Cold Storage

TECHNICAL TEAM

24/05/2019

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Introduction

Cold storage is a necessity in today's day and age for the Indian farmer. For example, the announcement of the minimum support price (MSP) of 14 kharif crops meant that the procurement of crops by the government was meant to rise. This may cause a massive loss in produce since farmers would likely increase the production of crops but without the necessary storage techniques and facilities, it would be all for naught. Post-harvest losses incurred by Indian farmers run upwards of Rs 90,000 crores.

We, at **Life9sys**, have come up with a solution to help aide these farmers in, not only storing crops, but also various crop medication etc.

Industry challenges and Problem statement

The current problem faced by the farmers are many. One of which is being unable to meet demand due to no proper storage solutions being available to them. The farmer can bump up their production of crops but it means very little if the crop cannot make it to market without going bad first.

At the same time, a farmer cannot hope to afford an individual cold storage unit which can aide in prolonging the life of the post-harvest crop long enough for it to reach the market in good quality. The farmer also has to sell the crops at whatever price is quoted to them before the crops goes bad and becomes worthless, causing them stress with the fewer options available to them.

We, at **Life9sys,** have come up with a solution for these farmers by introduction of a cold storage unit system that can be rented by farmers and can hold multiple farmer's inventory.

Our Cold storage overall benefits

- ✓ **Separate Rentable units**
  - The cold storage building consists of rentable units that multiple farmers can use at the same time to store their crops.
  - Near the entrance, a structure similar to bank lockers exist for smaller inventory storage like medicine.
  - The rent of these lockers is very low and farmer friendly in terms of longer duration of time of storage of crops.
- ✓ **Self sufficient**
  - The entire cold storage building is self-sufficient and detached from the electricity power grid.
  - Primary source of energy is from the natural gases/gober gas produced in the gober gas plant setup next to the cold storage unit.
  - Solar panels installed on the roof act as secondary sources of energy.
  - A diesel run generator acts as the last resort source of energy.
- ✓ **Security**

- Cameras, presence sensors, thermal imagers are all viable options to be placed in the cold storage unit.

✓ **Strict guidelines to be followed**
- In order to keep the other farmer's produce safe and keep the cold storage unit in general free from particulates and disease, some strict guidelines must be followed.
- An air screen placed at the entrance helps remove duct and particulate matter sitting on the body.

✓ **IoT driven sensors and gateways**
- The entire cold storage site and all the equipment have any number of required of sensors on them as may be deemed necessary for monitoring various parameters and for security purposes
- All these sensors are connected to the gateway located in the cold storage room and this gateway sends the data to the cloud for monitoring and pattern analysis.
- The data is also sent to the necessary people based on the situation and who is present there. In case of alerts, message is sent to the people who are deemed necessary to be alerted etc.
- Data parameters which do not currently exist can be derived and used for pattern analysis and applied in the future.

✓ **By-products produced**
- The by-products produced from this system can be sold in the market or re-used in the system. For example, dung cakes and bricks, vermicompost etc can be sold in the market as by-products from the biogas plant.
- The water reclaimed from the biogas plant can be mixed with fresh water to be introduced in the next batch of biogas production.

Methodology

Resolution of Energy dependency

The foremost concern about the cold storage unit is the energy dependency by the unit. In this solution, the storage unit is entirely self-sufficient. The primary source of power is from a biogas plant built near the storage unit. The fuel from it comes from buying cow dung from farmers.

The secondary source of power is solar panels placed on the rooftops of the storage units. These charge up batteries that can be used anytime the biogas plant may not be able to supply power to the unit.

The last resort source of energy is a diesel run generator. This is to be used when the above 2 sources are completely out of commission.

Resolution of Security

The Storage unit needs only 1 person at most as the person handling any operations in the unit. Cameras will be placed, not only near the entrance outside, but also inside. The camera inside is accompanied by presence sensors and thermal imaging cameras. These needed, not only for security purposes, but for safety as well. It monitors how long people have been inside and alerts people if

they have been inside for longer than they should be or alert the caretaker of someone being inside and is unresponsive etc.

Resolution of Efficiency management

All the working equipment have sensors on them to monitor their operations and various parameters that measure the efficiency of the machines and inform the admin of any maintenance or the respective people on site of any dangers they may face.

Overall Summary

- Wireless communication between all parties and devices present during the entire process.
- IoT enabled gateways to be installed at appropriate locations on farm
- AWS/Azure is the chosen cloud platform to implement centralized data processing and analytics
- MQTT is the chosen protocol for communication of data gathered from the dairy tech system to the cloud and vice versa

Conclusion

A cold storage system that rents out units to farmers for them to store their harvest for longer periods of time is a necessity. The losses incurred by them post-harvest can be greatly reduced and also gives the farmers time to make informed choices on whom to do business with, without having the pressure and stress on them of the harvest going bad while they are deciding.

Thank You

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