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An Implementation of an IOT Enabled Efficient Cold Storage Management System

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ABSTRACT: Cold stockpiling is a significant innovation which is essentially utilized for keeping up with the nature of the create and stay away from the decay of something very similar. These days, cold stockpiling is acquiring significance on account of its positive aftereffect of staying away from waste of collected produce. Farming is the foundation of current India. Regardless of being one of the main makers of products of the soil, the yield misfortune is expanding progressively in India. This is basically because of the after-creation challenges and the failure of the chilly stockpiling units. Potato is the fourth biggest created crop in India and generally devoured from one side of the planet to the other. In this undertaking we give an answer for screen and keep up with the solid natural conditions inside a chilly stockpiling unit explicitly for the potato yield and others, for example, tomato, apples by fostering a model. This is finished by constantly observing the necessary attributes i.e., checking the reasonable limit reach and refreshing the circumstance to the proprietor by using Arduino IoT Cloud.

KEYWORDS: IOT, NodeMCU, DHT11, Limit Switch.

I. INTRODUCTION

A rough estimated figure by the Food and Agricultural Organisation (FAO)- Approximately 40% of the food produced in India is wasted every year due to fragmented food and inefficacious supply chain system. The irony is that loss occurs even before the food reaches the consumer. India wastes more fruits and vegetables than the entire United Kingdom consumes and more grains than Australia produces.

Around 1% of the GDP is depleted in the form of food wastage. According to the Ministry of Agriculture (Govt of India), Rs.50,000 crores of food produced gets wasted every year.

India suffers from a serious level of hunger, but the most worrying for this hunger is, our country wastes a significant portion of its farm produce due to a weak cold chain infrastructure, with 16% of fruits and vegetables being wasted every year. Up to 10 per cent oilseeds, pulses and cereals grown in India are also completely wasted. Rameswar Teli, Minister of State for Food Processing Industries, provided this data in the Lok Sabha, attributing it to the study "Assessment of Quantitative Harvest and Post-Harvest Losses of Major Crops and Commodities in India" carried out by the Central Institute of Post-Harvest Engineering and Technology (CIPHET).

Perishable products like fruits and vegetables are wasted due to unavailability of cold storage and improper transportation facilities. The bottleneck in the supply chain between farmers and consumers is keeping the benefits of surplus production away from farmers and consumers.

India ranks 103 among 119 countries in the Global Hunger Index (GHI) 2018, sharing the rank with Nigeria. Inadequate food supply is one of the three major parameters in calculating GHI. The report suggests that India suffers from a level of hunger that is serious. A quarter of malnourished throughout the world hail from India and a wastage of food of this magnitude does not make the situation any better.

II. RELATED WORK

M K Chourasia and T K Goswami: Comes out to be the model predicted values of air velocity, product temperature and moisture loss from the potato in the stack were found to be in good Agreement with experimental values. There is no doubt that the temperature of the product is one of the most signification factors that govern the extent of storage losses and hence, the economic visibility of then storage system. Moisture loss is an equally important parameter as product. It was found that in some of the stack where the air distribution was comparatively poor, the relative humidity at steady state condition dropped by about 7% compared with the surrounding air.

Y H Yau (2010): Analyses for heat recovery ventilation systems and concluded the heat wheel system was the best system as it has the highest total energy saving, shortest payback period and providing the most stable indoor air

conditions.

III. METHODOLOGY

We have created this project on Arduino IoT technology for which we are using NodeMCU micro – controller and Arduino IoT cloud. Limit switch will detect position of cold storage gate or door. In case gate open for more than 3sec then buzzer audio alert will switch itself on via code for more than 5sec you will receive pop up on mobile. DHT11 is temperature and humidity sensor which will monitor value of temperature of cold storage and humidity. This value will be displayed on mobile screen. Auto temp level setup using application. We need to use slider in app which rotates a servo motor stucked with actual fridge temp control which set three buttons in app for selection of temp of cold storage for Potato, tomato, Apples.

