

## **IMPLEMENTATION OF RURAL WAREHOUSE MONITORING SYSTEM USING ARDUINO AND GSM**

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*Abstract—As India is evolving from a developing nation to a developed nation, there is a huge demand for the crop yield storage. Nearly 10% of the total crop yield is being wasted because of poor warehousing. Proper monitoring and maintenance of these warehouses are very much needed. The major development challenge is to monitor physical, chemical and biological factors that cause damage to crop yield in warehouses. Our proposed solution includes automation in the monitoring of humidity levels so that it reduces the growth of microorganisms that damage the stored crop yield in the rural warehouses, also includes the intimation of any inevitable damage that occurs to the stored crop yield. It works on gsm which provides a information from one point to another. It is also equipped with a alcohol sensor and a pir and there is also scope for the other sensors to be integrated for the sustainability of the proposed solution.*

*Key words-Warehouse parameters, Arduino uno, Pir sensor, MQ3 sensor, GSM modem etc.,*

### **I.INTRODUCTION**

Although people often think that a farmer's hard work is finished when the harvest is done the reality is completely different. A new production cycle is known as post harvest management begins. Storage is one of the key farm practices of post harvest management.. Proper monitoring and maintenance of these warehouses is very much needed. The major development challenge is to monitor physical, chemical and biological factors that cause damage to the stored crop yield in rural warehouses. Proper monitoring and maintenance of the rural warehouses is the major market need.

The major factors that cause damage to the stored crop yield are the physical factors like humidity and temperature, chemical factors like volatile organic compounds, and the biological factors like the rodents, insects etc. We are identifying and trying to reduce the damage at an early stage in the rural warehouses, so that we can reduce the damage to the stored crop yield and save farmers from getting into losses. No one wants to make their efforts and hard work go in vain and get into losses and no one wants to waste food. So we proposed a low cost, simple, efficient and east-to- use solution to monitor the stored crop in the rural warehouse[1].

### **II.LITERATURE SURVEY**

A warehouse is a building for storing goods. Warehouses are used by manufacturers, importers, exporters, wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial parks on the outskirts of cities, towns or villages.

They usually have loading docks to load and unload goods from trucks. Sometimes warehouses are designed for the loading and unloading of goods directly from railways, airports, or seaports. They often have cranes and forklifts for moving goods, which are usually placed on ISO standard pallets loaded into pallet racks. Stored goods can include any raw materials, packing materials, spare parts, components, or finished goods associated with agriculture, manufacturing, and production. In India, a warehouse may be referred to as a godown.

Warehouses are scientific storage structures especially constructed for the protection of the quantity and quality of stored products. The importance of warehousing are

- **Scientific storage:** The product is protected against quantitative and qualitative losses by the use of such methods of preservation as are necessary.
- **Financing:** Warehouses meet the financial needs of the person who stores the product. Nationalized banks advance credit on the security of the warehouse receipt issued for the stored products to the extent of 75 to 80% of their value.
- **Price Stabilization:** Warehouses help in price stabilization of agricultural commodities by checking the

tendency to making post-harvest sales among the farmers.

- **Market Intelligence:** Warehouses also offer the facility of market information to persons who hold their produce in them.
- **Good harvest:** By storing the harvest in the warehouse helps the farmer to store his harvest for a long period of time

### III. MONITORING SYSTEM WITH ARDUINO AND GSM

In the present days the usage of arduino and gsm has increased very rapidly. We can implement many projects using them. The gsm frames a network of connection from one point to another point. We can send alert messages from place to another place using GSM module. It is similar to sim slot in our mobile phone. Whenever the parameter value is raised beyond the given threshold value then we get a alert message to the respective mobile in this we can measure the parameters in the warehouse

#### A.SYSTEM ARCHITECTURE

This block diagram depicts the system architecture for rural warehouse monitoring system fig.1.

