Project Proposal Reference No.: 46S_BE_1669

DEVELOPMENT OF WEB-BASED SMART MONITORING SYSTEM USING IOT & MOBILE APPLICATION FOR GRAPE DRYING BUILDINGS

Name of College: Dayananda Sagar College of Engineering

Department: Electronics and Instrumentation Engineering

Name of Students: 1. Sneha M, 2. Aishwarya, 3. ArunKumar 4. Prajwal Y S

Name of Guides: Dr. RAJASHEKAR J.S, Dr. S.P. MEHARUNISSA

Keyword: IoT Technology, Smart Agriculture, Wireless Sensor Networks, Security Control System, Real-Time data monitor

INTRODUCTION/BACKGROUND

Grape production is mainly confined in these areas (about 95% of total production) where higher temperature with low relative humidity prevails after grape harvesting. These conditions help in faster drying of grapes (10-14 days) with good color development. The grape quality parameters including type of grapes, skin thickness (faster drying of thin-skinned berries with improved eating quality), yield per vine (12-15 kg may be optimum) etc. has importance in deciding raisin quality. Besides grape quality, prevailing high temperature (35 to 40°C) and low humidity (> 20%) conditions during grape drying has its own importance. Availability of these conditions helps in faster drying of grapes and achieving attractive color of raisin. By using modern sensor & sensing technology the variability in the drying process can be identified & quantified & controlled for improving quality & productivity of the dried grapes.

OBJECTIVES

In this project, the system was designed & developed for remote monitoring & collection of real-time data for control dehydration unit in the drying process. In view of current intelligent drying process, the proposed system consist a series of peripherals placed inside the drying structure, which are equipped with sensors for environmental monitoring. It is possible to optimize the required parameters for the increased yield of raisins by maintaining the temperature, humidity, moisture etc. and protect the raisin from sudden and unexpected rainfall by making use of automatic shed roof covering control method to overcome any damages in the area of process. For the Security Unit, we use the RFID technique to safeguard the shed unit by giving access to only authorized persons. In this project additional feature included for flame/smoke detection, remote access for entry of authorized person for security, energy management etc.

METHODOLOGY

The implementation analysis of web-based smart grape drying module developed by integrating Node MCU (Node microcontroller unit), IoT environment with mobile application and sensor network. Figure 1 shows the architecture of the proposed model. The system model placed in the grape drying shed, which monitor the statics of the dehydration unit & other required data for control & monitoring application.

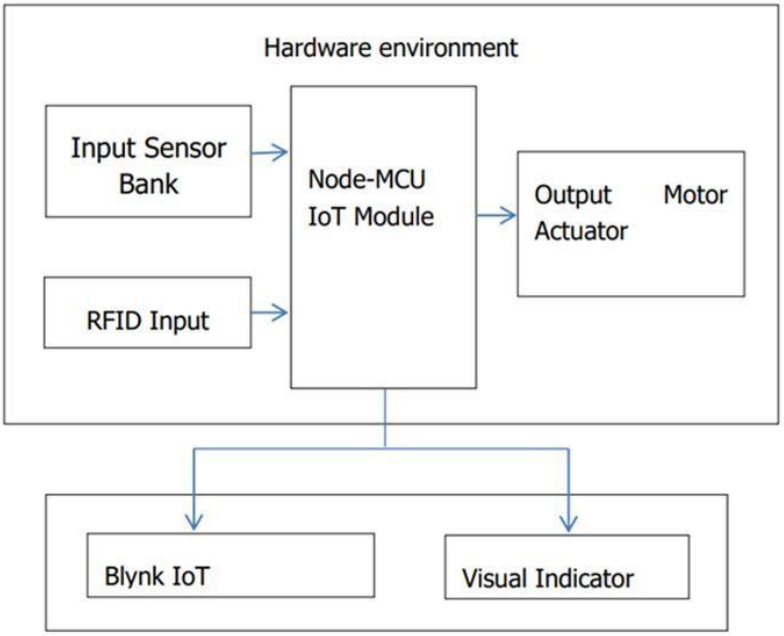

Fig 1: Architecture of the proposed model

In the case of drying, the raisins are first cleaned, washed, selected and sorted, and then subjected to dehydration process. Naturally it takes 20 days to dehydration.by maintaining the temperature (if temp >33 fan will be ON) keeping temperature constant humidity will be increase. Thus, the dehydration process will be done in 12-15 days. In the case of drying, the raisins are first cleaned, washed, selected and sorted, and then subjected to dehydration process. Naturally it takes 15 days to dehydration.by maintaining the temperature (if temp >33 fan will be ON) keeping temperature constant humidity will be increase. Thus, the dehydration process will be done in 7-8 days.

Shed Control System that we have used here has the main function to cover the shed automatically when there is unexpected rain. The rain sensor will detect the rain and send the message to the ESP-8266. The processor will control the opening and closing operation depends on the condition. There are additional features being used in the project to maintain and control the desired conditions such as humidity and temperature. A RFID card is used in the security unit to permit only authenticated person to enter the shed unit.

