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Cold Storage for Agricultural Products

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Abstract: To provide a multiplicity of vegetables over a long period, small-scale vegetable producers need to use energy efficient cold storage methods to reduce costs and extend the revenue period while maintaining produce quality and freshness. In this project; we are going to design the storage system for agriculture products. Whole storage is kept undergrounded in air tight chamber. This air tight chamber is to be monitor by different parameter like temp. Moisture, humidity, gas etc. purpose behind this is to keep the agro-product in sophisticated condition. This all system parameter are displayed on LCD display and controlled using keypad assembly. Or normal and simple SMS can also use to know the system parameter and have control over it.This all system is controlled and driven using mobile phone system or/ and keypad display method. Which method is to be used is up to the users convince.

Keywords: ARM Controller**,** compressor, condenser, GSM module, Sensors.

I. INTRODUCTION

Local pabulum systems can contribute to economically, gregariously, and ecologically salutary pabulum engenderment for local communities. In order to distribute quality product to the consumer, local victuals systems must use quick cooling and cold storage technology. In the past thirty years, the number of local farms incremented 11.2% thus the desideratum for energy efficient cold storage units. Cold storage is essential for vegetable farmers to preserve product quality and elongate the revenue period. Cold storage is a critical component in the aliment supply chain.

Without rapid cooling and opportune storage conditions, engender deteriorates rapidly. Alimental losses and even spoilage of whole crops can occur. Initial quick cooling to extract hidden field heat elongates shelf life and maintains quality product. Cold storage units are above ground, in an insulated basement and are in buried container. A base for underground cold storage is the persistent temperature of the soil approx. 5 feet below ground. Soil acts as insulation against wind and ambient conditions. Albeit soil temperature values vary by region, this constant temperature avails regulate storage conditions year round, averting winter freezing and summer spoilage. Modern cold storage units control the temperature and sultriness utilizing a variety of technologies.

Now days currently utilizes an above ground commercial refrigeration system. To surmount disadvantages of above ground cold storage the unit must store a range of engender from the fall and summer seasons. Energy efficient cold storage is an essential element to a sustainably designed local victuals system. Algid storage sanctions local farmers to provide seasonal pabulum to the community year round at a low cost. Local farmers need to find ways to increment profitability while adhering to sustainability principles. The optimal cold storage solution will sanction farmers to store and sell their products year round, with minimal energy use.

Fig.1. Root Cellar

II. LITERATURE REVIEW

In this paper author presents the efficient cold storage using natural resources and the how to store the product in ventilation and it also gives the approx. values of humidity, moisture and temperature for different product i.e onion, potato etc.

In this paper John Biernaum gives facts about how to store products in root cellers and the containers size and selection criteria of containers.

In this paper A.V.Singh presents the advantages of the cold storage the design of cold storage and the conditions for to store the producst in the cold storage system.

III.BLOCK DIAGRAM AND DESCRIPTION

A. RELATIVE HUMIDITY

To sense the humidity, SY-HS-220 humidity module is used. This model converts relative humidity into output voltage. Humidity sensor is connected to “channel 1” of port A of PIC microcontroller. The sensor output is a variable voltage with respect to humidity level and expressed in terms of %.

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In normal condition the humidity will be around 50% to 70%. Here, we have to set the minimum humidity and maximum humidity values.

$$Relative\ Humidity = \frac{100 * Amount\ of\ water\ vapour\ present\ in\ Air}{Max\ amount\ of\ water\ vapour\ that\ temp\ can\ contain}$$

B. TEMPERATURE SENSOR

The LM35 is a temperature sensor. External calibration is not required for this sensor. Its ranges from −55 to +150°C temperature.

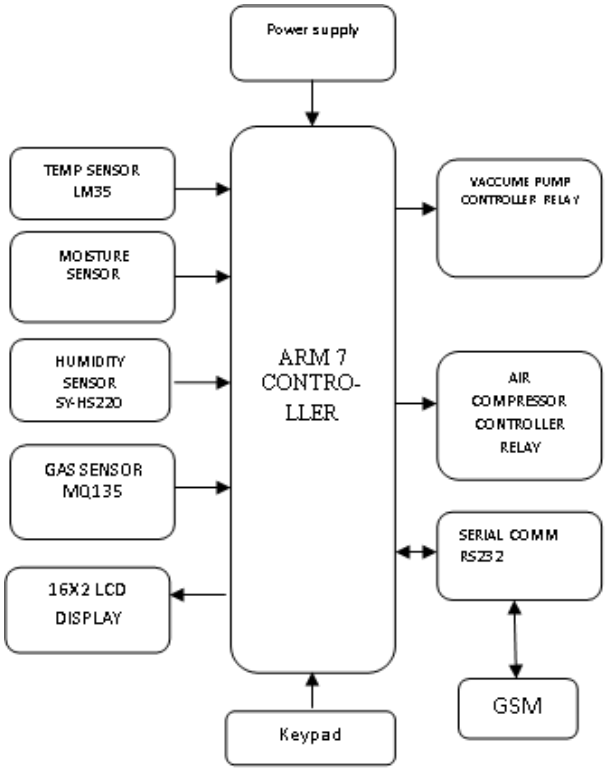


Fig.2. Block Diagram of System

C. GAS SENSOR

MQ135 is gas sensor which is used for detecting NH3,Co2, Benzene, Ethanol etc. It has fast response and high sensitivity and also simple driver circuit.

