Velammal Institute of Technology
Department of Artificial Intelligence & Data science
Application for SEED fund to make Prototype

1. **Name of the Students Involved**: Mallu Navya, Pagala Swetha, Rohan Reddy.
2. **Name of the faculty Involved:** Dr.S.Padmapriya, Ms.M.Hemalatha
3. **Title of proposed work:** IOT based smart onion warehouse
4. **Objective:**
    - We propose on tackling these abiotic factors causing rotting, sprouting, weight loss or decaying of onions by introducing a smart Internet of things (IOT) based warehouse to store onions. Although cold storage systems are used in certain countries for onion, which is rarely adopted in India due to poor economics and lack of cold chain facilities required to maintain the quality in the high ambient temperature prevalent in our country.
    - For effective long storage of onion, the parameters essential to be looked after are the bulb size, choice of cultivars, cultivation practices, time of harvest, field curing, removal of tops, drying, grading, packing, storage conditions (optimum storage range of relative humidity 65% to 70% with the temperature ranging between 25°C to 30°C).
    - An IOT circuit which consists of the sensors and the microcontrollers and other hardware responsible for retrieving the data and monitoring the conditions in and around the storage facility.
    - Onion storage in ventilation conditions is quite satisfactory. It can be considered to be a very upgraded and modern alternative to the standard ventilated onion storage structure. The onion storage structure should be oriented in the North - South direction i.e., length facing the East-West direction. The storage of onion will be on raised perforated platform of 0.60 m height with bottom and side ventilations. The ground clearance may be 60 cm with side opening of up to 80%. Height of storage under ventilation storage should be in the range of 90 cm to 150 cm. For a 25 MT storage, the size of onion storage area will be 4.5m X 6.0m. The minimum overhang of 1.5 m on the windward side and 0.5 m on all other sides should be provided to protect the produce from sunlight and rain.
    - Finally, the software component of the warehouse which will automate all the operations performed by the system, allow remote access to the system via cloud and provide a user-friendly interface (UI) to the user.
5. **Societal Outcome:**
    - Our primary goal is to increase the shelf life of onions from 3 months to 10 months.
    - Thus they can maintain a continuous market without wasting onions.
    - The consumer problem is addressed with a constant supply of onions which fulfils their demand and eliminates the risk of soaring prices of onions.

6. **National & International Status:**

	Journal Name	Journal Title with date
National(India)	IRJIET	Iot Based Onion Preservation System – May 2021.
	IRJMETS	Smart System For Onion Storage – May 2020.

7. **Methodology:**
   - Now coming to the working of our system, In the first component mentioned above which is the IOT circuit of sensors and microcontrollers uses

3 sensors:

i) DHT11 Temperature & Humidity Sensor
ii) MQ135 sensor to detect presence of ammonia
iii) MQ2 sensor to detect carbon monoxide

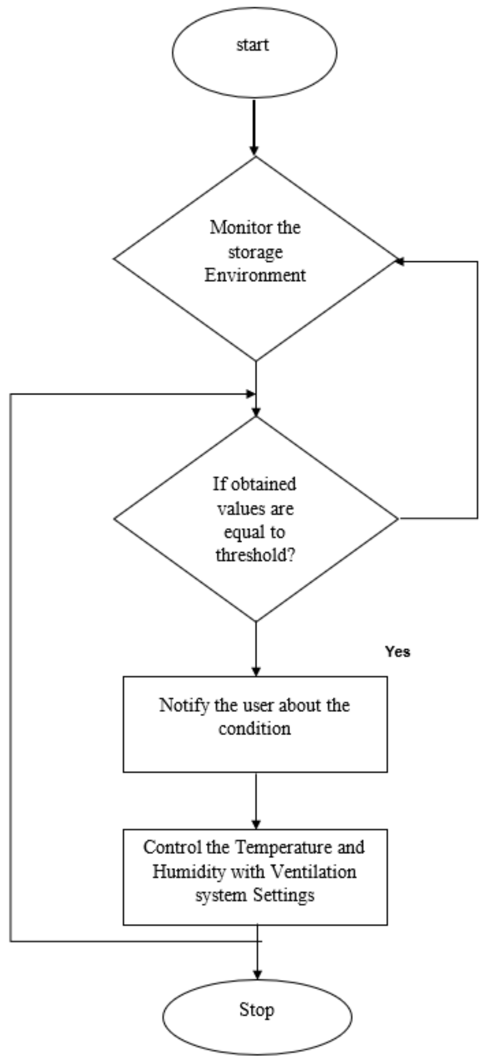
4gb ram raspberry pi microprocessor:

- ✓ These sensors are installed in and around the facility depending upon the size of the warehouse and these sensors will collect respective data and send it to the microprocessors which are then sent to make comparisons with the pre-existing threshold values. Depending on the results of the comparison the system further decides on whether control in the temperature or/and humidity is required.

- ✓ This is where our **ventilation system comes in play which consists of a number of fans directly proportional to the size of the storage facility**; the vents lay across the facility and automated shutters which open when in need of fresh air. The stack section of the vent has a cluster of nichrome wires clubbed together running in the middle. Whenever we require hot air to be blown the **nichrome wires are powered up in turn generating the heat required**.

- ✓ **The vents are laid in a unique fashion such that air reaches each and every onion stored eliminating the risk of even one onion being wasted. The speed of the fans is controlled so that onions stored in any amount receive a very relative amount of air pressure; too much pressure might cause onions to fly and too less pressure might not help us achieve the necessary outcome**.

- ✓ Modifications made to the interior of the warehouse include installing a separate surface where the onions which are to be stored are dumped, this is a perforated floor strong enough to hold the weight of maximum onions that could fit in. To prevent outside conditions from impairing our functioning, it might be essential to add an additional layer of roofing made of a robust thermal insulating material (perhaps polycarbonate roofing sheets). This might give the system a big advantage.
- ✓ The system's backbone is the last element, the software system. Everything is connected through an Internet of Things (IOT) cloud computing platform called “Thing speak”, where the main computation would occur. The entire project is designed to be fully automated and to give the user or customer the greatest possible experience. By considerably enhancing the way our system operates, we also focus on the ventilation and warehouse structures.



8. **Use case:**

Customer segment	Customer relationships
• Farmers • Onion Processing Industry • Onion Value added Products Manufacturing Industry • Cosmetic Industry (Shampoo) • Dehydrated Onion & Onion Powder Preparing Industry.	• Increasing the supply chain Management for Farmers • Excellent customer and maintenance services. • Company owned showroom in major cities.

9. **Seed amount budget details:**

Sl.No	Component Name	Quantity Required	Cost
1.	IoT Module	1	Rs.5000
2.	Ventilation Structure of the Storage Unit	1	Rs.8000
3.	Energy harvesting Unit	1	Rs.9000
		Total Cost per unit	**Rs. 22000**

Project Guide **HOD** **Principal**