Block Diagram:

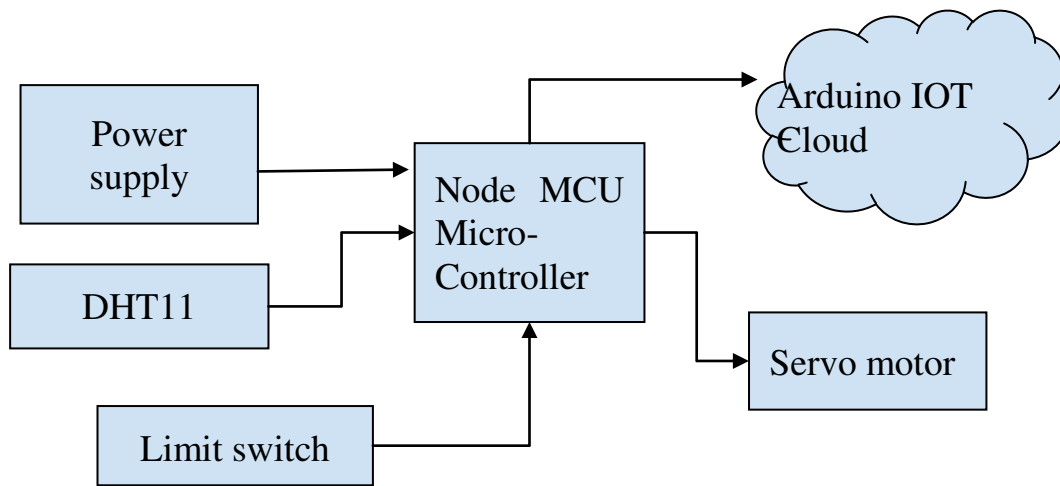
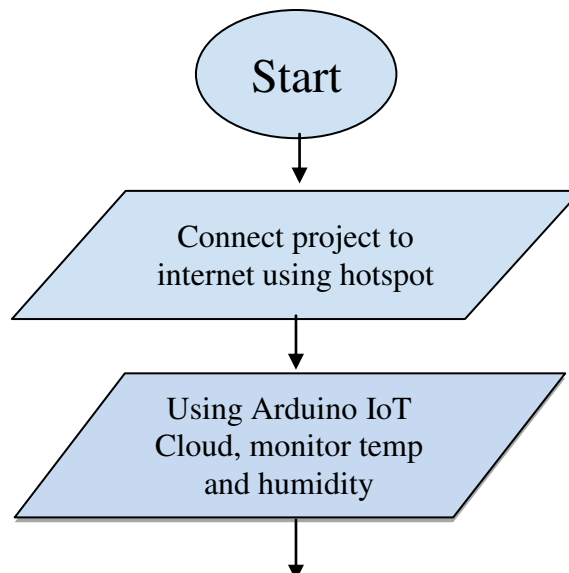


Figure 1 – Block Diagram

Description of block diagram:

In this block diagram, we could see the Node MCU as a Microcontroller. The DHT11 sensor and limit switch are connected to microcontroller as input device and servo motor is connected to microcontroller as output device. Node MCU is connected to the Arduino IoT which in turn manage and the control the system.

Flow Chart:



