

CENTRE FOR SKILL AND ENTREPRENEUR DEVELOPMENT

E-INTERNSHIP
ON

SMART COLD STORAGE

REPORT



GLA UNIVERSITY | DCS



ACKNOWLEDGMENT

“It is not possible to prepare a project report without the assistance & encouragement of other people. This one is certainly no exception.”

On the very outset of this report, we would like to extend my sincere & heartfelt obligation forward all the personages who have helped us in this endeavor. Without their active guidance, help, cooperation, and encouragement, we would not have made headway in the project. We are ineffably indebted to DC's Internship Program for giving this worthy opportunity this internship and encourage ours to accomplish this project.

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We also acknowledge with a deep sense of reverence, our gratitude towards our team members, without their support and teamwork we may not accomplish this assignment on time.

Thanking You

GROUP - 1 (II year)



SMART COLD STORAGE

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II - YEAR



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INTRODUCTION

New technologies have made it possible to get fresh, perishable foods from one side of the world to the other without putting the integrity of the foods at risk.

Similarly, state-of-the-art temperature-controlled containers and trailers make it possible to get valuable, perishable biopharmaceuticals to areas of need.

But as much as we talk about refrigerated transportation, we often forget to talk about one of the aspects of cold chain logistics that makes it possible: cold storage and refrigerated warehousing

IMPROVING COLD STORAGE PROCESSES WITH IOT



A Cold storage warehouse consists of temperature-sensitive perishable and non-perishable products that require easy to use monitoring system. It is essential to instrument cold storage trucks and warehouses with smart sensor-based industrial [IoT solutions](#) to slow down the spoilage of food items.

IoT, when combined with AI, can transform the way devices interact. The technology eliminates human intervention with autonomous capabilities. The application of IoT is now becoming common with the wireless temperature sensors and smart location gateways. An IoT monitoring system enables restaurant chains to improve food safety and ensure quality control with complete regulatory compliance.



GOALS FOR Q2



Static Infrastructure

- Increase customer satisfaction by 2%
- Maintain growth



Suitable Environment

- Improve social media presence
- Ensure the cost of development stays below budget



Consistent Power Supply

- Regular power
- Other benefits

The most fundamental requirements for any cold storage before being smart must be to control transpiration, respiration, disease control and insect infection

From considering the optimum temperature to maintain the proper humidity in the surrounding composition in storage room to exposure of veggie and fruits in light all the scenarios are thorough our best outcome.

Not only we are working on making cold storage more efficient we are also working on how to make use for farmer. Wait here the things are not done we also come up with an intention of changing mechanism of providing power supply with today's technology.

Not only we are maintaining the suitable environment for each type of crops and fruits we are also enhancing the security. Different types of sensors are enclosing in the system not only to improve the cold storage but also enhance the security.

