# Efficient implementation of auto control system using PIC 16f877a for small scale industries

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## ABSTRACT

The purpose of this system ”Atomization of agro industry” is to develop a Automated Control system using Temperature control, Light control and automatic counting of packets. Automation and controlling is becoming more crucial issue in today’s World .It is Also having more important in various industry and various processing plants. Proposed system consist of design and construction of an PIC-16F877A based automated counting, weighing, Temperature control and light control. Sensors keeps sensing the room temperature and light intensity over a period of time, Also it generates controlling action when necessary in terms of Fan on-off, Light on-off. Temperature its sensed in 3 different ranges so that fan speed can be changed in 3 steps. Light sensor senses the light intensity and when it is above the predefined range, light is put On. There is an Fill sensor used for automatic counting of packets, when switch is open the count is increased by 1.Automatic weighing is done to determined level using load cell. Proposed system provides better performance and reduces human efforts. The proposed system have low cost, versatile, portable his system is useful in small as well as large scale industries where automation is required.

**Keywords:** PIC-16F877A, Fill sensor, Load cell, Fan

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## INTRODUCTION

The objective of system is automation and to reduce human efforts. Counting and packing manually is always been a problem for manufacturers in agro industry. There is problem of inaccurate counting of bags, due to manually counting thousands of bag per day. There is also problem of weighing the bags of different materials each time manually. This will disturb the manufacturing and packing department while dispatching the product. Hence atomization of packing section is very necessary in agro industry to overcome the loss of material. It includes automatic counting, weighing, temperature control and light control. Paper introduces an automatic packaging system which is done by weighing the product to the required level by using load cell and automatic counting using Fill sensor as a switch. At the same time we are controlling lights and fans. Lights are controlled by using LDR by sensing light intensity and fans are controlled by sensing the room temperature. The design is associated with flexible structure for the software and hardware support. The proposed system consists of PIC-16F877A, Switch sensor, Load cell, Temperature sensor, Light sensor, LCD Module, ULN2003, EPROM, Relay, Fan, Bulb. Load cell is used to weigh the product approximately to 50kg, and then the switch is opened. The Switch is used to count the packets. When the switch is open the count is increased by 1. The count value is stored on external non-volatile erasable programmable read only memory (EPROM) for post analysis [1]. The Temperature sensor acquires the temperature of the system. In the proposed system LM-35 is used as temperature sensor. There are three different set points for temperature. When the room temperature is above the set point then respective relay will be on, and fan's speed is controlled. The LDR is used to sense the room light intensity if it is less then set point the put on the light. An integrated Liquid crystal display (LCD) is used for real time display of data acquired from various sensors, to display the set points and to display the count value of the packets [2].

## SYSTEM ARCHITECTURE AND WORKING

The Automation is becoming more and more important in lot of industries like agro industry, laboratory and pharmaceutical industry. Everyone wants their work to be done fast and with fewer efforts.