D. MOISTURE SENSOR

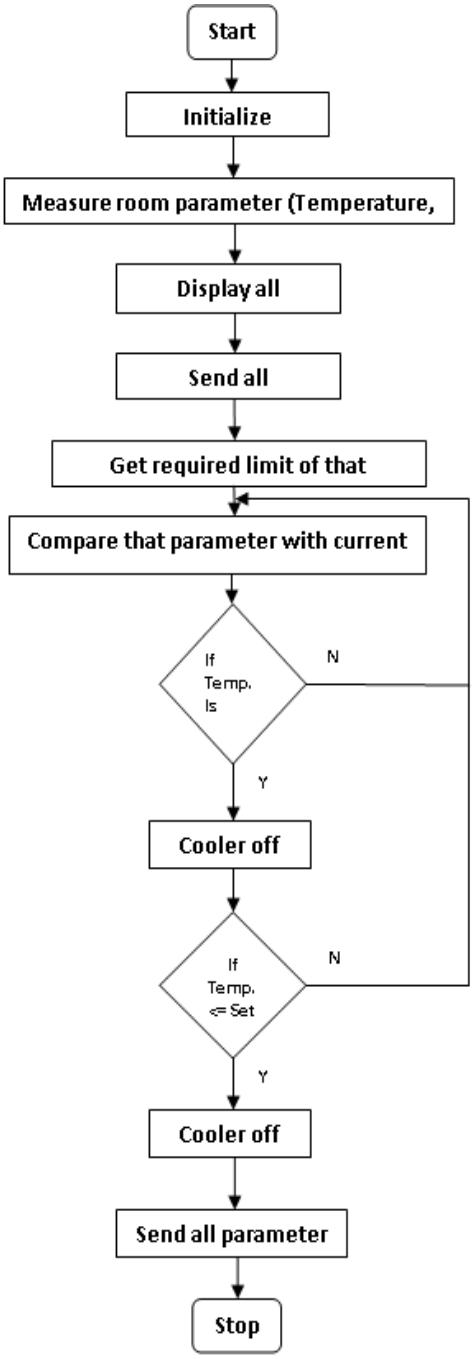
Moisture sensor is used for to measure amount of water molecule present in the soil. For sensing the moisture of soil, here use simple two metal rods. The moisture content of a product is expressed as a percentage of the wet weight

$$\text{Moisture content (\%)} = \frac{100 * Weight\ of\ the\ moist\ product}{Weight\ of\ water\ in\ the\ soil}$$

E. Heat Load

Heat load is calculated utilizing the amount of heat abstraction required in BTU/hr from the room to maintain conditions.

FLOWCHART:



IV. WORKING

To avoid threatened of agriculture product, this system is recommended. In this system complete storage was kept undergrounded in air tight chamber. This air tight chamber is to be monitor by different parameter like temp. Moisture, humidity, gas etc. purpose behind this is to keep the agree-product in sophisticated condition.

Air tight chamber is kept under-ground and made air tight by using of vacuum air compressor so that no bacteria can survive. This system is kept at desire temp using air cooler compressor and temperature feedback is measure and occupied by temperature Sensor to keep the storage unit in at same temperature.

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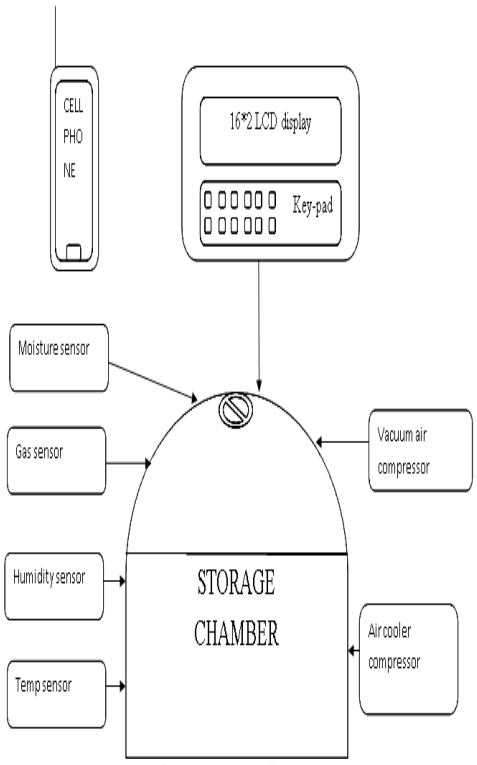

Fig.3. Basic Structure

To maintain specified moisture the moisture sensor feedback is to be taken and given to the compressor to maintain humidity and moisture at desire level. Gas sensor is used in it because when agree–product is on the way of threaten is spared typical smell, (it is different for different product) this smell need to be monitor to avoid future losses that is because of gas sensor is used.

This all system parameter are displayed on LCD display and controlled using keypad assembly. Or normal and simple SMS can also used to know the system parameter and have control over it.

This all system is controlled and driven using mobile phone system or/ and keypad display method. Which method is to be used is up to the users convince.

Cold storage system Model:

Result:

Initially controller measures the different parameter like temperature, humidity and etc. And it display in LCD.

Fig.4. Showing Normal Condition

Then we decided the required temperature to the system by using keypad. And temperature is set to his desired value. It displays all the parameter on LCD.

Fig.5. Showing Abnormal Condition

V. CONCLUSION

The client's initial goal as to design an energy efficient cold storage unit that could store a wide range of engender at a reduced energy cost when compared to the subsisting refrigeration system.

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