));
}
void loop()
{
int h = dht.readHumidity();
int t = dht.readTemperature();
if (isnan(h) || isnan(t))
  {
  Serial.println("Failed to read from DHT
sensor!"); return; }
    int rain = analogRead(A0);
float lux = lightMeter.readLightLevel();
  Serial.print("Light: ");
  Serial.print(lux);
Serial.println(" lx");
  lcd.setCursor(0,0);
  lcd.print("T = ");
```

```
lcd.setCursor(4,0);
lcd.print(t);
lcd.print("%C");
lcd.setCursor(9, 0);
lcd.print("H = ");
lcd.setCursor(13, 0);
lcd.print(h);
lcd.setCursor(0, 1);
lcd.print("R = ");
lcd.setCursor(4, 1);
lcd.print(rain);
lcd.setCursor(9, 1);
lcd.print("LI = ");
lcd.setCursor(12, 1);
 lcd.print(lux);
ThingSpeak.setField(1, t);
ThingSpeak.setField(2, h);
  ThingSpeak.setField(3, rain);
  ThingSpeak.setField(4, lux);
ThingSpeak.setStatus(myStatus); int
x = ThingSpeak.writeFields(myChannelNumber,
myWriteAPIKey);
if(x == 200){
   //Serial.println("Channel update successful.");
 }
else{
   //Serial.println("Problem updating channel. HTTP error
code " + String(x));
 }
 delay(1000); lcd.clear();
 }
```

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