

**AUTOMATIC ONION ROTTING DETECTION AND CONTROL USING SENSORS,
MICROCONTROLLER AND VENTILLATION UNITS****¹G. A. Arkhade, ²S. S. Pawar**Lecturer, Department of Electronics and Telecommunication, S.H.H.J.B Polytechnic Chandwad, Nasik,
Maharashtra, India^{1,2}arkhade.gapoly@snjb.org¹**ABSTRACT**

Onion is one of the most Consumed vegetable in the world as well as in India, It is consumed in almost all parts of the India. India is the 2nd largest producer of onion after China. Because of continues change in whether onions can rot. Once the process is initiated it grows very rapidly resulting in unexpected losses. To avoid this unexpected loses a microcontroller and sensors based electronic circuitry has been developed. Various Gas sensors are used to sense emitted gases. If the onion starts rotten, this system informs the farmer by Alarm, SMS and Display, as well as take necessary control action like open or close the curtains, turn on the ventilation Fan.

Keywords: Rotten onion, Control action, Ventilation fan microcontroller and gas sensors.

I. INTRODUCTION

Onion rotting is major problem in India as well as in other countries of World. India is the second most populated country of world after china. Population of India is 136.64 crores +. Onion is very important & valuable crop for Indian farmers as well as in the world.. It has a wide impact on national economy and financial status of consumers [2] After harvesting the onion it is necessary to store it properly. Rotten onion results in huge loss to the farmers. Onion is grown in all three crop seasons. According to ICAR -Directorate of Onion and Garlic Research, the cultivation in India is growing day-by-day [1]. In India, onion crop is grown in above 1.22 millions hector area with an annual production 20.14 millions tons with productivity 16.12 tons per hectors. By considering survey, we observed 60 to 75 percent onions are get wasted from total production due to change in climate [6]. This is big loss to our farmer and our country. To overcome this problem and save the money of our farmers and country, this system is developed. We visited the storage sheds in markets as well as farmers location and study the postharvest losses and tried to find solution to prevent it. After deep studying the storage techniques and losses, we designed and developed a Automatic onion rotten detection microcontroller based electronic circuitry that can provide early warning and capable of sending messages to farmer on their mobile and also display the continues status of different parameter like level of different emitted gases, temperature, humidity. This system works on the principle of sensing emitted gases by onions and processing them to obtain desired output. Emitted gases are sensed by their respective sensors & then, their signals are read & processed by microcontroller. According to programmed microcontroller alarm and text message will be sent to the farmer mobile. To control other parameters like temperature and humidity we use a green colored net curtain and ventilation fan at bellow an upper sides of onion storage shed.

II. LITERATURE SURVEY

In Indian scenario, Per capital onion consumption has shown a significant growth in recent years. Total annual consumption requirement of onion (directly and indirectly) in 2017-18 is estimated at 200 lakh tones, while total Onion production during the year was 217.18 lakh tones. Since the production is higher than the consumption, so if we prevent the losses of onion and store onion scientifically, then the price surges may be controlled, but the storage facility of onion in India is significantly low, a data shows only 48.73 lakh tones of onion could be stored in 2017-18 due to limited onion storage facility availability in India. Recently the new initiative of

Government of India “Operation Greens” has been launched with an allocation of Rs 500 crore. The operation aims to aid farmers and help control and limit the erratic fluctuations in the prices of Onions, potatoes and tomatoes [8]. The idea behind Operation Greens is to double the income of farmers at the end of 2022. In the storage of onion the rotten is the major problem and hence this system is very useful to all farmers.

