Warehouse Security System

Lohith M.
lohith.m@gmail.com
SJM Institute of Technology, Chitradurga, Karnataka

Dr. Aravinda T V
sjmitplacement@gmail.com
SJM Institute of Technology, Chitradurga, Karnataka

Abstract: From ages Agriculture is one of the main areas in terms of income for Farmers. Proper food storage has a very important role when it comes to food security that is affected by both food loss and food wastage. Food product losses can be avoided, which is automatically increases the food availability. In this report, we are proposing an IoT enabled warehouse monitoring system to deploy in remote areas where the very minimum accessibility for farmers with good security facilities to reduce losses of food and increase the safety of food. This framework will monitor warehouse parameters such as Humidity, temperature, Smoke and motion, which can affect to grains. The ESP32 WiFi microcontroller module collects the data from the different sensors and sends data to Blynk App dashboard, WhatsApp and Telegram App. Many numbers of these IoT nodes can be installed inside the warehouse and which will get information about the warehouse environment to the farmers through Blynk, Telegram and WhatsApp notifications so alert the user. Along with the security inside the warehouse, this proposed system also monitor the entry door of the warehouse to alert the farmer if any strange person want to enter inside the warehouse. In such situation the photo of the person will be captured by the ESP32 CAM and send it to the Telegram App of the farmer to allow or not to allow him inside. If farmer authorizes the person, then, the person can enter inside the premises of the warehouse.

Keywords: IoT, Warehouse, Microcontroller, ESP32

1. INTRODUCTION
Warehouse is the one of the organizations which is the main part of the supply chain management. In agriculture sector the warehouse plays crucial role, generally for making sure of food security. In older days, there was traditional methods for storing and securing the foods and grains in which a lot of the manual work required and occasionally which is not efficient and most time-consuming. After successfully harvest the food and grains, harvested crops have to be stored in a good place where the crop gets very good food security in terms of accessing to maintain quality and safe.

The main objective of this article is to develop an IoT based Warehouse Security System, which will enable farmers to get live parameter from very minimal cost so that the live monitoring can be seen on the dashboard and also farmer will be able to capture the images inside the warehouse premises.

There are some people who does not want others to live the proper life. Such people may destroy or harm the harvested and stored goods. For this reason, whenever any unauthorized person is trying to enter to the warehouse, then prior permission needs to be taken from the authorized farmer or the administrative person of the Warehouse. Once the administrator or former authorizes, then the entry door will be unlocked. This is the great advantage of for the farmer because not all the time former can visit the premises of warehouse to check the status and quality of the goods. He/she can authorize or send some other person to check the condition on behalf of him. This feature will be great feature to disallow the unauthorized persons.

2. SYSTEM DESGN AND IMPLEMENTATION
Below is the overall System Architecture for the proposed framework. In this we can see that the different nodes will be connected inside the warehouse to get the live information. And the appropriate data will be displayed on the Blynk dashboard and notifications will be sent on Blynk, WhatsApp and Telegram App.
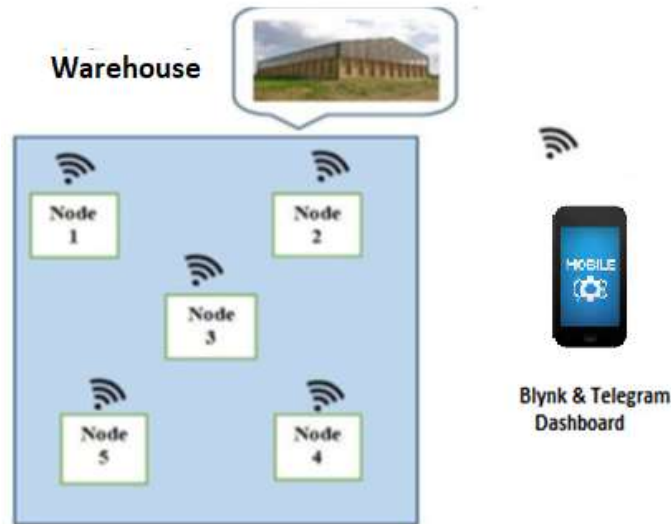
Figure 1: System Architecture

In IoT we do deal with many sensors to collect the different data parameters. Below mentioned are the few components can be used in the proposed prototype.

DHT11 Sensors
ESP32 Wi-Fi Module
HC-SR501Motion Sensor
MQ-135 Smoke Sensor
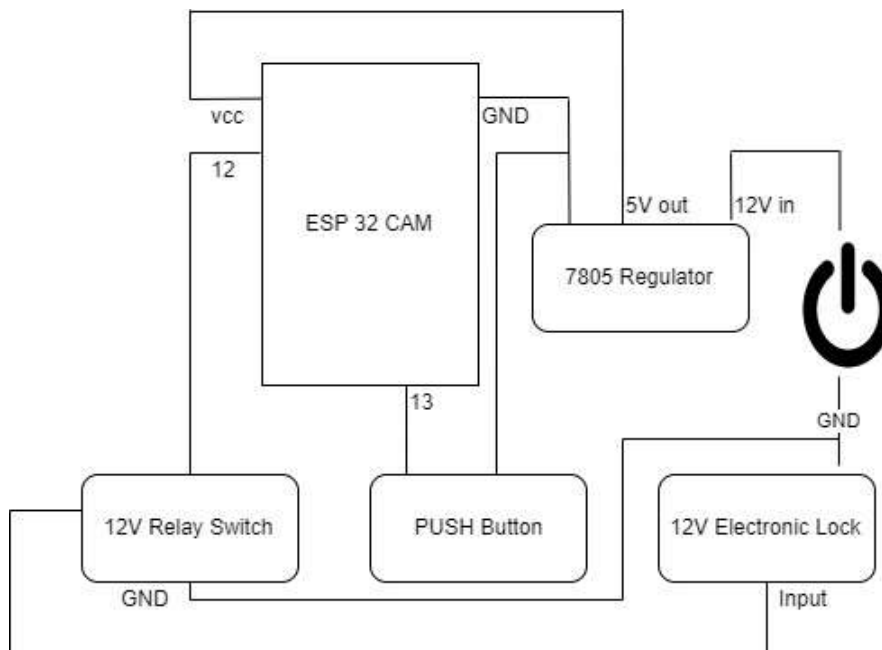Fire sensor
Bread board/PCB
ESP 32 CAM