ARCHITECTURE & WORKING

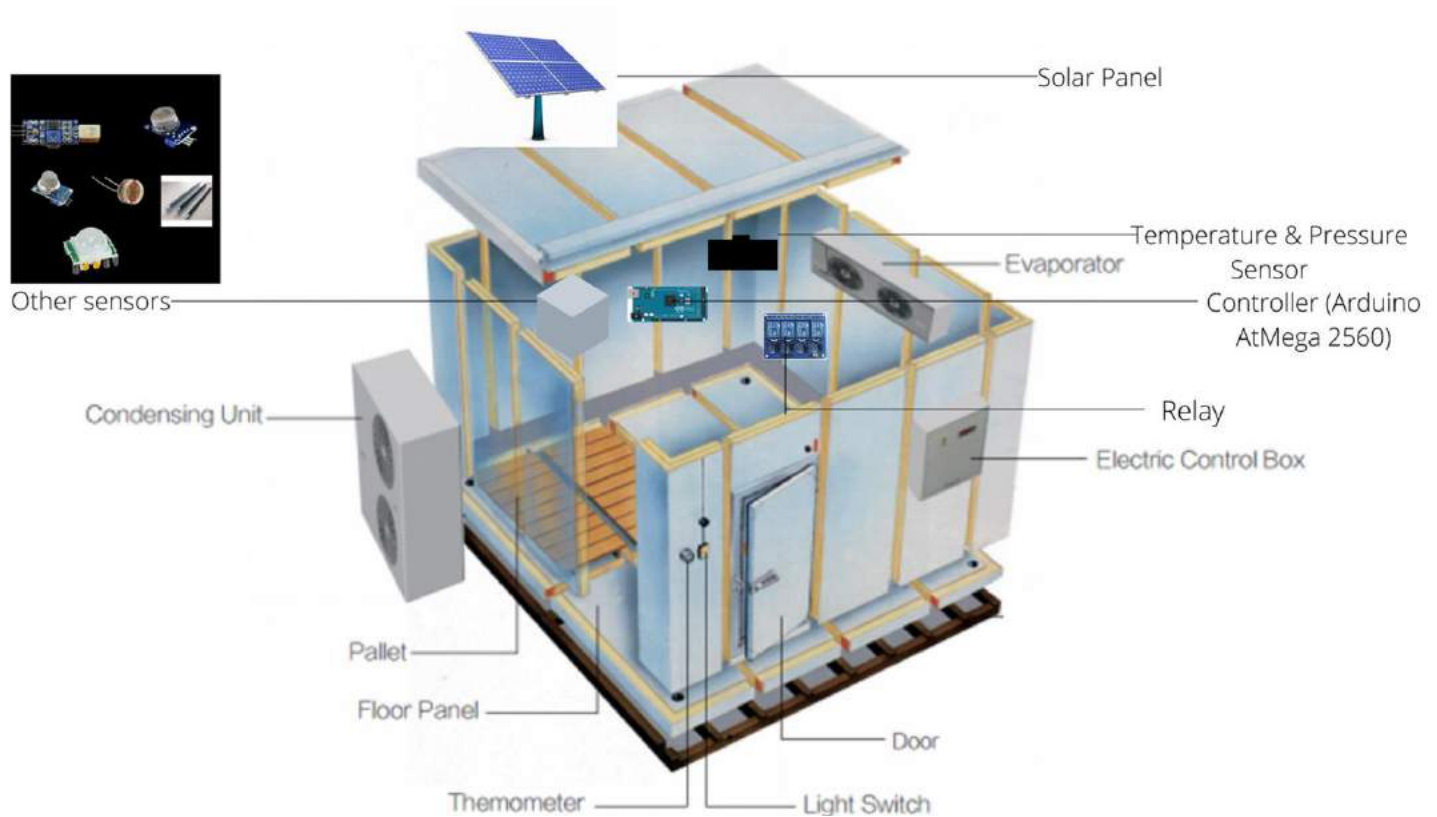


Figure 1: Architecture of smart cold storage

Here as we can see there are different types of sensors and devices are implemented to make the traditional cold storage more efficient and smart system. We also work on security. Here we use different sensor to close and open the main gate to improve the entry system in storage plants. Fully automatic light and temperature varies for each crop and fruits store in it.

Each sensor has its own working we work on security. Here we use pir sensor for motion detection if there is any entry detected without any authentication then all the gates are closed and light on. Not only that we use gas sensor to detect the harmful gases release by crop which increase the decay process. This will help to remove such gases and prolong the life of crops. The major problem is to maintain the proper temperature through the process which need regular supply of energy so we take the help of solar energy. This will maintain the continuous power supply within the storage system and doesn't make us depend on full energy. This will be the game changer. Let's see the footprint of the given system.

