



QUALITY GRAIN CHECKING SYSTEM USING IOT & MACHINE LEARNING

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Abstract: India is a global agricultural powerhouse. It is the world's largest producer of milk, pulses and spices, as well as the largest area under wheat and rice. In India, farmers mainly depend on warehouses to store the harvest. So, to improve the quality of grain storage we came up with this idea and focus on the storage of grains after the yield is produced. Storage of food grains plays an important role to preserve grains for future use. Quality Grain checking helps monitor warehouses and prevent grain spoilage. To enhance the monitoring of food grain storage in warehouses, we propose the utilization of IOT devices. By continuously tracking temperature, carbon dioxide levels, and humidity, we can proactively identify and prevent spoilage of food grains. Additionally, we incorporate the use of Convolutional Neural Networks (CNN) and Machine Learning algorithms to study and analyse the patterns and behaviour's associated with grain storage.

Keywords: Convolutional Neural Network, Machine Learning, IOT, Quality Grains, Agriculture.

1. INTRODUCTION

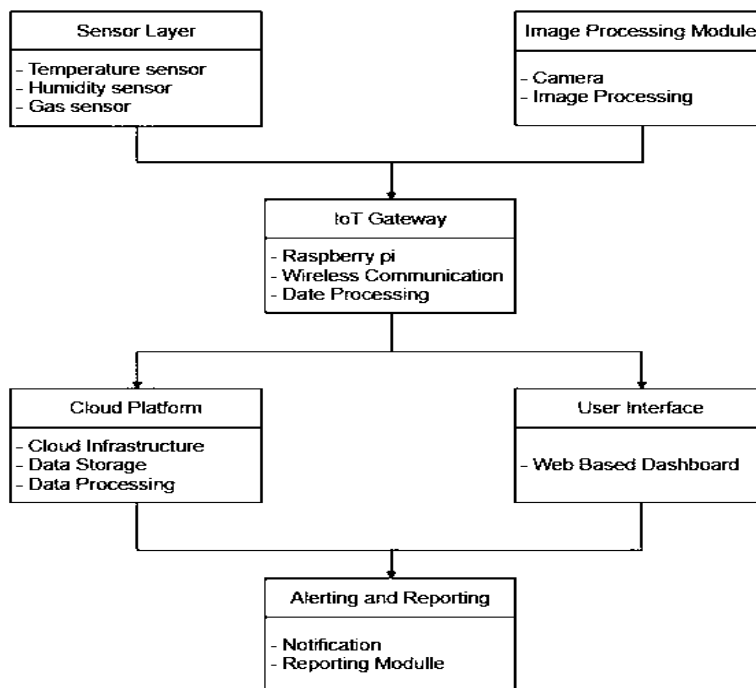
India is a global agricultural powerhouse. It is the world's largest producer of milk, pulses, and spices, and as well as the largest area under wheat, rice, and cotton. In India farmers mainly depend on warehouses to store the harvest. So to improve the quality of grain storage we came up with this idea and focus on the storage of grains after the yield is produced. Storage of food grains plays an important role to preserve grains for future use and warehouses play a major role here. It helps monitor warehouses and prevent grain spoilage

2. RELATED WORK

1. In the study titled, "IOT Monitoring System for Grain Storage" in IEEE Access, 2020. By Ravi Kishore Kodali, Jeswin John and Lakshmi Boppana This research paper presents a system design comprising a microcontroller and a diverse array of sensors capable of gathering data on temperature, humidity, and food quality.

3. METHODOLOGY

3.1 PROPOSED ARCHITECTURE



3.2 PROPOSED SYSTEM

To improve the quality of grain storage we came up with this idea and focus on the storage of grains after the yield is produced. Storage of food grains plays an important role to preserve grains for future use. Quality Grain checking helps monitor warehouses and prevent grain spoilage.

By continuously tracking temperature, carbon dioxide levels, and humidity, we can proactively identify and prevent spoilage of food grains to detect. Here our camera will capture the label through which the sensor values are read and this sensor's values are compared to the standard values, if any deviation found then the buzzer is buzzed to indicate the variation to the user.

