



# IOT BASED SMART WAREHOUSE MONITORING SYSTEM

Mrs. Deepa R Bhangi  
Department of ECE  
K S School of Engineering and management  
Bengaluru, Karnataka, India

Mrs. Swati Sarkar  
Department of ECE  
K S School of Engineering and management  
Bengaluru, Karnataka, India

Mrs. Bhargavi Vijendra Sangam  
Department of ECE  
K S School of Engineering and management  
Bengaluru, Karnataka, India

*Abstract*— Fruits and vegetables are indispensable part of people's life. Thus, vegetables warehousing in appropriate manner is essential in order to meet the growing demands. The warehousing time and quality of the vegetables are greatly influenced by the warehousing environment factors. Therefore, it has crucial significance for the vegetables warehousing environment to carry out multi parameter monitoring and analyse the parameters collected and then make the regulation and control. At present, it is necessary to carry out regional management of storage in order to save energy and improve the utilization rate. Because different vegetables need different refrigeration temperatures, so real-time temperature and humidity monitoring is particularly important. For meeting this requirement, this project designs an IOT based Warehouse monitoring system for storing vegetables using Arduino. It makes use of wireless sensor networks that collect data from different sensors deployed at various nodes and sends it through the wireless protocol. This system makes use of hardware and software parts such as Temperature sensors, Moisture sensors etc. This all can be seen in IOT website which keeps a track on Summary of warehouse where it shows information of Temperature, Humidity, level of stocks with date and time, based on per minute.

*Keywords*—Temperature Sensors, Moisture Sensor, IOT

## I. INTRODUCTION

Agriculture is the backbone of our nation and it plays a major role in our country's economy. India itself achieves the self-sufficiency in the area of farming. Farmers are not having the comfortable facility to store and preserve their yielded vegetables and fruits at their own place. Due to this lagged facility their products get wasted often and their income will be affected. Even though they are having the preservation facility provided by the government, the transportation cost is high since they are less in number. This project will give the solution for their current issue on preserving the agriculture products. Every year farmers face numerous problems due to the storage requirements, lack of proper monitoring of the food stored. Warehouses are used for storage purposes. A large part of the food stored is left without proper storage facilities. But due to the fluctuations in the market supply both from one season to next and from one year to next, the losses that the country faces every year due to improper storage is about Rs.50,000 cores in monetary terms. There are various environmental factors that influence the natural contamination of fruits and vegetables such as type of storage structure, moisture, temperature, sufficient light, humidity, etc. As the storage time increases, the food will lose its value. This results in the problem of food safety.