FOOTPRINT

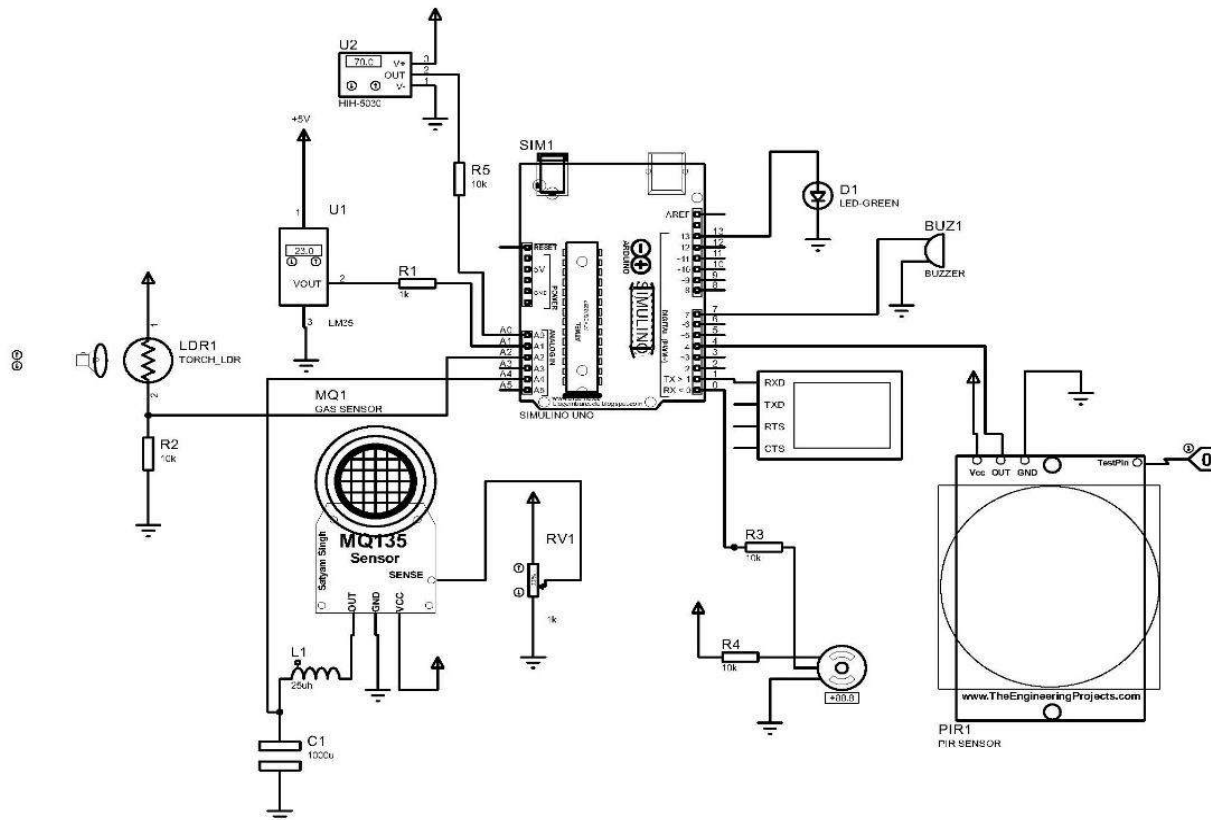



Figure 2 : footprint for a particular node with the security module

The above circuit is the footprint for a particular node. With that we also show the pir sensor connection in one so that we can easily understand the circuit. Here we use Arduino uno and nodemcu esp8266-01 as a microcontroller. Other sensor here are temperature sensor, humidity sensor, ldr sensor, gas sensor, servo motor and buzzer to in alert  everyone.