Advantages:

- By using our model we can check and protect the grain quality
- The grains are protected from pests by our model.
- And if there are any changes in the sensor readings the user is notified so that he is aware of the grain quality.
- Here we are creating an environment which ensures the grain quality.

3.3 PROPOSED ALGORITHM

CONVOLUTIONAL NEURAL NETWORK: To illustrate the construction of a convolutional neural network (CNN) for image classification, we will create a compact 6-layer network capable of distinguishing one specific image from others. This network is designed to be suitable for running on a CPU and serves as an example of a real-world CNN.

Raspberry Pi:

It is a small and single-board computer used widely and it is developed to promote the programming skills. One of the key features of the Raspberry Pi is its GPIO (General Purpose Input/Output) pins, which allow it to interact with the physical world by connecting to and controlling external devices such as sensors, actuators, LEDs, and motors. This capability makes the Raspberry Pi a popular choice for projects involving robotics, home automation, Internet of Things (IOT), and prototyping.

Raspberry Pi has fostered a vibrant community of users, developers, and enthusiasts who share ideas, projects, and resources, further expanding its applications and potential.

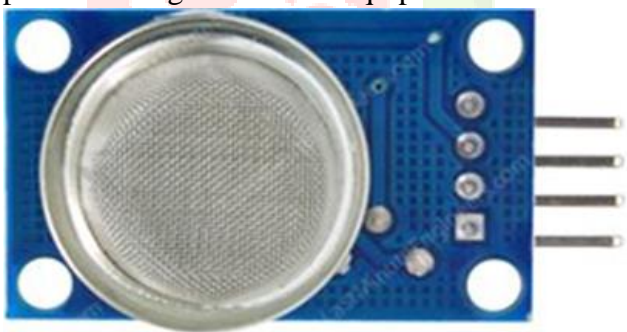


MQ2 Gas Sensor

The MQ2 gas sensor is a popular sensor module commonly used for detecting various gases and air quality monitoring. It is widely used in applications such as gas leakage detection, fire detection, and environmental monitoring.

The MQ2 sensor module consists of a small tin dioxide (SnO_2) semiconductor sensor, which changes its resistance when it comes into contact with specific gases. The module also includes a small heating element that helps to improve the sensitivity and response time of the sensor.

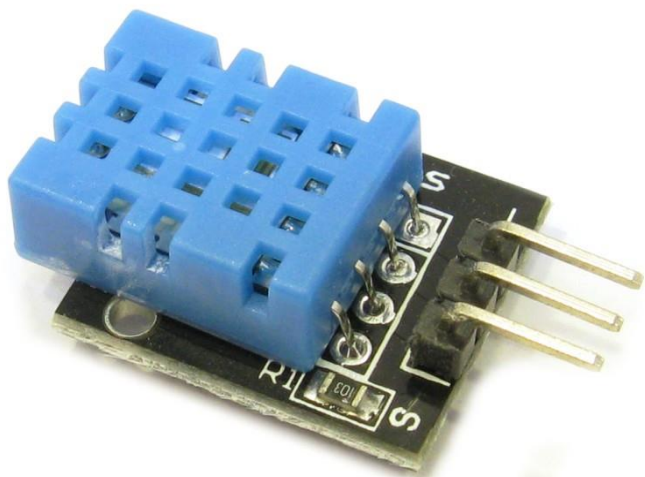
It can also detect LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide. It's important to note that the MQ2 sensor provides an approximate estimation of gas concentration and is not as precise as professional gas detection equipment.



