



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 12, Issue 3, March 2023

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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# Atmosphere Condition Monitoring Using Remote Sensing and Solar Cells Based On IoT

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**ABSTRACT :** The Embedded Technology is currently in its primary and the affluence of Knowledge offered is amazing. Embedded System is a permutation of hardware and software. Embedded technology plays a most important role in integrating the variety of functions coupled with it. This desire to bind up the variety of sources of the Department in a closed loop structure. This proposal significantly reduces the manpower, saves time and operates efficiently without individual interfering. This project puts out the first action in achieving the desired target. With the advent in technology, the existing systems are developed to contain inbuilt intelligence. This system will automatically broadcast the real time surroundings data. In this project we are going to observe the environment circumstances using the smart sensors in embedded technology, using this project we can analyze the climate and pollution state of our surrounding, using this data we can recover our surroundings from pollution. The Arduino as the prime controller which uses ATMEGA328 microcontroller, temperature, humidity, gas, sound sensors are used to sense the environment condition and provide the data to the Microcontroller which is used to observe the level and send the data to the cloud server via IOT module.

**KEYWORDS:** Internet of Things (IoT); Weather Monitoring; Air Pollution Monitoring.

## I.INTRODUCTION

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location. Human beings have attempted to predict the weather informally for millennium and formally since the nineteenth century. Weather forecasts are made by collecting quantitative data about the current state of the atmosphere on a given place and using scientific understanding of atmospheric processes to project how the atmosphere will evolve on that place. Weather is driven by air pressure (temperature and moisture) differences between one place and another. These pressure and temperature differences can occur due to the sun angle at any particular spot, which varies by latitude from the tropics. The atmosphere is a chaotic system, so small changes to one part of the system can grow to have large effects on the system as a whole. This makes it difficult to accurately predict weather more than a few days in advance, though weather forecasters are continually working to extend this limit through the scientific study of weather, meteorology. It is theoretically impossible to make useful day-to-day predictions more than about two weeks ahead, imposing an upper limit to potential for improved prediction skill. Once an all humanendeavor based mainly upon changes in barometric pressure, current weather conditions, and sky condition, weather forecasting now relies on computer-based models that take many atmospheric factors into account. Human input is still required to pick the best possible forecast model to base the forecast upon, which involves pattern recognition skills, tele-connections, knowledge of model performance, and knowledge of model biases.

Monitoring systems provide the opportunity to improve the decision making for management dramatically. While the effective implementation of a robust monitoring and control system used to be a challenge, current technologies such as the Internet of Things (IoT) are considered to be a possible solution. Gilchrist (2016) explains the need to implement IoT application as industrial systems are already very complex so that the abilities of human operators to understand, manage, and optimize their performance have reached their limits. Collecting appropriate data and extracting relevant information followed by their analyzation enables gaining insight and new knowledge to realize optimization of production performance that is much harder to match for traditional methods. Therefore, this paper deals with the realization of IoT-based monitoring of the environment conditions to improve the production performance.

## II.LITERATURE SURVEY

Through weather monitoring system we can collect the information about humidity and temperature and according to current and previous data we can produce the results in graphical manner in the system. After reviewing many articles, there are presently no papers that mention monitoring the combination of temperature, lighting and humidity in one integrated system and have actuators to modify these settings. In addition to this, there is one research paper that has discussed monitoring these three environmental conditions; however, there has been no mention about having actuators to modify. So our main idea was to coin a system that can sense the main components that formulates the weather and can be able to forecast the weather without human error. Ancient weather forecasting methods usually relied on observed patterns of events, also termed pattern recognition. For example, it might be observed that if the sunset was particularly red, the following day often brought fair weather. This experience accumulated over the generations to produce weather lore.

However, not all of these predictions prove reliable, and many of them have since been found not to stand up to rigorous statistical testing. The simplest method of forecasting the weather, persistence, relies upon today's conditions to forecast the conditions tomorrow. This can be a valid way of forecasting the weather when it is in a steady state, such as during the summer season in the tropics. This method of forecasting strongly depends upon the presence of a stagnant weather pattern. It can be useful in both short range forecasts and long range forecasts. Measurements of barometric pressure and the pressure tendency (the change of pressure over time) have been used in forecasting since the late 19th century.