SIMULATION

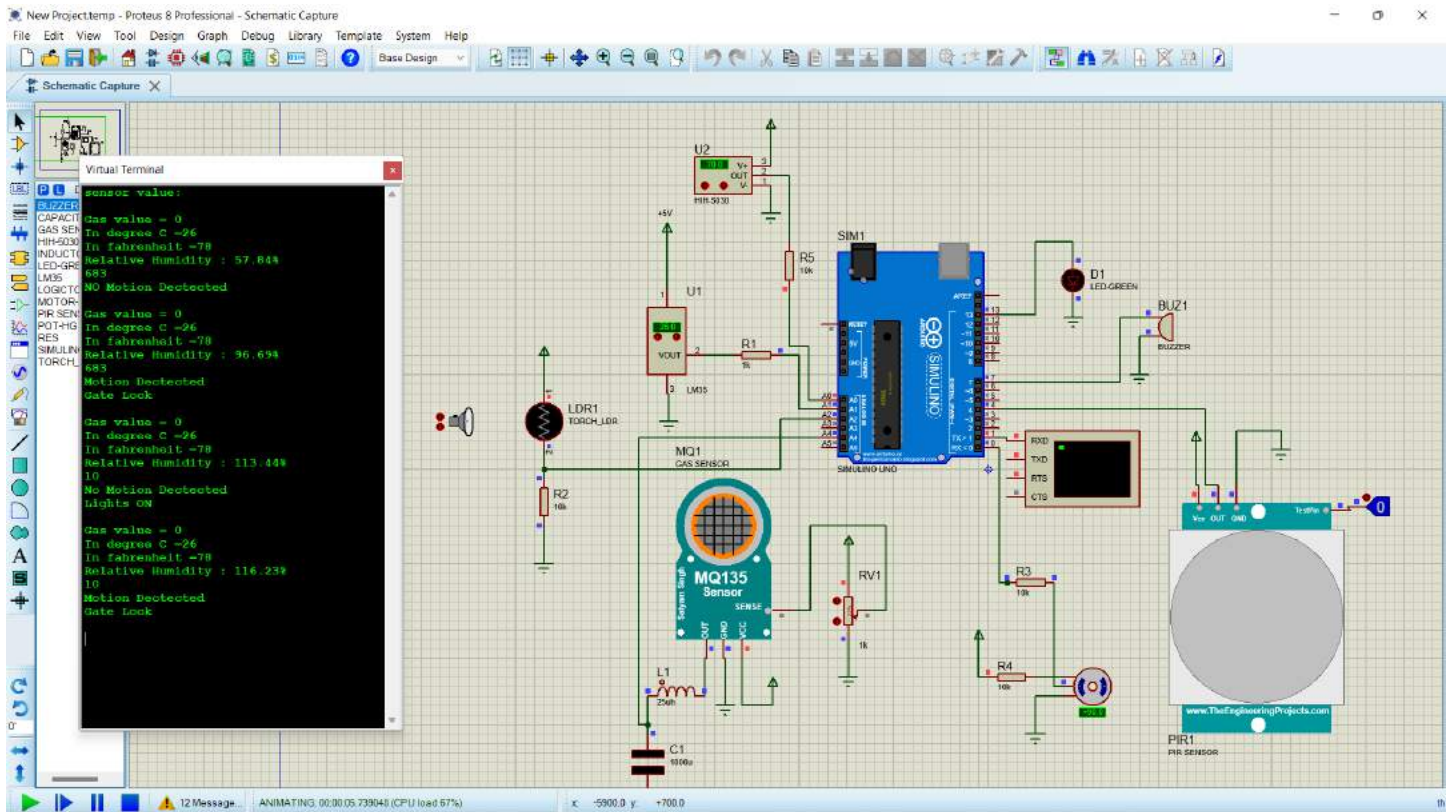


Figure 3: VIRTUAL SIMULATION

This is the Proteus software where we use the various sensor and microcontroller to perform the simulation task. We already discussed the sensors and microcontroller use in it. Here we will discuss the working of each sensor and how it makes the traditional cold storage into a smart cold storage system.

Let's see, here the first and the most important sensors is temperature sensor i.e., LM35 which provide the current temperature so that we can maintain the correct temperature using relays. next come humidity sensor as from the name it measures the humidity present in the warehouse. We also use LDR sensor to measure the intensity of light and adjust the light in the plants. If the intensity is more than the requirement it will turn off the light or adjust the light in the warehouse. Next come our security sensor that PIR sensor which will detect the unauthorized entry in the cold storage. If any invalid entry detected it will generate a signal with turn on the buzzer so that the guard will also alert and send notifications on applications. Not only that it will turn on the motor which is connect to main gate so that all the gate closed so there is no escape. This is all for a demo model we are still working on its update.



MICROCONTROLLERS & SENSORS

“The Internet of Things is one of the most important and promising technological topics today. Some market researchers estimate that there are more than 20 billion connected devices and counting. Around us, there are smartphones, wearables, and other devices, all of which use sensors.

In this report, we are using a variety of sensors and other devices. Before using any sensor, we give to spend a lot of time in research and other things to the choice the best sensor on the basis of the following feature:

- It should be sensitive to the phenomenon that it measures
- It should not be sensitive to other physical phenomena
- It should not modify the measured phenomenon during the measurement process


Here is the sensor and other devices which we used in our project:

- ✚ Arduino Uno
- ✚ ESP01 Wi-Fi module
- ✚ LDR Sensor
- ✚ PIR Sensor
- ✚ LM35 sensor
- ✚ Relay
- ✚ Humidity Module
- ✚ MQ135 Gas Sensor
- ✚ Insect killer
- ✚ Servo motor

Let's discuss every microcontroller and sensor briefly

- ❖ **Arduino Uno:** The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc
- ❖ **ESP01 Wi-Fi module:** The ESP8266 **ESP-01** is a Wi-Fi module that allows microcontrollers access to a Wi-Fi network.