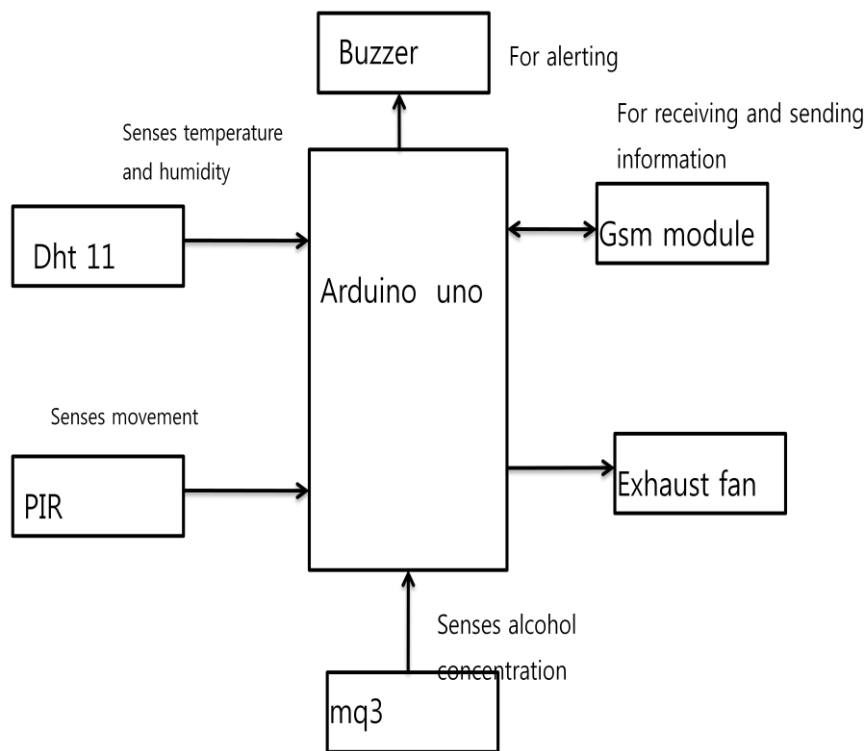


Figure 1:Block diagram of system

#### B.SYSTEM COMPONENTS

**MQ-3:** MQ-3 alcohol sensor is a low cost device that is very sensitive to alcohol and thus helps in the detection of this fungus figure 2. The detection range is 10-10,000 ppm and heater voltage rate is about  $5.0V \pm 0.2V$  DC or AC(High) and  $1.5V \pm 0.1V$  DC or AC(Low). The average response time is less than 150 seconds.[3]



Figure2:MQ-3 sensor

*DHT-11*: Digital temperature and humidity sensor is a composite sensor contains a calibrated digital signal output of the temperature and humidity figure 4. For humidity it has accuracy at  $25^{\circ}\text{C} \pm 5\%$  RH. For temperature the range is  $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . [2]



*Figure 3: DHT-11 sensor*

#### *C. ARDUINO UNO:*

It is an open source microcontroller device with easily accessible software/hardware platform and is compatible with many sensors available. The ATmega328 microcontroller is the MCU used in Arduino UNO R3 as a main controller. ATmega328 is an MCU from the AVR family; it is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8 parallel data signal. The application that arduino used in this project is shown in Fig.6. The software used with respect to arduino is arduino IDE. It connects with the arduino hardware and programs are uploaded to arduino board [6].