II. PROPOSED ALGORITHM

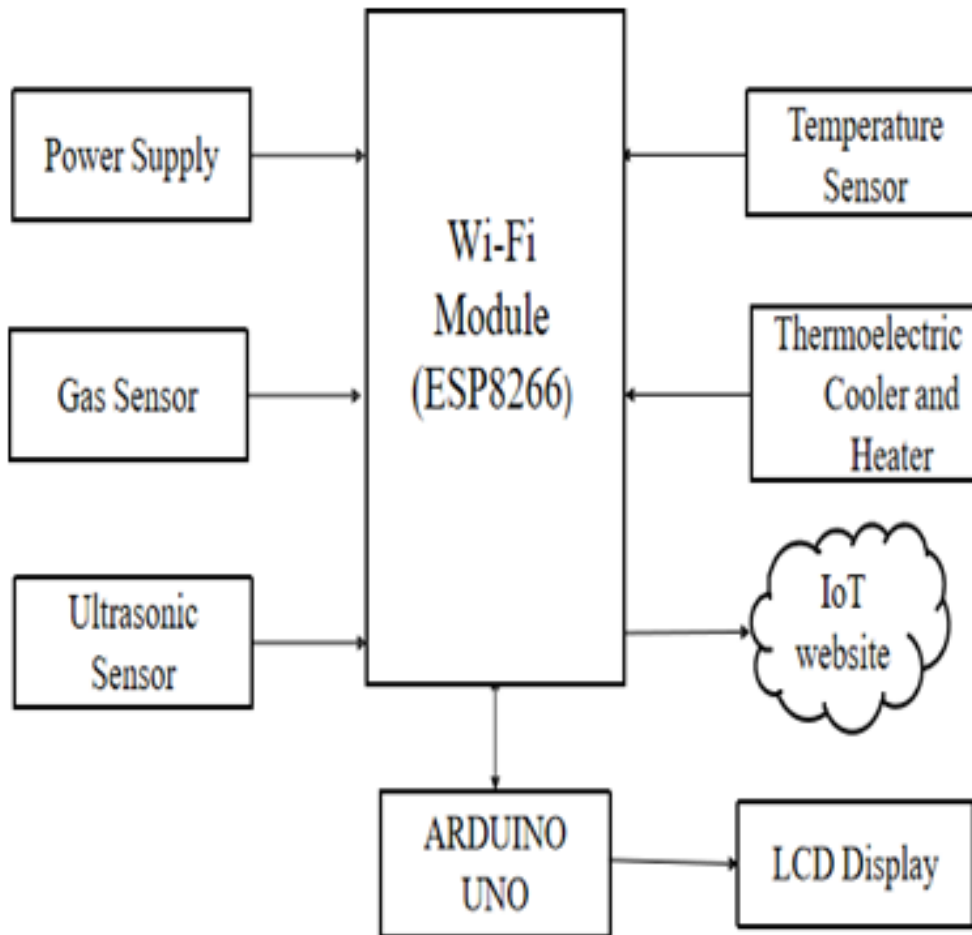
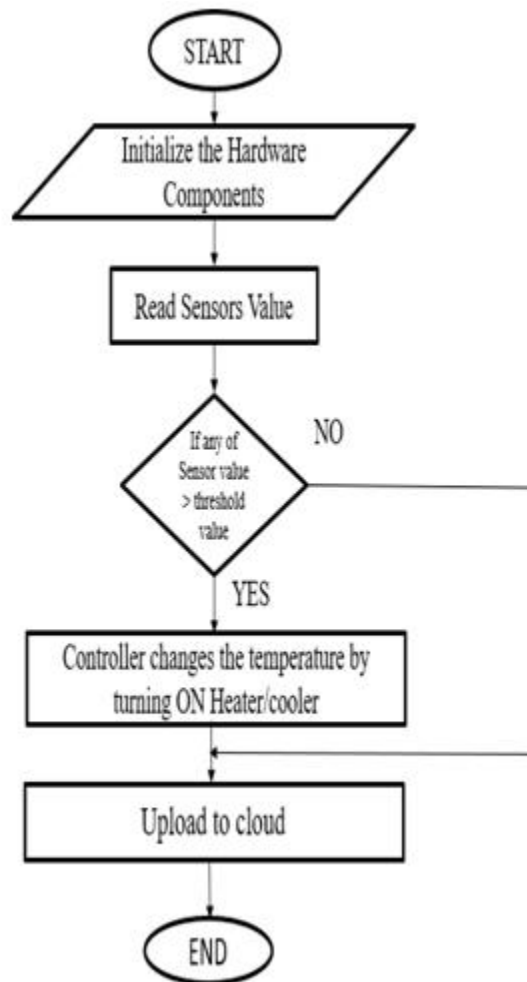


Fig: Block Diagram of the Proposed System

Here with the use of ESP-8266 and with the help of Arduino uno all the sensors have been connected. The Sensors are distributed throughout the onion and tomato storage area and are responsible for collecting data on various environmental factors, such as temperature, humidity, gas concentration, and airflow. The system is designed to ensure that the produce is stored in optimal conditions, which helps reduce waste and improve the quality of the produce. The IoT website can use machine learning algorithms to detect patterns and anomalies in the data, and trigger alerts or actions accordingly. For The system is responsible for processing the data collected by the sensors and generating insights that can help optimize the storage conditions for the onions and tomatoes. The system

helps improve efficiency by reducing the need for manual monitoring and record-keeping. Instead of having to manually monitor the storage conditions and inventory levels, warehouse managers can rely on the system to provide them with real-time data and alerts, allowing them to take quick and informed actions to ensure the quality and safety of the produce. The system can also help reduce energy consumption and identify potential maintenance issues before they become major problems. An IoT-based smart warehouse monitoring system for onion and tomato storage helps warehouse managers ensure that their produce is stored in the best possible conditions, resulting in better quality produce and reduced waste.

**B. Watermark Extraction algorithm –**



**Fig 3.2** Flow Chart of the Proposed System

This flowchart includes the initialization of hardware components, The process involves connecting the sensors such as sensors nodes, as well as the steps involved in collecting sensor readings, this helps in checking if it is time to read sensor values, initiating the sensor readings, retrieving the sensor data, validating the data by which are the temperature and humidity levels in the warehouse environment. The sensors are configured to collect data at regular intervals, which can be set as per the requirements of the specific warehouse and produce being stored. Setting threshold values, and changing temperature conditions in response to the readings. When sensor values exceed the threshold, the system can help prevent the spoilage of onions and tomatoes. The sensor checks if the temperature is too high or too low and turns on the heater or cooler, If the temperature is above the Threshold voltage that Turn's on Cooler Send a signal to turn on the cooler and Wait for the temperature to reach the desired range. If temperature is below the Threshold voltage that Turn's on Heater Send a signal to turn on the heater and Wait for the