- ❖ **LDR Sensor:** LDR-Light Dependent Resistors. A Light Dependent Resistor (LDR) is also called a photoresistor or a cadmium sulfide (CdS) cell.
- ❖ **HC SR501 PIR Sensor:** The PIR sensor is a passive sensor (which means it hardly uses any energy to work). It detects infrared radiation from a passing heat source.
- ❖ **LM35 sensor:** The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature
- ❖ **AC RELAY 220V:** Relays control one electrical circuit by opening and closing contacts in another circuit.
- ❖ **Humidity Sensor Module - HR202:** This module is based on **HR202 resistive** humidity sensor, which exposes excellent linearity, has wide measurement range and low power consumption
- ❖ **MQ135 Gas sensor:** The MQ135 Gas Sensor is an all-in-one sensor for detecting ammonia, alcohol, benzene, smoke, CO2 and a myriad of other gases. It is the best available multipurpose gas sensor on the market.
- ❖ **Servo Motor :** it's a rotary actuator or linear actuator that allow for precise control of angular or linear position, velocity and acceleration.



GREEN ENERGY AND COLD STORAGE



The setup starts with a walk-in storage room, sized according to requirement, with various temperature- and relative humidity-regulatory devices (such as compressors and thermostats) in place. Desired temperature range for a cold storage is 5°C to 25°C. Relative humidity should be between 65 and 95 per cent.

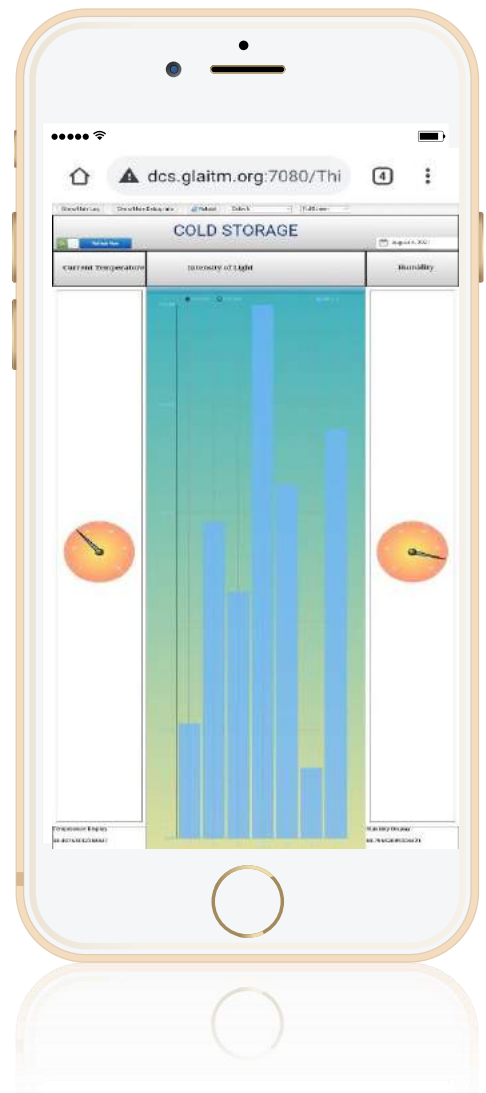
The system can be made grid-connected or completely off-grid, as suitable. Excess energy can be stored either in batteries or thermal storage units.