DHT11 SENSOR

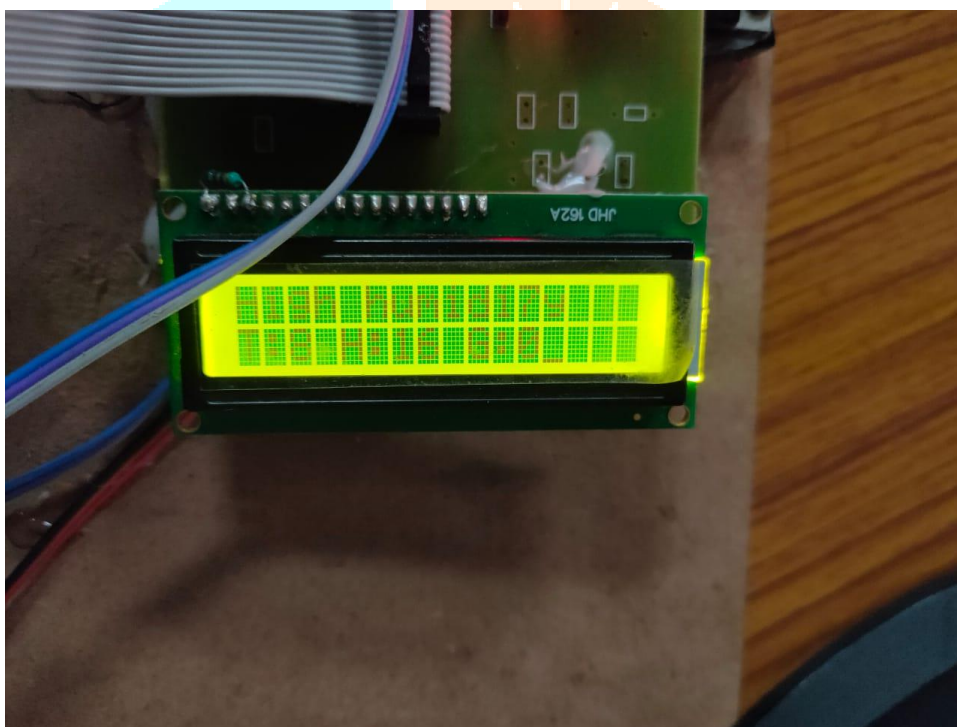
The DHT11 sensor is a popular digital temperature and humidity sensor module commonly used in electronics and IoT projects. It is a low-cost sensor that provides basic temperature and humidity measurements with reasonable accuracy.