temperature to reach the desired range. If the values are within the acceptable range, the system continues monitoring the warehouse environment. Then No Action Needed. Do nothing. The data on temperature, humidity and gas concentration is then uploaded to the cloud platform for further analysis. Once the sensor data is uploaded to the cloud platform. The data can be used to monitor the storage conditions of onions and tomatoes and identify potential issues before they become problems. Additionally, the data can be used to generate reports and analytics that can help optimize warehouse operations, improve the quality of the product, and reduce waste. If any issues are detected, and it can be viewed on IoT website. The end of the flowchart indicates that the monitoring and management process has ended. This could be due to various reasons, such as the end of a sensor reading cycle or a change in the storage conditions that requires manual intervention.

### III. EXPERIMENT AND RESULT

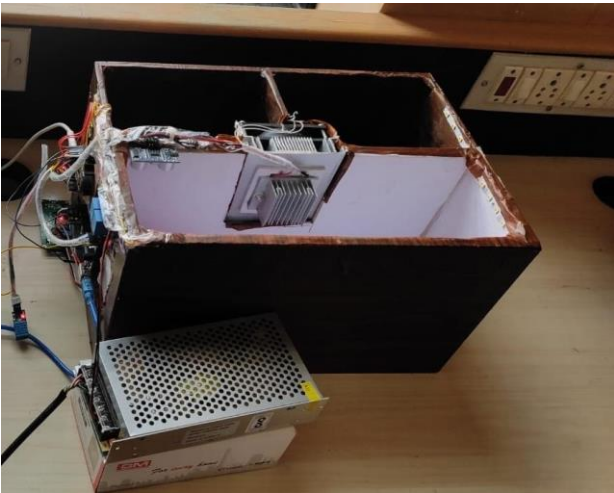


Fig: Model of warehouse

The above figure represents. The warehouse unit mainly consist of two blocks. In each of these blocks, various types of vegetables are stored. We have to monitor each of these blocks separately.

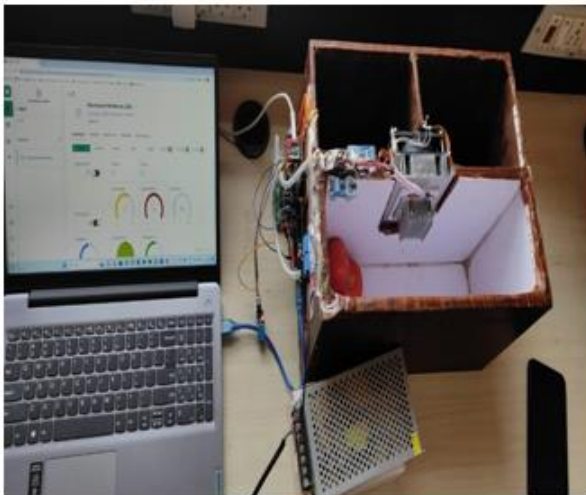


Fig: Setup of warehouse model by using blynk app

The above fig 7.2 represents The physical parameter values sensed from the warehouse environment are now uploaded to the blynk app. the real-time parameter of the warehouse and make appropriate changes in accordance with the changing warehouse environment Our model uses low cost device components which make it up to an affordable warehouse setup The IoT website has got various features like making available the channel as either private or public, The incoming data from the IoT website channel is now processed in order to perform better details of changes atmospherically in any of these 4 parameters viz., temperature, humidity, gas and light intensity. A humidity sensor senses, measures, and reports the

relative humidity in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount. The IoT functioning of the system is well managed by the low- cost, highly efficient WiFi module ESP826601. There are 4 sensors, temperature, Humidity sensor DHT11, Gas sensor MQ2, which are all connected to the PIC microcontroller through which they send the physical parameter values to the IoT website. The ultrasonic sensor will check the level of stock in the warehouse and The DHT11 sensor will check the temperature and humidity the threshold value we have given for onions and tomatoes is 35°.

If threshold value is greater than 35° controller changes the temperature and humidity automatically it will turning on heater or cooler the temperature and humidity will be displayed in the LCD and also we cans see temperature and humidity values in the blynk app also, MQ2 gas sensor will detect the methane gas emitted from the vegetables this will display in the blynk app.

If the onion stock is full means it will show the value 0 if the stock is empty means it will show the 20. The ultrasonic sensor will check the level of stock in the warehouse and The DHT11 sensor will check the temperature and humidity the threshold value we have given for onions and tomato's is 35° if threshold value is greater than 35° controller changes the temperature and humidity automatically it will turning on heater or cooler the temperature and humidity will be displayed in the Lcd Similarly for tomatoes also stock is full means it will show the value 0 if the stock is empty means it will show the value 20, we are using a ESP8266 is wi-fi microcontroller all the sensors are connected to the this a Peltier module requires more power supply so we are using additional power supply, Relay we are using as switch in this module It will display the collected data in the blynk app.