Benefits of using Solar Power

- ✓ 25kw ON-Grid solar plant --> 100+ units daily
- ✓ 5-ton commercial air conditioner uses 75-80 units.
- ✓ For farmers subsidy is provided by both state and central govt.
- ✓ Such a plant costs around 10 lakh rupees and it seems to be high but much cheaper when u see it in long term.
- ✓ Such a plant turns your electricity consumption up to negligible and this all not stops here it also generates money.
- ✓ On an avg. such a plant will give 1 lakh earning in just 2 years through govt. provided scheme of net meter and within 4-5 years your solar plant will be effectively zero.
- ✓ -> Diesel is now at 90rs per liter and a generator also cost lakhs of rupees and a 30-40kVA generator requires 7-9 liters of fuel in an hour on full load.
- ✓ -> And most important motive to spend such amount will we worth when your cold storage has electricity all the time and no person is required to turn on or off the generator.
- ✓ -> Most importantly, It has 25 years of warranty with zero maintenance.
- ✓ -> And whenever consumption increases, we can extend the plant according to needs.

CONCLUSION

Through are interface we can monitor and keep the data in your hands. There is no hi-fi monitoring system or any technical is required just having a smartphone with internet connection and we are done. through are integrated system you can open the application anywhere and checkout the value just in one click!!!



DASHBOARD

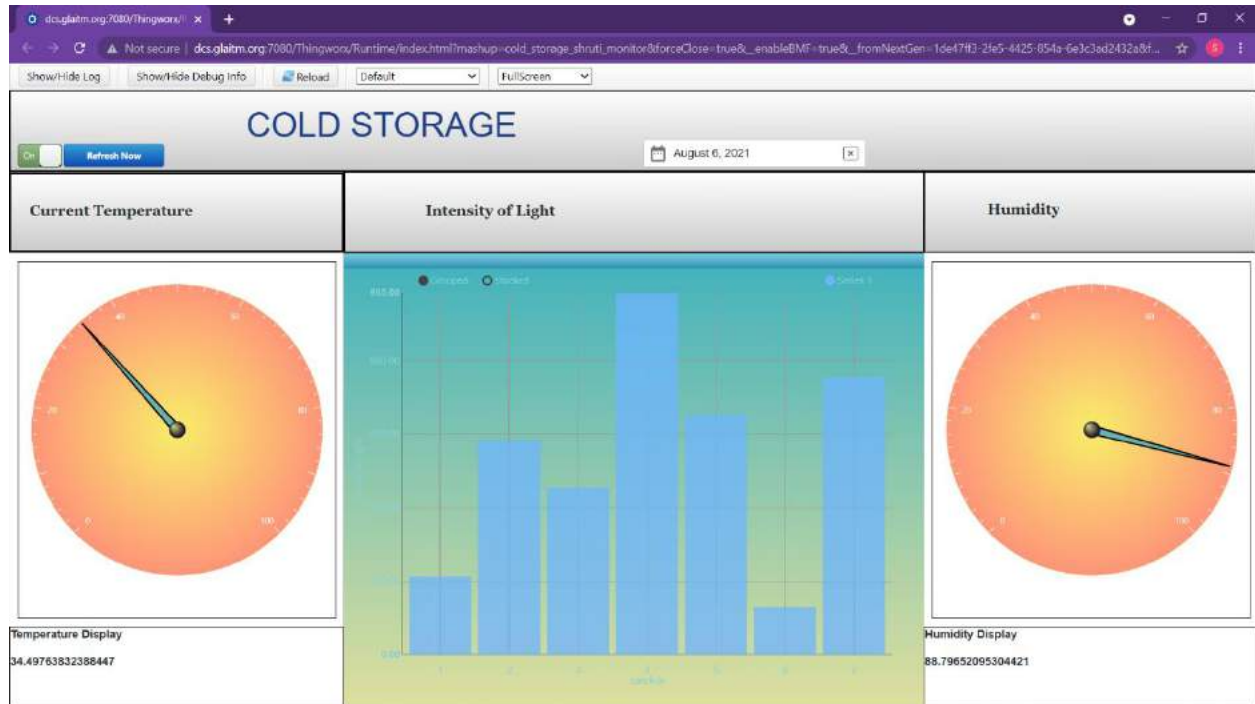


Figure 4: ONLINE interface shows real time value and accurate data

. This is all for a demo model we are still working on its updates and try our best to give the best result .

Checkout the given link to download our app https://mega.nz/file/PZJhUAjL#PCmH_v2B4-INymgZd7zlc6u4g29s7T-YrKYwmNU6AoM

Now our farmers won't lag behind. As generation become smarter Our farmer too!!!



THANK YOU