III. PROPOSED SYSTEM

This system consists of Microcontroller 8051, Alarm system, GSM module, temperature sensor [LM 35], Hydrogen sulfide gas sensor [h2s-bh-23950050(118)], Sulfur dioxide gas sensor [so2-af], Nitrous oxide gas sensor [mics 2710], Ammonia gas sensor [mq-135], Humidity sensor, LCD display, Power supply and Ventilation unit. Different gases are emitted by onions, which can be sensed by using above gas sensors. Gases sensed by these sensors produces an electric signal which is given to microcontroller for taking a necessary control action. A microcontroller which is used in this system is programed, and it will work according to designed program. This system works on principal of sensing temperature, humidity and gasses emitted in rotting process using appropriate sensors interfaced to Microcontroller. The different temperature and Humidity levels are pre-set in the program, as the temperature increases to desired value the cooling fans on and curtain is open automatically. Rotten Onions emit different gases as well as heat. Ammonia, Sulphur dioxide, Hydrogen sulphide and carbon di-oxide are few of those gases are emitted by onions & are mainly responsible for onion rotting. By detecting these gases, we can sense the level of rotting onion. In this system we are pre-set the three levels of gas emission, Level-1, level-2, level-3. At initial Level-1 system will display the warning message on display as well as send the text message to farmer. As the emission increases level-2 and Level-3 indication will be displayed on display and Farmers mobile and control action that is turn on the ventilation unit is take place. In this Level-1 will be initial stage of onion rotting and Level-3 is very hazardous stage that is onion is get rot.

V. SYSTEM ARCHITECTURE

Following diagram is our system block diagram which indicates the complete system Architecture.

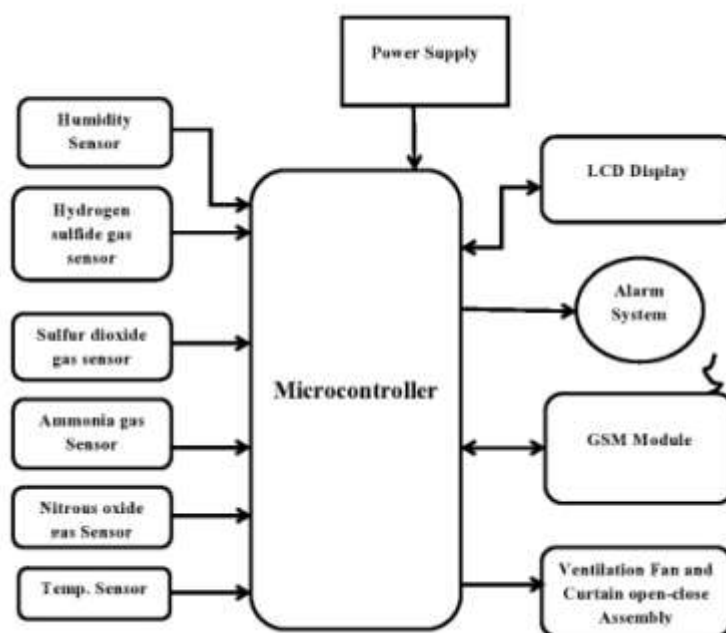


Figure 1: Automatic onion rotting detection and control using sensors, microcontroller and ventilation units.

V. METHODOLOGY

In that some method are used for display the result. So, in that the Microcontroller is used with interfacing the LCD display. In that some Hardware are used like Temperature sensor, Humidity sensor and Various gas sensors. Humidity sensor is Working voltage 3.3 V to 5 V Humidity measurement range 20 percent to 95 percent, humidity measurement error ± 5 percent. Temperature measurement range 0 -50, measurement error ± 2 degrees. DHT11 digital temperature and humidity sensor module is a composite Sensor contains a calibrated digital signal output of the temperature and humidity.

The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in $^{\circ}\text{C}$). It can measure temperature more correctly compare with a thermistor. This sensor generates a high output voltage than thermocouples and may not need that the output voltage is amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is $.01\text{V}/^{\circ}\text{C}$.

VI. RESULT

Table 1: Observation table shows the parameter measured from storage shed.

Time	Temp. Inside the storage Shed	Temp. Outside the storage Shed	Humidity	% of Gases Emission	Remark
09:00 AM	32-35	28	40-46	10-20	Very Low
12:00 Noon	36-38	33	39-45	21-27	Low
03:00PM	39-43	37	35-40	28-45	Medium
06:00PM	47+	32	32-38	46-60	Max

VII. CONCLUSION

From the Automatic Onion Rotting detection and control using sensors, Microcontroller and ventilation unit we can store the onion in the shed for the long term and by continues monitoring the system observation we can maintain the quality of onion .In case of rotting the onion this system will inform the farmer via Alarm, message display on our system and SMS on Farmers mobile, as well as take the necessary control action like ventilation fan on off and green shed net curtain open –close automatically.

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