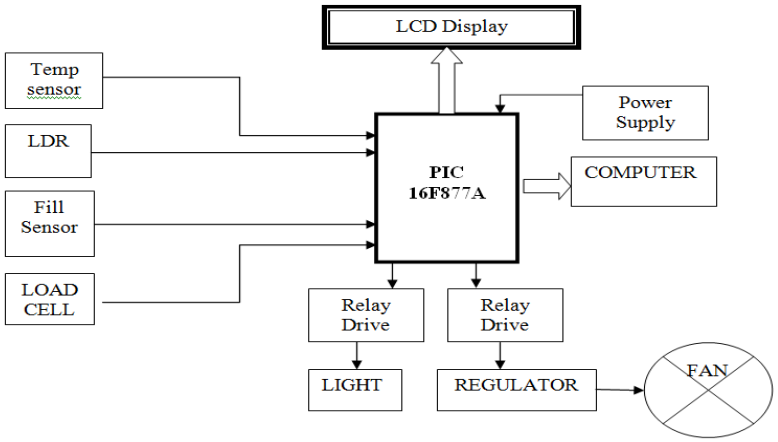



Fig.1 Block Diagram of Industrial Automation

The concept of system is to automatic control of fan, light and automatic weighing and counting. The proposed system uses a Fill Sensor which is an simple electrical switch. When the product is filling the stitch is closed, when the product is weighted approximately to determined range i.e 50kg using load cell, then the switch is opened, the pin of PIC is grounded and count is increased by 1. The count value is further stored on external non-volatile erasable programmable read only memory (EPROM) for post analysis. Hence the total number of packets produced per month can be saved using EPROM. The Temperature sensor acquires the room temperature. In the proposed system LM-35 is used as temperature sensor. The analog output of sensor is connected to PIC which converts it to digital and connected it to relays. There are three different set points for temperature. When the room temperature is above the $1^{st}$ set point then $1^{st}$ relay will be on. When the room temperature is above the $2^{nd}$ set point the $2^{nd}$ relay will be on and so on. Hence the speed of the fan is controlled automatically. The Intensity sensor i.e. LDR senses the room light intensity. The analog output of LDR is connected to PIC which converts it to digital and if it is less the set point then bulb is turned on [11].

An integrated Liquid crystal display (LCD) is used for real time display of data acquired from various sensors, to display the set points. It is used to display the 4 parameters of the system: Count, Weight, Temperature, Light intensity. The proposed system uses a Fill Sensor which is an simple electrical switch. When the product is weighted approximately to determine range i.e 50kg using load cell which is connected to channel 2 of PIC ADC and analog weight is converted to digital value, then the switch is opened, the pin of PIC is grounded and count is increased by 1. The count value is further stored on external non-volatile erasable programmable read only memory (EPROM).

The LM-35 acquires the room temperature. The analog output of sensor is connected to channel 0 of PIC which converts it to digital and connected it to relays. There are 3 different set points for temperature. When the room temperature is above the $1^{st}$ set point then $1^{st}$ relay will be on. When the room temperature is above the $2^{nd}$ set point the $2^{nd}$ relay will be on and so on. Hence the speed of the fan is controlled automatically. The Intensity sensor i.e. LDR senses the room light intensity. The analog output of LDR is connected to channel 1of PIC which converts it to digital and if it is less then set point then bulb is turned on through relay.

The graphical user interface describes anything our application displays to the user. It is primary way we interact with the user and allow him or her to interact with us. We can create professional interfaces with minimal effort. Graphical user interfaces have been around for many years. Visual C++ 2008 provides a powerful and flexible development environment for creating Microsoft Windows-based and Microsoft.NET-based applications. Here we Visual C++ 2008 in an integrated development system.