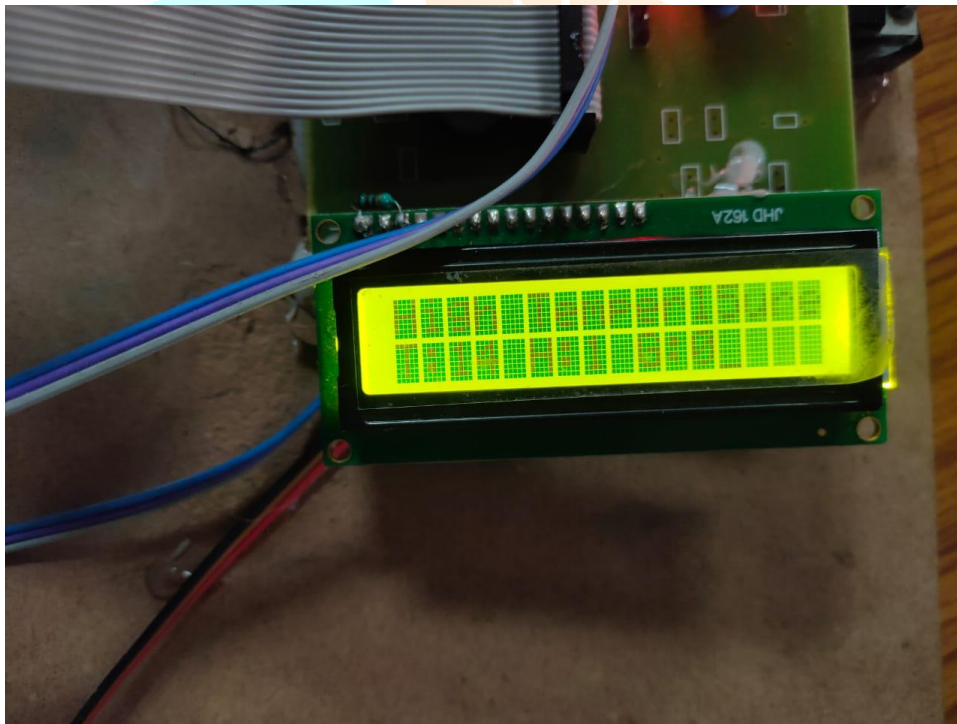
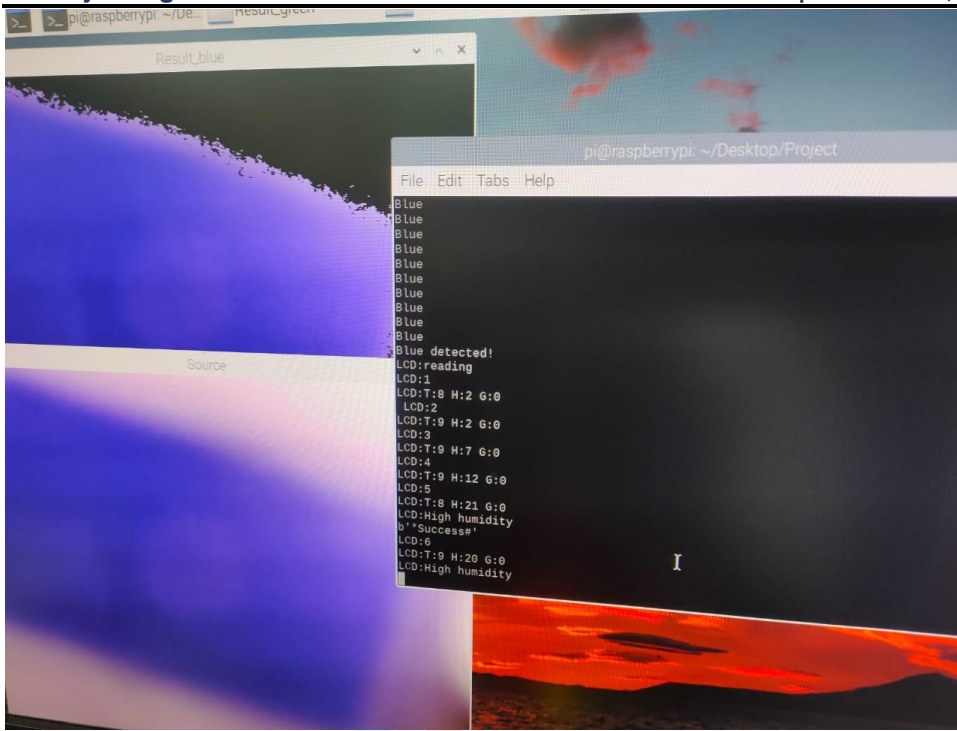
The DHT11 sensor module includes a capacitive humidity sensor and a thermistor for temperature measurement. It communicates with a microcontroller or other devices using a simple 1-wire digital protocol. To use the DHT11 sensor, you typically connect its data pin to a digital input pin of a microcontroller, configure the microcontroller to read the sensor's data, and then process the temperature and humidity values.