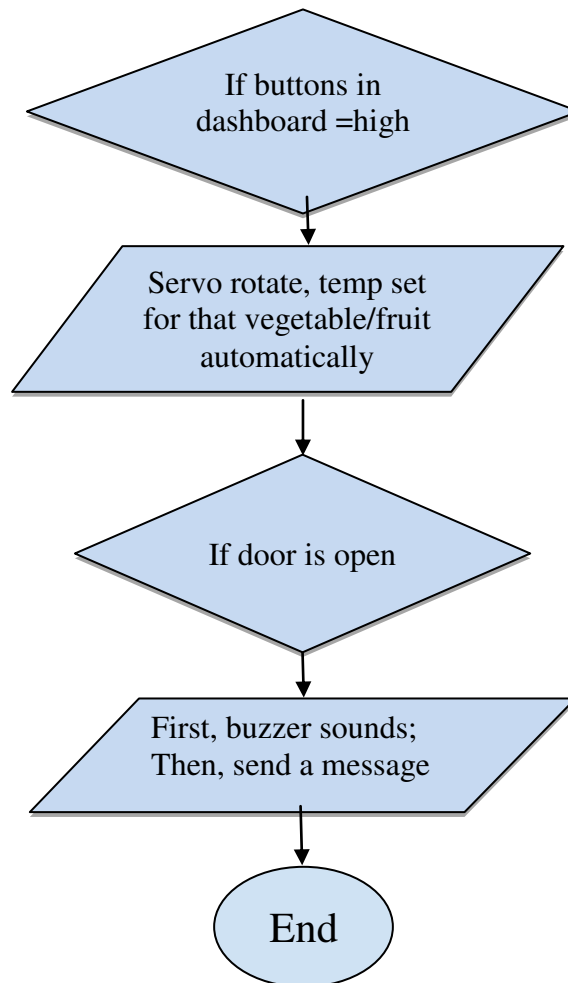


Figure 2 – Flow Chart

IV. EXPERIMENTAL RESULTS

We have discussed the functioning of system in the previous chapter. There are some screenshots of the result given below.

In figure 6.1, we can see the values of temperature and humidity on the dashboard.

In figure 6.2, we received a message when door is open that “Door is open please close it.”

In figure 6.3, we can see two items tomato and apple. We have two click on that button to set the temperature for desired food item. Once we click on it, a particular temperature will get set.