Figure: HW Configuration for Door Monitoring System

The small push button provided in the circuit to alert the farmer or the administration staff of the warehouse that unknown person entering the Warehouse entrance. In this case ESP32 Cam will capture the Image of the person and sent to the Telegram App of the administration staff and farmer. Once the farmer notified about incident, then he/she will be able to take decision by looking into the captured photo. If the person needs to be allowed then there will be command action in the Telegram to unlock the door, in case if the taken photo is not clear then more photos of the person can be taken by sending photo command from Telegram App.
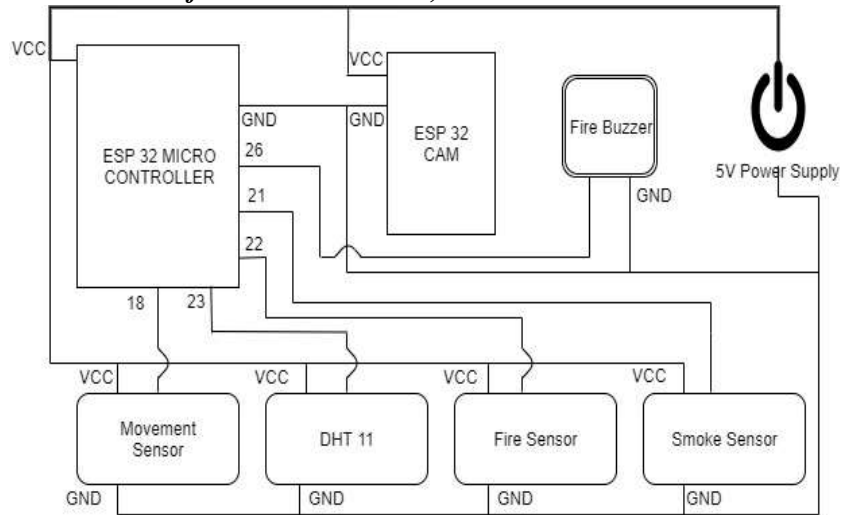
Figure: HW Configuration for Warehouse monitoring

ESP 32 Microcontroller will be connected with different sensors to detect the information inside premises of warehouse. DHT11 is the sensor will read the data about the current humidity and temperature which of the warehouse. There can be some specific timer which is running in the microcontroller which will read the temperature from DHT 11 and send it to the Blynk dashboard. There are Motion Sensor, Smoke Sensor and Fire sensors are connected to the microcontroller to detect the motion, smoke and fire inside the premises of warehouse. ESP32 microcontroller will be programmed to send the data to Blynk App and Telegram App. Whenever any fire or smoke detected then automatically ESP32 CAM will capture the image and send it to the Telegram App of the user.

3. RESULTS
The outcome of the framework will be displayed in the dashboard and WhatsApp messages inside the internet enabled mobile phones.

Figure : Initialize of Warehouse Door Monitoring

Figure: Telegram Initiated commands

Figure: Error handling of commands

Figure : Fire detected scenario

Figure : Motion detected scenario

Figure : Smoke detected scenario

Figure : Telegram Initiated Capture command

4. CONCLUSION

This proposed framework shows the design and implementation of IoT powered Warehouse monitoring system for securing and storage system for food grains. Other than supporting a warehouse maintenance system, it supports a IoT based low-cost solution for the Warehouse security. This proposed framework has the ability for controlling of the complete warehouse to avoid food waste and unfortunate economic loss. The DHT11 sensor will used to read temperature and humidity in the warehouse. When harmful smoke has been detected, the sensor helps in detecting smoke inside the warehouse. If the fire flame found, to protect products from the fire, sensor is being used to detect the fire and a notification will be sent to the management team and farmer also buzzer will be triggered to alert the nearby people to report the incident. The different information collected from different sensors will be displayed in the BLYNK dashboard in which a user can easily monitor the live data from anytime and anywhere. BLYNK Dashboard parameters update automatically with the newest sensor data. Moreover, simultaneously the WhatsApp notification and Telegram App notification will be sent to the user with the captured image.

5. REFERENCES

[1] IoT Instrumented Food and Grain Warehouse Traceability System for Farmers by Susmita Banerjee, Anil Kumar Saini, Himanshu Nigam and Vijay. 2020 International Conference on Artificial Intelligence and Signal Processing (AISP)