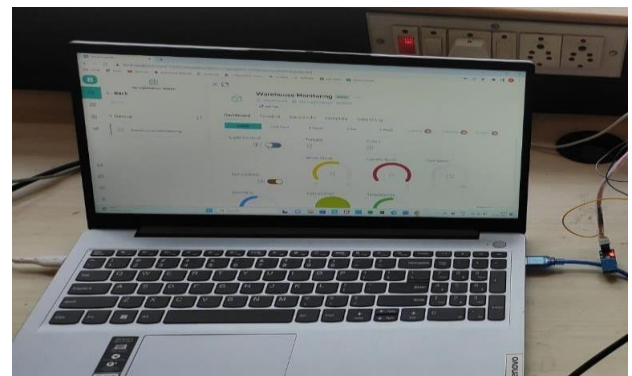


Fig: Display of the Data by using in the blynk app

The above figure represents. The level stock in the warehouse and the temperature and humidity, will be displayed in the blynk app, and also the fan status also displayed in the app, The methane gas level will also display in this app.



#### IV. CONCLUSION

Fruits and vegetables are indispensable part of people's life. Thus, vegetables warehousing in appropriate manner is essential in order to meet the growing demands. The warehousing time and quality of the vegetables are greatly influenced by the warehousing environment factors. Therefore, it has crucial significance for the vegetables warehousing environment to carry out multi parameter monitoring and analyze the parameters collected and then make the regulation and control. At present, it is necessary to carry out regional management of storage in order to save energy and improve the utilization rate. Because different vegetables need different refrigeration temperatures, so real-time temperature and humidity monitoring is particularly important. For meeting this requirement, this project designs an IOT based Warehouse monitoring system for storing vegetables using Arduino. It makes use of wireless sensor networks that collect data from different sensors deployed at various nodes and sends it through the wireless protocol. This system makes use of hardware and software parts such as Temperature sensors, Moisture sensors etc. This all can be seen in IOT website which keeps a track on Summary of warehouse where it shows information of Temperature, Humidity, level of stocks with date and time, based on per minute.

#### V. REFERENCES

- [1] Competitive Assessment of Onion Markets in India: Report Prepared for Competition Commission of India, Government of India.
- [2] "State-wise analysis of Production, Storage, Market arrival and Price trends for Onion and Potato", Horticulture Statistics Division D/o Agriculture & Cooperation.
- [3] "Onion storage technology": <http://www.onions-potatoes.com/storage/storage-onions.php>.
- [4] E.P. Banuu Priya, V.R. Sinja, "STORAGE OF ONIONS – A REVIEW", R.P.J.S. Alice, S. Shanmugasundaram and K. Alagusundaram, Indian Institute of Crop Processing Technology, Thanjavur-613 001, India
- [5] April 2012, "MARKET INTELLIGENCE SYSTEM" Baseline Data for Potato & onion
- [6] Dr. V.G. Wagh, S. A. Pawar, November 2016, "Advance Rotten Onion (Allium Cepa) Sniffer: Rottening Detection and Primary Prevention Using Sensors, Actuators & Transducers", Vol. 5, Issue 11.
- [7] Jayeeta Mitra, "Onion dehydration: a review", NCBI
- [8] Seema T. Borole, , Sep - Oct. 2013, "Comparative Losses and Economic Feasibility of the Improved Onion Storage with Low Cost of Onion Storage Structure", International Journal of Modern Engineering Research (IJMER), Vol. 3, Issue. 5, pp-2656-2661
- [9] Falayi F.R. and Yusuf H.A, " Performance Evaluation of a Modified Onion Storage Structure", Department of Agricultural Engineering, The Federal University of Technology, Akure, Ondo State, Nigeria.
- [10] Materials for shade nets- a guideline to select most performant materials to enhance the living conditions inside the emergency shelter
- [11] Post-harvest management of bulbs [http://www.nhrdf.com/htmlfiles/Onion/oni\\_post.htm](http://www.nhrdf.com/htmlfiles/Onion/oni_post.htm)
- [12] DR.P C. Tripathi, "Post harvest handling ,storage and marketing of onion and garlic : Post harvest handling ,storage and marketing of onion and garlic", National Research Centre for Onion and Garlic, Rajgurunagar, Pune, India.
- [13] Anil Chopra's Blog "Onion storage-issues and solutions, India