## FLOW CHART OF THE SYSTEM

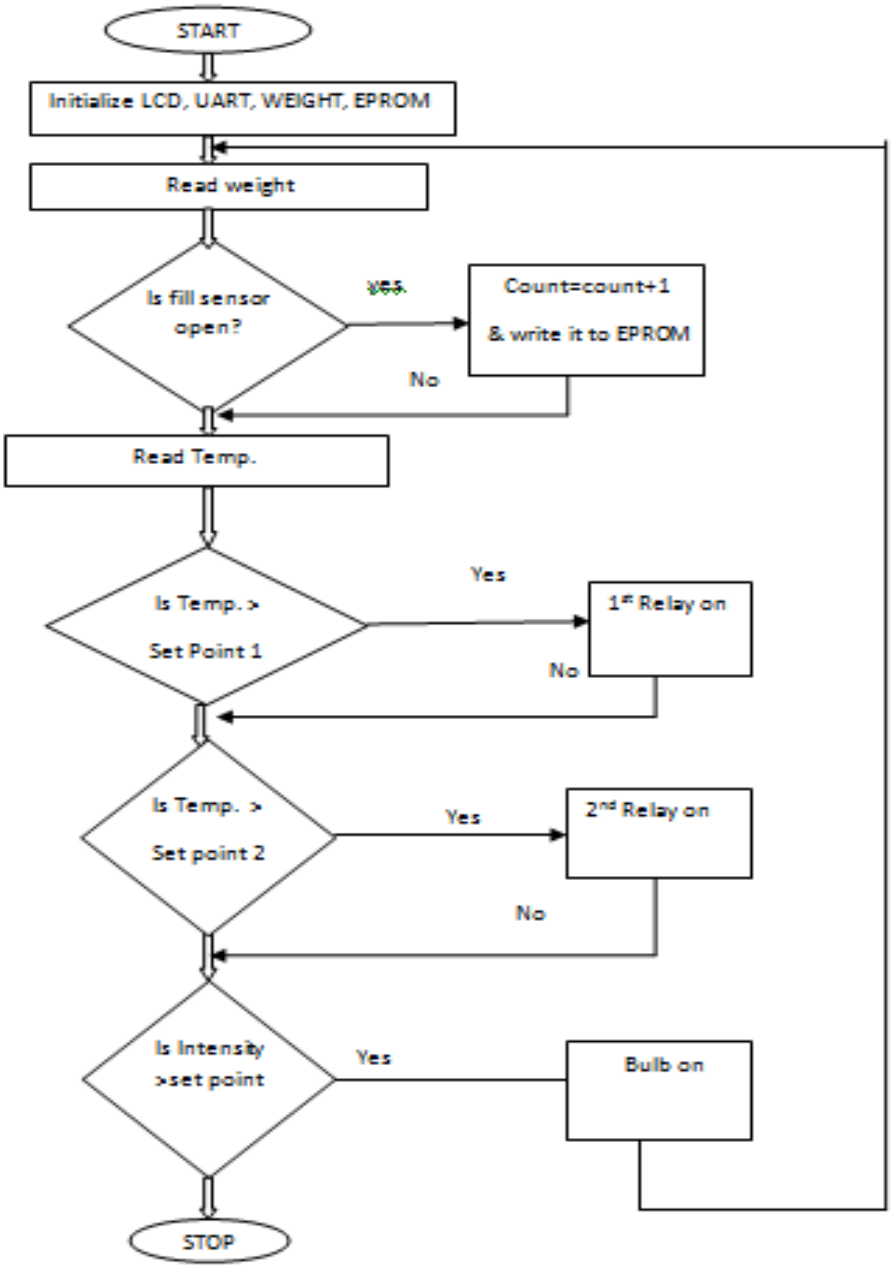
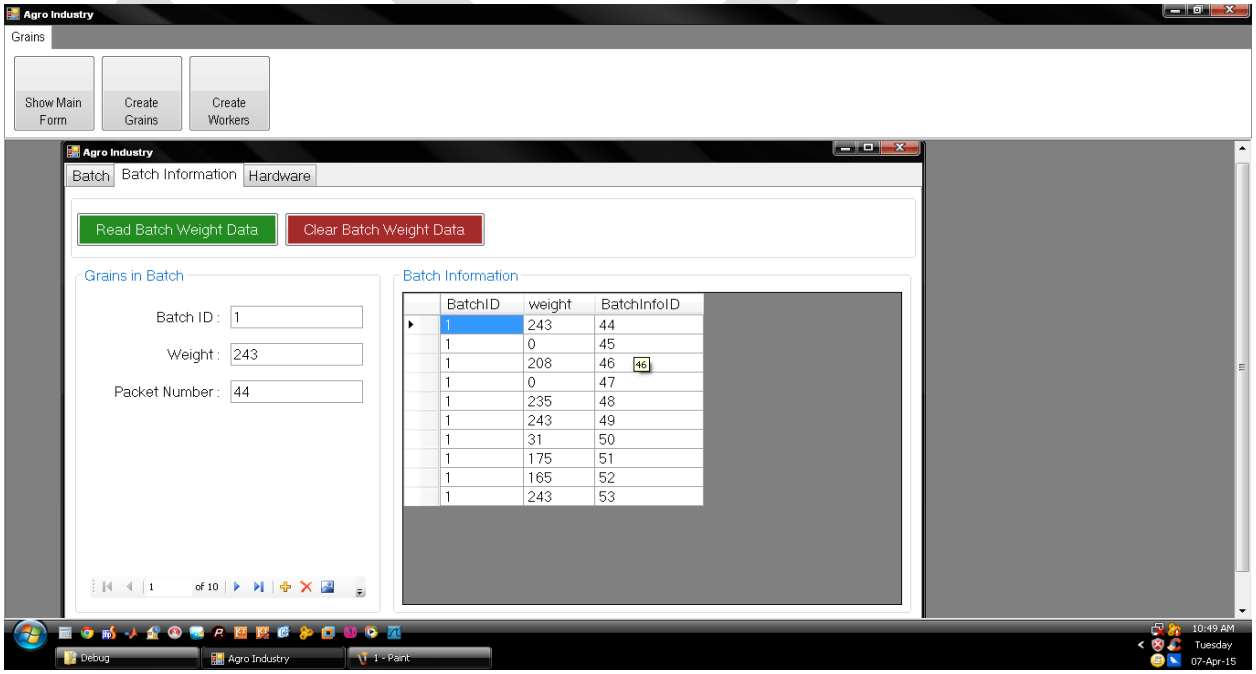



