Intelligence Warehouse for Grain Processing

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Abstract: The aim of our project is to safeguard the harvested grains from being spoiled by insects, microbial attack, air and water which decrease the quality as well as quantity of threshed (harvested) grains. Storage is one of the biggest problems in an agricultural country like India where million tones of harvested grains is lost by different factors headed above. The intelligent warehouse system consists of an automatic roof which is made up of panel of solar cells contains the sensor devices to protect natural forces like fire, rain, sunlight and wind. The sensor is used to prevent the crops from dust and different unwanted particles which causes alteration in the quality of grains. This project is developed with various sensor devices which prevent the crop from various natural accidents by raising proper alarm. This leads to the great amount of loss. Farmers have wide range of diversity to select suitable paddy crops. However, the cultivation of the paddy crop is high the protection of cultivated paddy is very essential element.

I. INTRODUCTION

The warehousing is a way to store food grains, seeds, manures and fertilizers to minimize losses and deterioration in storage. Warehouses are scientific storage structures, identified and developed for the protection of the quantity and quality of stored products. It is used to preserve and protect the grains against rodents, insects and pests, and ill-effect of moisture and dampness.

Grain production has been steadily increasing due to advancement in production technology, but improper storage yields high losses in grains. According to world bank Report, post-harvest losses in India amount to 12 to 16 million metric tons of food grains each year. The monetary value of these losses amounts to more than Rs.50, 000 cores per year.

II. EXISTING SYSTEM

The existing warehouse system supports the grain storage which will affect changing weather conditions. The thermal performance of the facility over a period of time has been simulated taking into account the effect of thermal mass within the space which affects the average internal space temperatures. The amount of goods stored in the warehouse has been found to play a significant role in keeping the warehouse temperature within the acceptable range. Monitoring agricultural environment for various factors such as soil moisture, temperature and humidity along with other factors can be of significance. More human effort is needed to manage the store room.

Disadvantages

1. It leads to the attack of insects and is not hygienic.
2. Storing for long term usage is not possible.
3. Large amount of labor is needed for moving of grains.

IV. PROPOSED SYSTEM

The purpose of our project is to protect the harvested grains during daytime. So here automatic door set up is to protect the grains. During the day time it senses the sun light and opens the shutter automatically and allows the sun light into the grains. At the same time it senses the dark at the night time and closes the shutter automatically. This was done by the pneumatic cylinder and solenoid valve. During rainy season the rain sensor helps to sense the rain water and it gives the signal to control unit. Then the shutter will not open. Relay is used to control the shutter motor. The fire alarm is used to prevent the fire accident by any electrical fault or anything will happen. A gas sensor is a device that detects the occurrence of gases in an area, often as part of a safety system.

Advantages

1. Temperature of grains can be consistently monitored.
2. Security can be ensured at maximum extent.
3. Human effort is reduced as automation principles are used.
4. Used to store and preserve grains for a longer time.
5. Doesn't affect by external weather factors.
6. The quantity of grains can be maintained.

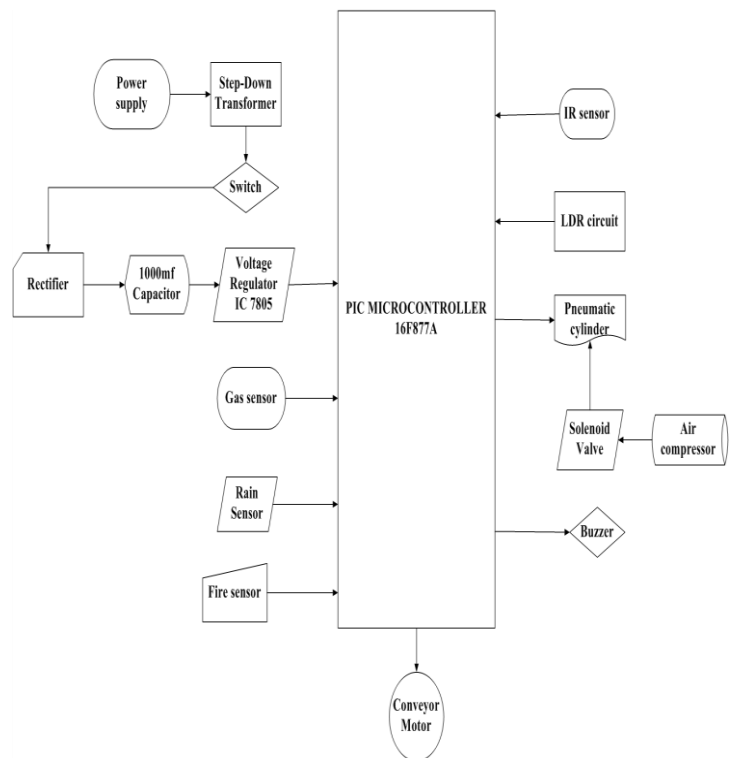## V. ARCHITECTURE OF INTELLIGENT WAREHOUSE FOR GRAIN PROCESSING

Figure 1 Architecture of Warehouse

Architecture Description

1. Voltage Regulator IC
2. PICMICROCONTROLLER 16F877A
3. Gas Sensor
4. Rain Sensor

5. Fire Sensor
6. Pneumatic cylinder
7. Solenoid Valve
8. Buzzer

A. Voltage Regulator IC

The system uses a voltage regulator 7805 integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may not have constant voltage output. The voltage regulator IC keeps the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors are used to connect at input and output pins depending upon the respective voltage levels.