Figure 6.1 – Temperature and Humidity

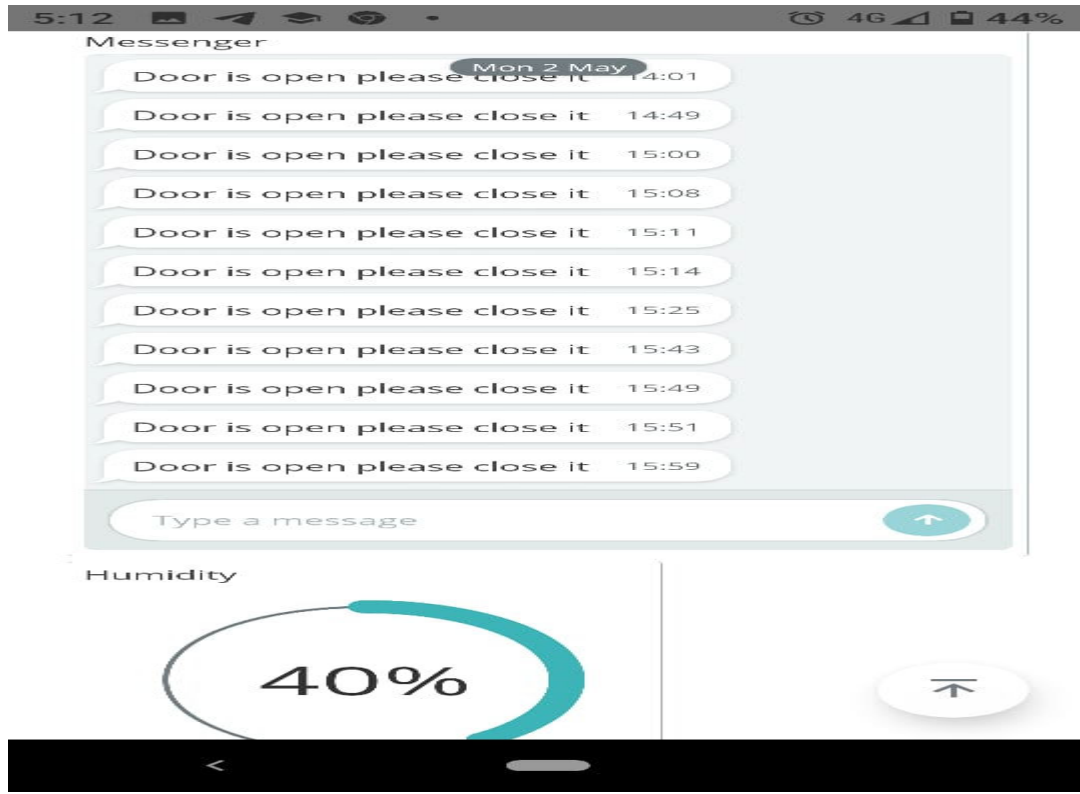


Figure 6.2 – Notification on Dashboard

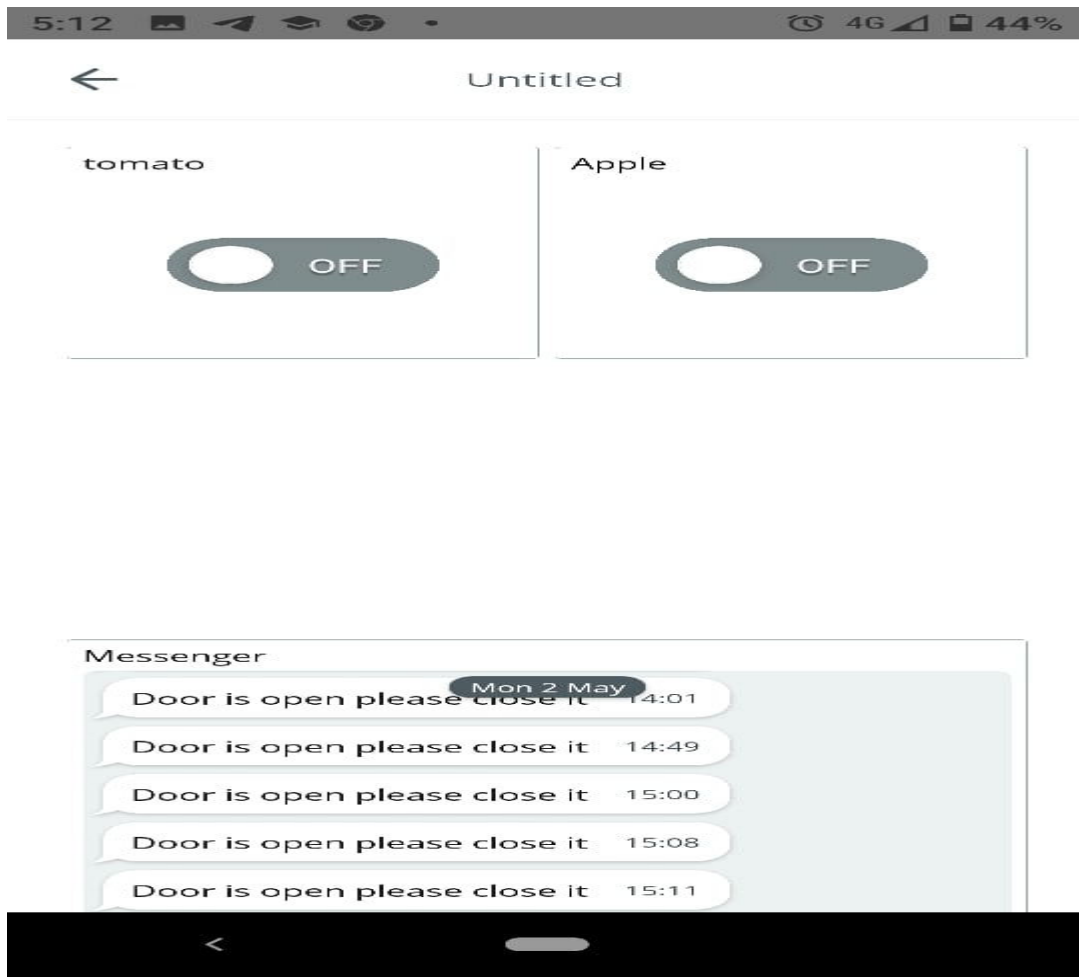


Figure 6.3 – Buttons used to set the temperature for required food item

V. CONCLUSION

In such way, we will develop a system which will set required temperature for that food item (vegetable/fruit) from distant location.

At the same, it is important to maintain the set temperature. So, in case, door remain open, it will make changes in the set temperature. Hence, we use limit switch and buzzer which will sound if door remain open and then we will get notification on mobile phone.

All this will help us to reduce food wastage which led to reduction in malnutrition and to make world this healthy. It is also useful for farmers to store their produce in cold storage, so that it will remain fresh.

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