Fig.2: Flow chart of the system operation

After initializing the system, LCD, Load cell, UART, EPROM of PIC are turned ON. Weight is acquired and if the switch is open then count is increased by one. Otherwise it will read the temperature. The set point of temperature is given through computer. If the room temperature is greater than set point then 1st relay is on. Else it will compare the 2nd set point, and if temperature

is greater then 2nd relay will be on. Else it will check the intensity; if it is less then set point the bulb will be ON and the loop repeats for every one sec.

## EXPERIMENTAL RESULTS

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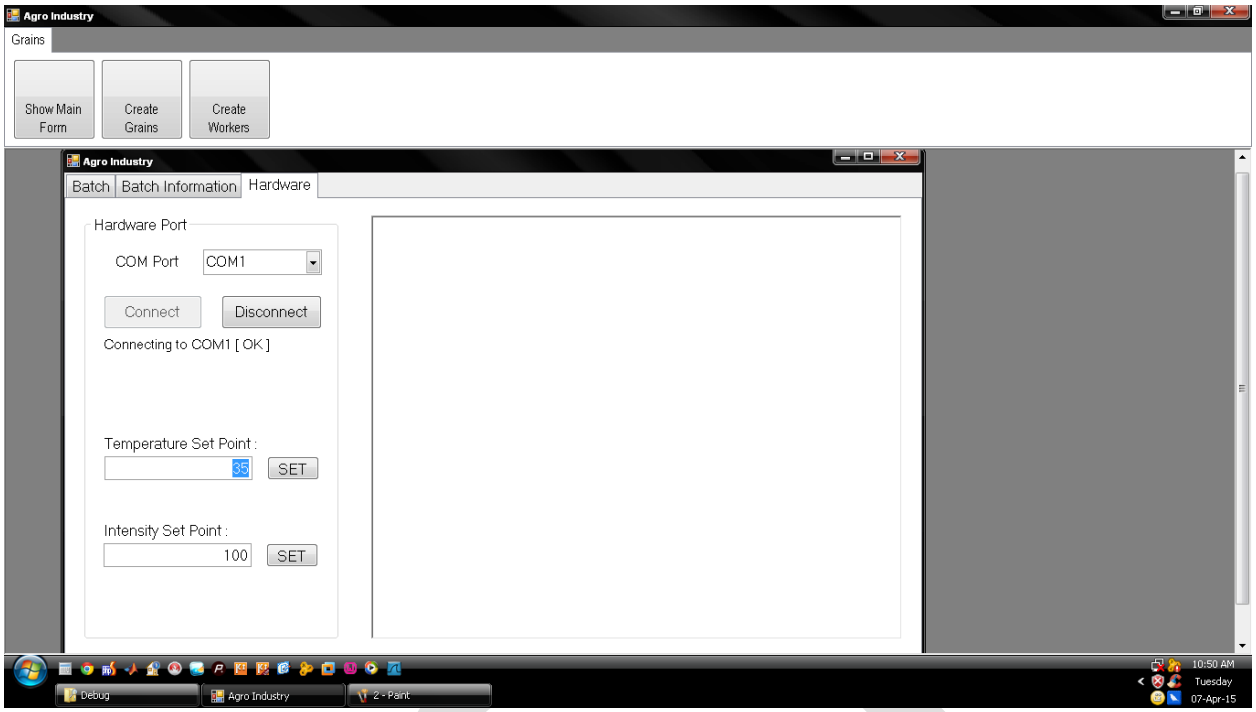