B. PIC Microcontroller 16F877a

PIC 16F877A is a 40-pin 8-Bit CMOS FLASH microcontroller from microchip. The core CPU architecture is high-performance RISC with only 35 single word instructions. The RISC follows single cycle instructions. The branch instructions only take two cycles. 16F877 comes with 3 operating speeds with 4 MHz, 8MHz, or 20 MHz clock input. Since each instruction cycle takes four operating clock cycles, each instruction takes 0.2 μs when 20MHz oscillator is used.

It consists of two types of internal memory such as program memory and data memory. The program memory is provided by 8K words (or 8K*14 bits) of FLASH Memory, and data memory has two sources.

Data memory with the size of 368-byte RAM (random access memory) and 256-byte EEPROM (Electrically erasable programmable ROM) are used. It includes the core feature of interrupt capability up to 14 sources, and single 5V In-Circuit Serial Programming (ICSP) capability. The sink/source current, which indicates a driving power from I/O port, is high with 25MA. It requires the power consumption of less than 2 mA in 5V operating condition.

C. Gas Sensor

Gas sensor is a very vital component in the project. It is used to detect the gas leakage in the warehouse. This sensor utilizes the component MQ-2 as the sensitive component. It has a protection resistor and an adjustable resistor on board. The MQ-2 gas sensor is sensitive to LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke.

D. Rain Sensor

A rain sensor is used to detect the rainfall in the warehouse region. The rain switch is a switching device activated by rainfall. The component like disk is available inside the gauge, which absorbs the water and expands more as rain continues falling. The message will be sent to the sprinkler system controller, interrupting the electronic signal that turns on the sprinklers. The signal is blocked until the disks shrink again to their dry size. The spraying schedule resumes when the sprinkler controller receives the start signal.

E. Fire Sensor

The Fire sensor device is used to identify the fir smoke and raise the signal against it. This is a simple and compact device for protection against fire. The module uses IR sensor and comparator to detect fire up to a range of 1 meter. The Fire sensor is used to detect fire flames. This is very essential component in a grain warehouse.

F. Pneumatic cylinder

Pneumatic cylinders (sometimes known as air cylinders) are mechanical devices which uses the power of compressed gas to produce a force in a reciprocating linear motion. The component called hydraulic cylinders, forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod is used to transfers the force to the object to be moved.

G. Solenoid Valve

The component like a solenoid valve is an electromechanically valve. Solenoid valves are the most frequently used control elements in fluidics. This is controlled by an electric current through a solenoid. It may have two-port valve, in which the flow is switched on or off. In the valve with three-port, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold. Multi valve tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids contains fast and safe switching which provides high reliability, long service life, low control power and compact design. Besides the plunger-type actuator which is used most frequently, pivoted-armature actuators and rocker actuators are also used.

H. Buzzer

A buzzer or beeper is an audio signaling device. It is a mechanical, electromechanical, or piezoelectric types. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.
It is commonly consists of a number of switches or sensors connected to a control unit. The control unit finds the types of button were pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel. Then it creates warning sounds. This device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

VI. METHODOLOGY

The input 230V AC voltage applied to the step down transformer it step down into 12v Ac. Bridge rectifier is converting AC into pulsating DC of 12V. A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. A capacitor is a passive two-terminal electrical component used to store electrical energy. 1000uf Ceramic capacitor is used to filter the harmonics in the power supply line. The 7805 voltage regulator has 3 pins. First pin is 12v input pin, second pin is ground pin and third pin is 5v output pin. This third pin 5v is give to PIC 16F877A Microcontroller. PIC microcontroller consists of 40 pin IC. The PIC Microcontroller gives 5000 MIPS (Million Instruction per Second). A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. Gas sensor is used to detect a gas leak and interface with a control system. A rain sensor or rain switch is a switching device activated by rainfall. Here this sensor detects the rainfall and gives signal to control unit. That time the shutter wills not open. This sensor is used to detect the presence of a flame or fire. It is used to detect a rise in temperature of 10 degree or more in its locality. So it avoids the accident in this system. Pneumatic cylinder is mechanical device

which use the power of compressed gas to produce a force in a reciprocating linear motion. The pneumatic cylinder is used for open and closes the door. The solenoid valve is connected with the pneumatic cylinder and the compressor is connected to the solenoid valve. When the compressor Turns ON then the solenoid valve is activated then the pneumatic cylinder is operated manually by open and closes the door. A buzzer is an audio signaling device. Here it is used for alarm purpose.

CONCLUSION

This warehouse is to protect the harvested grains from being spoiled by insects, microbial attacks, air and water which decrease the quality as well as quantity of threshed (harvested) grains. We presented an automatic warehouse to protect the food grains in large amount. To overcome the manual work. Here we proposed an automatic process to safely protect the grains. For security purpose we here use more sensors. Thereby the grains are protected during rainy season also. Our project is more efficient in agriculture field.

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