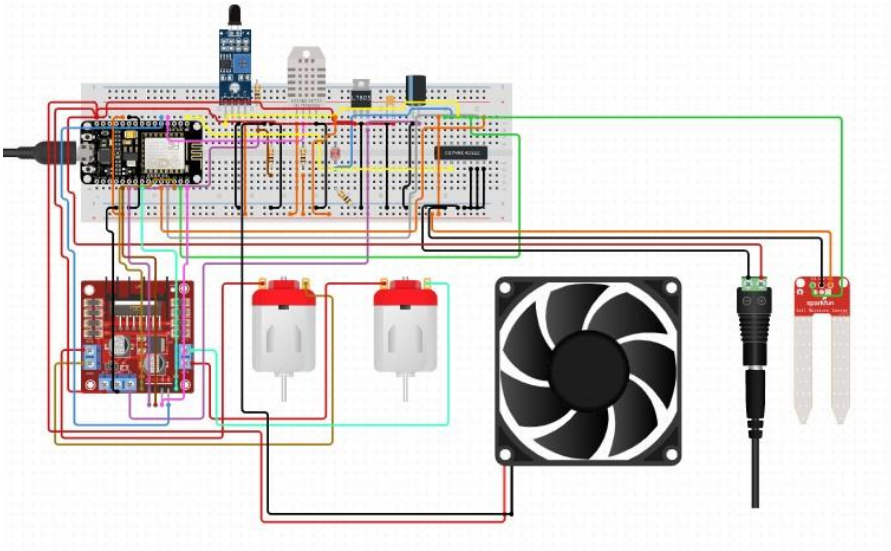

Fig 2: Dehydration and Shed Unit circuit

RESULTS AND CONCLUSION

The model is having the main function to automatically close the sheds in case of unexpected rains. The information data collected by the input sensors is given to the Node-MCU, where it processes the data and drives the output actuators accordingly. The below shown figure 3 is the snapshot of the notification in Blynk application that is displayed containing information about the weather condition. The temperature and humidity section determines the temperature and humidity level in the atmosphere.

a. The statement “Fire not detected” says whether fire has been detected or not.

b. The word “Darkness” represents the output from LDR.

c. “Rain not detected” represents the condition of rain

d. The temperature and humidity section determines the temperature and humidity reading.

e. The two OFF button in the snapshot each represents the controlling of LED and OFF

IoT is rightfully regarded as one of the most promising digital technologies that will definitely become more widespread and useful in the nearest future. Even at the current state, the capabilities of IoT solutions are impressive, and their advantages are tempting. Agriculture monitoring system is needed to reduce the need for human intervention in farming. By using this model, we can maintain the suitable conditions required for the raisins, by safeguarding it from environmental factors like rain, high temperatures, fire or trespassing. This smart shed model is used can significantly reduce the resining period from 20 days to 15 days. The main advantage is that the action of the system can be changed depending on the situation (plants, climate, soil, etc.).

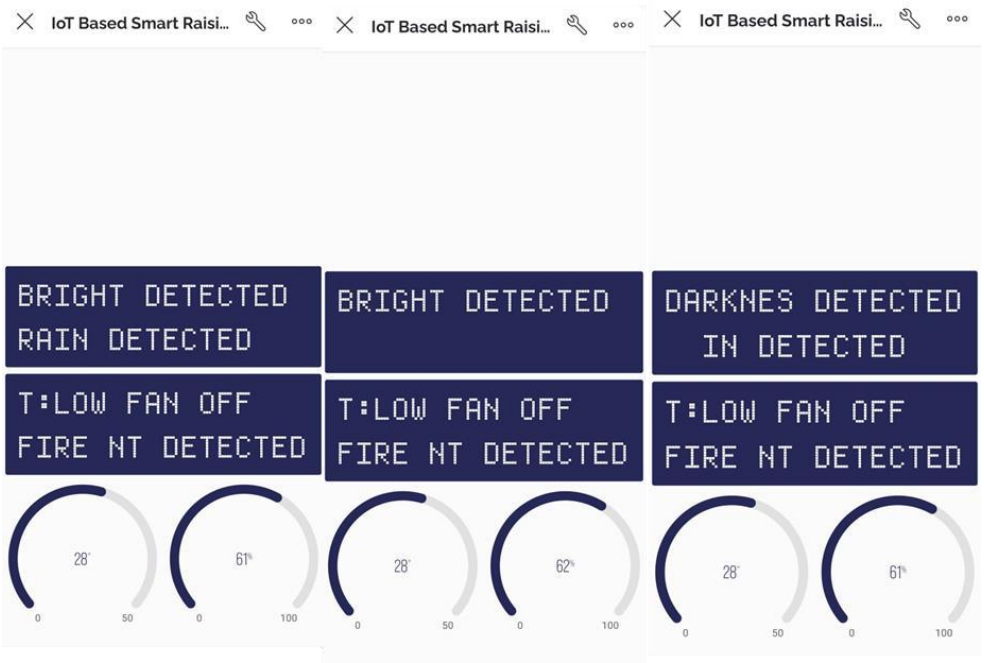

Fig 3: Snapshot of Blynk Application with alert message notification

SCOPE FOR FUTURE WORK

The development of a web-based smart monitoring system using IoT and a mobile application for grapes drying units has immense potential for future work.

1. Integration of AI and ML: The addition of AI and ML technologies to the system can help in the prediction of drying time and quality of the grapes, leading to improved efficiency and productivity.

2. Implementation of predictive maintenance: The system can be designed to predict maintenance requirements based on data collected by IoT sensors, thus reducing downtime and maintenance costs.

3. Integration with weather forecasting systems: The system can be enhanced by incorporating data from weather forecasting systems to provide farmers with real-time weather updates and alerts, enabling them to take proactive measures to protect their crops.

4. Expansion to other crops: The system can be expanded to include other crops, such as cherries, apricots, and plums, to cater to a broader audience.

5. Development of a marketplace: The creation of a marketplace within the mobile application can connect farmers and buyers, creating an efficient supply chain for dried fruits.

6. Integration of blockchain technology: The use of blockchain technology can provide a secure and transparent platform for transactions, allowing farmers to receive fair prices for their crops.