IoT can be useful in wide range of applications like Smart home, smart cities, asset tracking and inventory control, shipping and location, Medical devices, security, individual tracking, and energy conservation. As already mentioned IoT allows communication between devices, commonly referred to as Machine-to-Machine (M2M) communication. With this possibility, physical devices can communicate to people letting them know their condition and where it is located. Devices such as trucks or ships allow the maximum capacity to be filled to the devices by communication amongst devices and then transferring that information to a person to capitalize on the information provided. All of these combined technologies maximize revenue by cutting cost of incapability within the business. Some of the existing methodologies include automated temperature control using Lab VIEW and using a PWM system with a transistor, operated with a relay.

## III.PROPOSED SYSTEM

There are a lot of high end systems available these days for round the clock weather monitoring. But these systems are implemented on a very large scale, for monitoring real time weather for a whole city or state. Implementing such system for a small area is not feasible, since they are not designed for it and the overhead for maintaining such systems for a small area is very high. Our proposed system makes use of 3 sensors to measure the weather/environment factors such as temperature, humidity, light intensity, dew point and heat index. The values read from the sensors are processed by the Arduino micro-controller and stored in a text file which can be processed upon to derive analysis. The readings are also displayed on an on board LCD for quick viewing. All these readings can be analyzed to get the weather characteristics of a particular area and record the weather pattern. These recorded parameters are essential and vary from places to places. All these requirements are fed into the database and these values are essentials and recorded over time. Using these values as input we can plot a weather chart of a particular area over time. Based on the present weather factors and preset values the set actions are done. The set action can include turning on the heating system when the temperature is colder than the set value and turning on the cooling system when the temperature is hot or humid beyond the set values. The serial output from the Arduino micro-controller which are the values read from the sensors can also be stored in a database. The database can be used as a source for data if we want to display values through a website or a standalone application.

The information of the environmental conditions in the production area of the LEAD Factory can be visualized in real-time on its Shop Floor Management Board. Fig. 3 shows a sample visualization of the humidity and temperature over time. While a rather constant value course can be seen at the beginning, two sudden drops in temperature and two rises in humidity at the same time can be seen. At the time of the first temperature drop, a window near the corresponding sensor was opened. During the period of tilted windows, temperature slowly declines and humidity slowly rises. Finally, the last drop in temperature visualized in the below graph represents another window opening. In order to evaluate the system, the points in time of the performed actions described above were compared with the timestamps



of the peaks and troughs in the graph. Due to the minor time differences, the developed demonstrator successfully represents a solution for real-time monitoring of the environment conditions in the production area

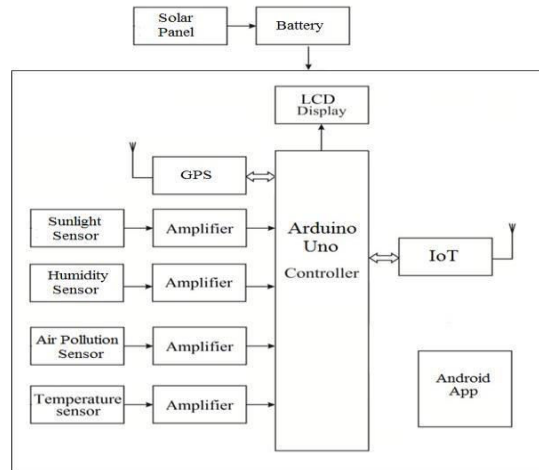


Fig.1.Block Diagram of Atmosphere Monitoring System.

The working principle of this work describes the interdependent functionality of the components and their output. The circuit diagram is shown in Fig. 1. Firstly, all the components are initialized by supplying the required power of +5v. There are two temperature sensors, lm35 and dht11; we are using two temperature sensors to get a accurate value of temperature reading and taking the average of the two values. Depending on the temperature, hot air or cool air introduced to maintain the temperature threshold value, which is preset. If the temperature is too low for the particular area hot air is blown in to bring the temperature to moderation. Otherwise, if the temperature is too high, cold air is blown and thereby raising the temperature to the required level.