#### *D. PIR SENSOR :*

PIR sensors help you to sense motion, nearly always accustomed find whether or not a person's has affected in or out of the sensors vary. They are tiny, cheap, low-power, straightforward to use and do not wear out. Sensitivity vary: up to twenty feet (6 meters)  $110^{\circ} \times 70^{\circ}$  detection range. Power supply: 5V-12V input voltage for most modules but 5V is ideal in case the regulator has different specs [4]



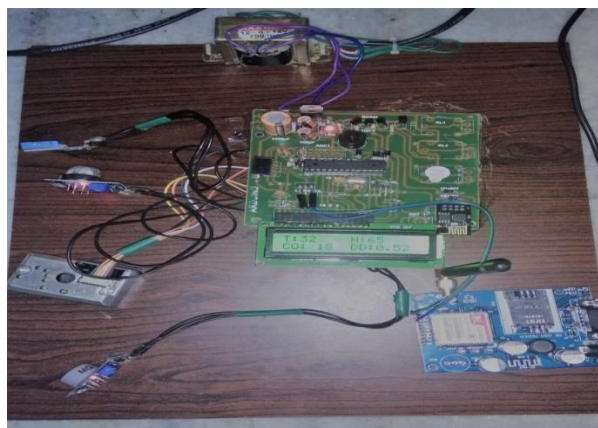
*Figure 4: DHT-11 sensor*

#### *E. GSM SIM 900:*

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine-SIM900A, works on frequencies 900/1800MHz.

#### *F. DESIGN AND IMPLEMENTATION*

This paper practically implemented is as shown in figure 6. It mainly aims in temperature, humidity and rotten smell. The implemented kit temperature and humidity are sensed using DHT-11, senses alcoholic gases in the warehouse which is sensed using MQ-3, the pir senses the movement of any organic matter in the warehouse. These sensors are connected to the arduino microcontroller ATmega 328 which is used for storing and processing the analog values output of the sensors. The arduino IDE environment is used for programming the microcontroller. With the help of code the values of the sensors are displayed on the 16/2 LCD [5] which is used for onsite monitoring. The data of the sensors alert messages are sent to the administrator if the levels exceed the predetermined threshold level. The developed kit can be viewed as figure 6.



*Figure 5: warehouse monitoring kit.*

#### IV. RESULT

The result can be distinguished into two distinct parts. They are the display of data on LCD, alerting the user when threshold value exceeds. The alert messages of temperature, humidity, alcohol density and motion are displayed on the LCD.



Figure 6:Output on LCD screen



Figure 7:Temperature alert



Figure 8:Humidity alert

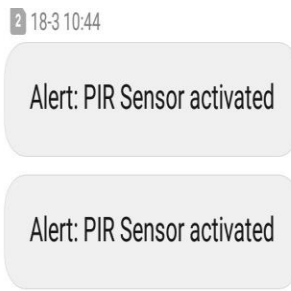


Figure 9:pir alert

Once the threshold levels exceed, it is indicated by the buzzer and also SMS is sent to the administrator as shown in figure 9 & 10.



Figure 10:Sending SMS



*Figure 11:Generated message*

## **V. CONCLUSION**

Our proposed solution continuously monitors and maintains the stored crop yield in a effective and proper manner. It is considerably low cost, simple, efficient and easy-to-use. The cost varies with the usage of number of nodes and can also be extended to the other warehouses in a particular region. The damage to the stored crop yield in the warehouses is identified and reduced. So the farmers can now store the crop yield without any worries of the crop yield getting effected like catching fire or rotting of crops. As a result, more crop yield can be preserved for the future use and the profits can be earned. There will be a considerable increase in the agricultural economy and in turn in the country's economy. Food scarcity is not due to lack of resources but due to lack of management and maintenance of available resources. When we try to protect the available resources we can have sustainable future.

## **REFERENCES**

- [1] Temperature and Humidity Measure-control System Based on CAN and Digital Sensors Wu Zhuang, Jiao Zhi, Li Guo Hong North China Institute of Aerospace Engineering, Hebei Langfang 065000, China
- [2] DHT 11 Datasheet
- [3] MQ 3 Datasheet
- [4] Pir datasheet
- [5] Lcd datasheet
- [6] M. Simic, "Microcontroller based system for measuring and data acquisition of air relative humidity and temperature", 37th International Conference of IMAPS-CPMT Poland Kraków, 22–25 September 2013.