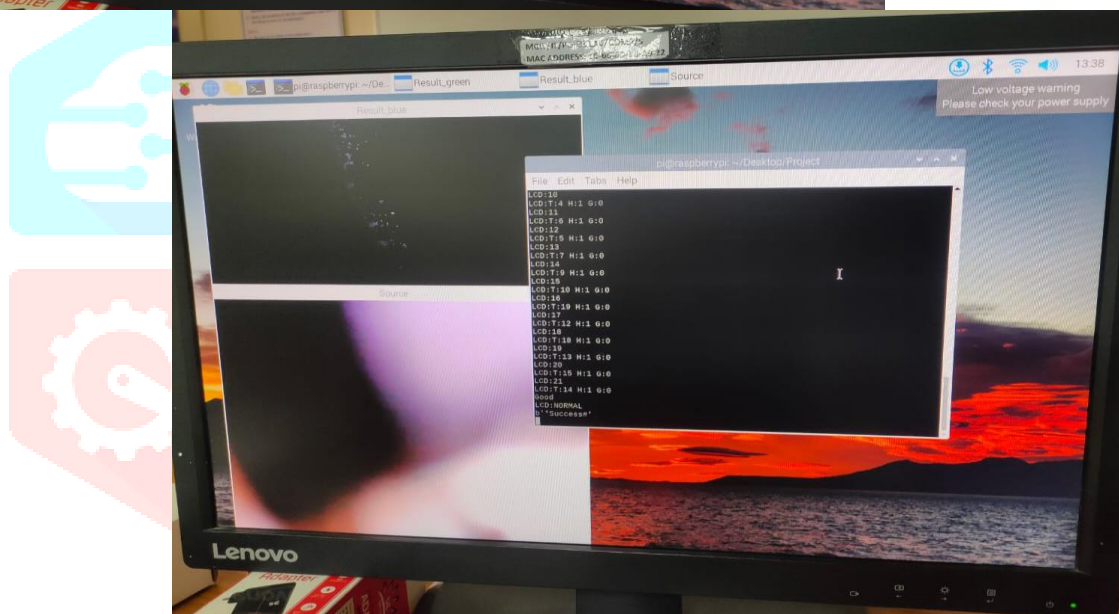
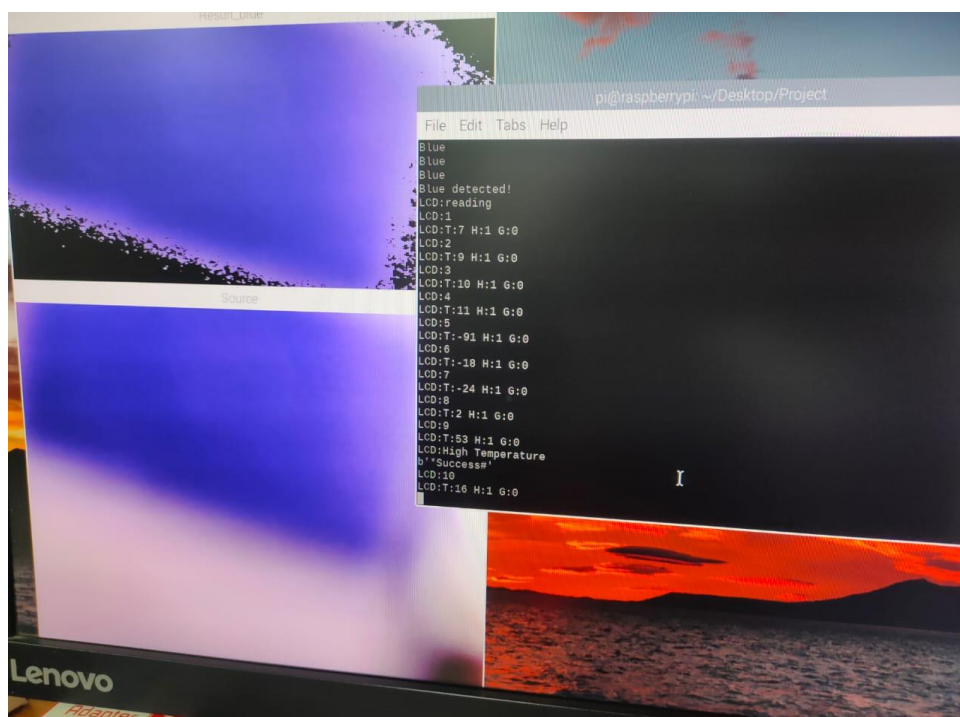


4. RESULTS

OUTPUT SCREENS







5. CONCLUSION

The Quality grain checking system ensures the quality of the grains is monitored continuously through which quality of grains can be effectively maintained to ensure their optimal condition with the help of IOT and Machine Learning. The project ensures if the grains are stored in a good environment which helps in maintaining its quality, if there are any changes in the environment the user is notified through the buzzer. This helps in maintaining and preserving the quality of the grains.

6. REFERENCES

1. Sagaya Selvaraj and S. Anusha RFID Enabled “Smart Data Analysis in a Smart Warehouse Monitoring System using IOT” Conference Series 1717 (2021) 012022 IOP Publishing.
2. R. K. Kodali, J. John and L. Boppana, “IOT Monitoring System for Grain Storage”, in 2020 IEEE International Conference on Electronics, Computing and Communication Technologies (CONECCT), 2020.