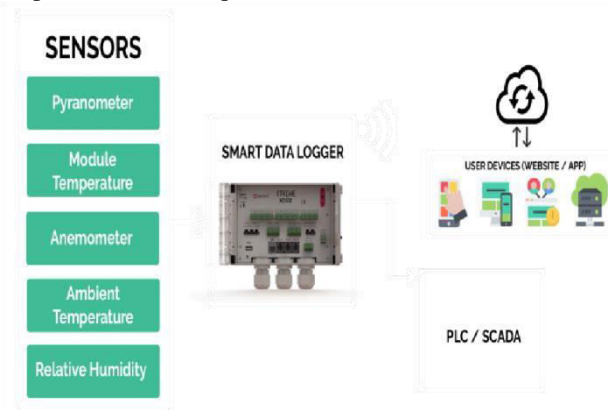


Fig 2: Weather Monitoring System

This is how temperature is manipulated. Secondly, there is an LDR which work based on light intensity. When the sunlight is too much or not enough for the plant to handle, the servo motor opens or closes the door of the glass box based on the readings of the LDR. This helps in recording the natural light incident on the area. The natural light intensity may vary from time to time. This is important in agricultural applications, where light is required for the growth of plants and some plants may not grow well in low light. On the other hand, when the light intensity is high throughout the year, such areas or places are suitable to set up solar power stations. Light intensity along with other parameters such as temperature and humidity can be used in predicting weather forecast without the use of any satellite data.

#### IV.RESULT ANALYSIS

The gathered data is serially fed into a computer, which uses the com port to communicate with the Arduino device and the data recorded is stored in a text file. The text file can be directly imported to an excel file with the functionality of a macro. The imported data is then sorted and formatted, and charts are then plotted with the imported data. The charts present a visual representation of the data, which shows the weather pattern over a recorded period of time. The visual patterns indicate the weather behavior of the particular region. This is the primary objective of the present work. The DHT11 sensor provides the current temperature and 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 lower, 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.

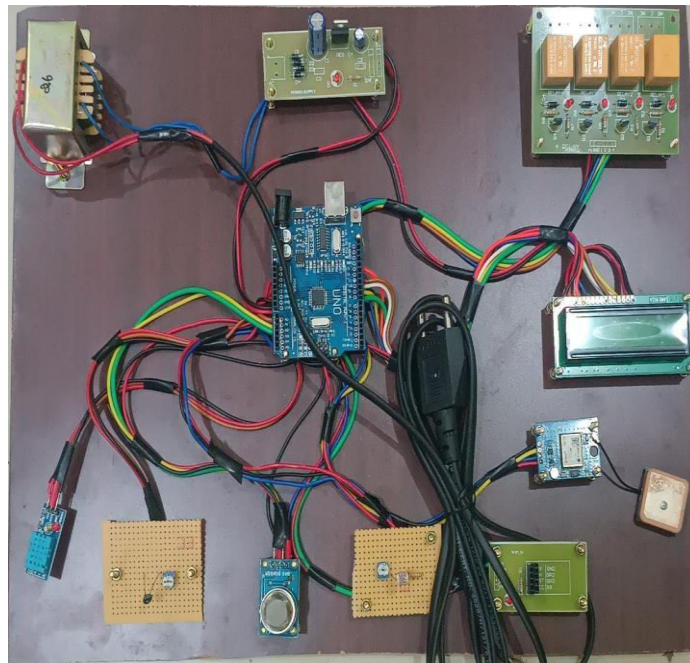


Fig.3. ATMOSPHERE CONDITION MONITORING USING REMOTE SENSING AND SOLAR CELLS BASED ON IOT

#### V.CONCLUSION

This paper has presented an extensive and critical review of research studies on various environment monitoring systems used for different purposes. The analysis and discussion of the review suggested major recommendations. The need of extensive research on deep learning, handling big data and noisy data issues, and a framework of robust classification approaches has been realized. We have focused mainly on water quality, and air quality monitoring as smart agriculture systems that can deal with environmental challenges. The major challenges in implementation of smart sensors, AI and WSN need to be addressed for sustainable growth through SEM. The participation of environmental organizations, regulator bodies and general awareness would strengthen SEM efforts. The poor quality of sensory data can be preprocessed using appropriate filters and signal processing methods to make the data more suitable for all subsequent tasks associated in SEM.

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**INNO SPACE**  
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**Impact Factor: 8.118**



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