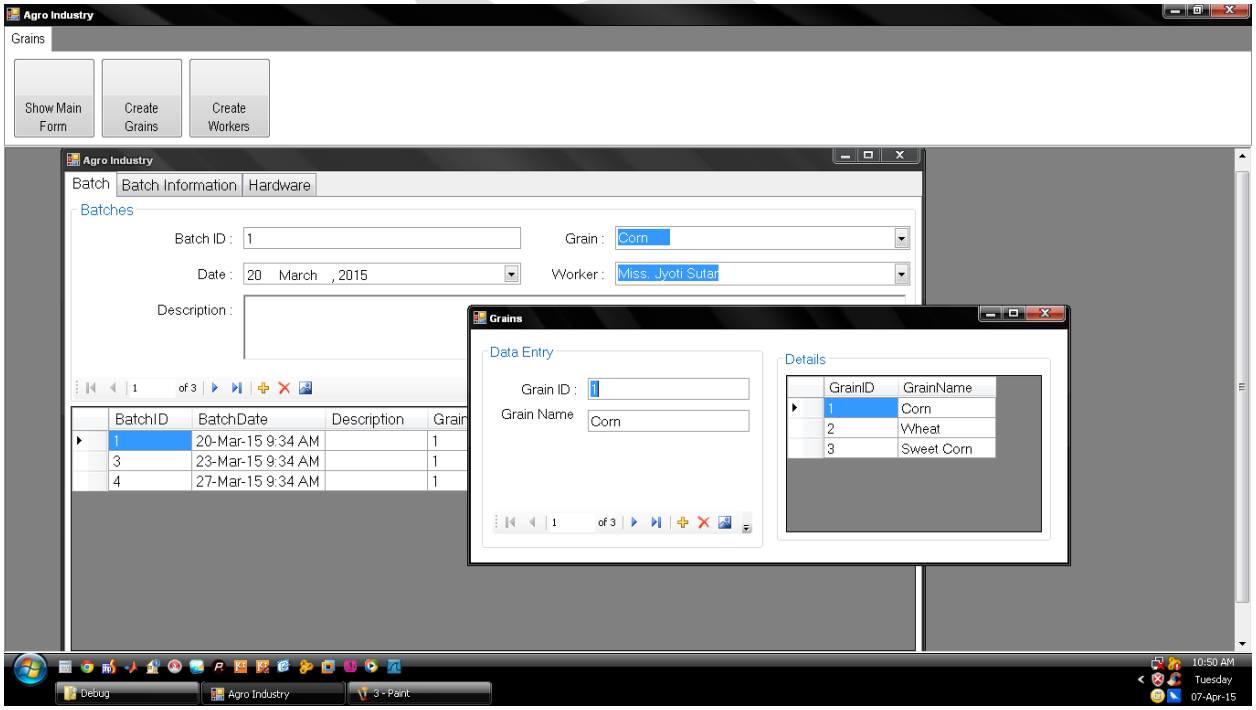

## CONCLUSION

In this system PIC based automation of agro industry with real time data is designed and developed. With the help of this system we can maintain the record of count of packets and their types. We can automatically control the appliances of industry. We can save the data to computer using serial port. LCD is used to display the four parameters of the system: count, weight, temperature, light intensity. The cost of the system has been reduced to great extent.

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