

AUTOMATED MATERIAL HANDLING PROCESS FOR PROCESSING INDUSTRY

Bhagat Akshay¹, Deshmukhe Satyam², Khot Pramod³, Kiran Patil⁴

Abstract: The advantages of automation are Speed, Repetition, Accuracy, Safety, and Adaptability. Also automated system can be programmed to carry out different task. Hence automation is implemented in all business running fully integrated systems. There is always the obvious balance of cost vs benefit, as an organization grows and the benefits of systems increases. There is also large financial benefit in putting this system. That is too simple and requires a significant amount of external manual work. The Indian dairy industry is contributing significant role in the country economy. A dairy is a place for handling milk and milk products. This plant is rapidly expanded and modernized with improved machinery to large scale of production. Our system is designed for automatic handling of milk packets for milk industry. Hence reducing the labor cost. The Arduino processor is used for that. Proximity sensor is used to count the number of packets. Actuator & conveying belt is used for movement of buckets to cold storage automatically.

Keywords: Sensor, Milk Processing, Automation, Packaging process, Arduino processor, Actuator

1. INTRODUCTION

In the past 20 years technology has changed the nature of manufacturing. In old days, manufacturing and material handling were all done by hand by using of peoples. Now that computer and technology have penetrated the industry, automation has the competitive advantage in today's manufacturing world.

Nowadays, people call for economical society the market has the new request with the related package design. The economical packages achieve the lowest cost and minimize resources consumption and maximize the benefits.

The process control system were based on electromechanically relays, connected together in logical pattern. The new atomized system can be used to control a single machine or build up total control and management system to make entire plant more productive.

Automation has allowed for companies to mass produce products at outstanding speeds and with great quality and low cost. Automation plays an increasingly important role world economy and in daily experience. Automation is the use of control system and information technology to reduce need for human work in the production of goods and services.

2. RELATED WORK

The Indian dairy industry is contributing significant role in the country economy. A dairy is a place for handling milk and milk products. This plant is rapidly expanded and modernized with improved machinery to large scale of

production. It is a electromechanical systems which is broadly divided into six parts.

Milk processing unit:- It involves collection of milk from the villages, chilling the milk to 3-4 degree Celsius and transporting through the insulated pipe for packaging process.

Packaging process:- In this section milk is packing in various types like cow, toned, standard and buffalo milks which are available in 200ml, 500ml, 1000ml etc.

Sensors, actuators & counters:- This parts plays an important role in this system. Proximity sensor sense the milk pouches and this milk pouches are directly feed in buckets. Counter counts the number of milk pouches and rapidly switch on and off through a certain delay.

The block diagram of existing milk processing and handling system is as following:

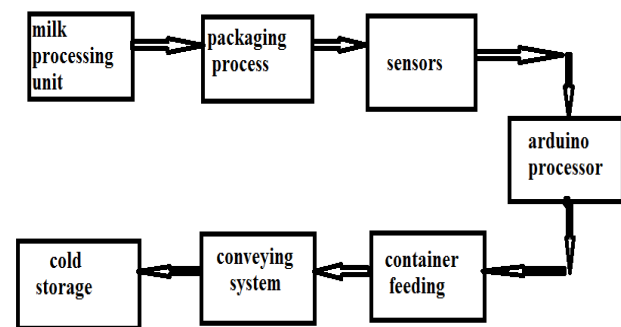


Fig1 Block Diagram of system

Container feeding:- Actuator is a component responsible for movement of containers. Actuators requires control signal and source of energy. The control signal may be electric voltage or current or hydraulic pressure. The packed milk pouches are properly feed in buckets in this section.

Conveying system:- Conveying system is a way through which full feeded buckets send to cold storage by using conveyor belt.

Cold storage:- In this cold room the full feeded buckets are stored at 3-4 degrees. This milk is ready to customer. This milk is finally transport to several cities.

3. ARDUINO AND SENSORS

3.1 ARDUINO:

Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs,

4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.



Fig 2 Arduino Board

The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++. An Arduino board consists of an Atmel 8-, 16- or 32-bit AVR microcontroller (although since 2015 other makers' microcontrollers have been used) with complementary components that facilitate programming and incorporation into other circuits.

3.2 PROXIMITY SENSOR

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact.



Fig 3 The proximity sensor

A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.

3.3 Counter



Fig 4 Counter

A counter is a device which stores (and sometimes displays) the number of times a particular event or process has occurred, often in relationship to a clock signal. The most common type is a sequential digital logic circuit with an input line called the "clock" and multiple output lines. The values on the output lines represent a number in the binary or BCD number system. Each pulse applied to the clock input increments or decrements the number in the counter.

3.4 Actuator:

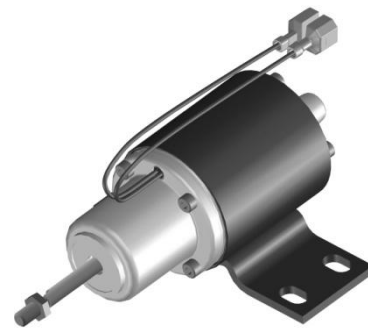


Fig 5 – Actuator

An actuator is a component of machines that is responsible for moving or controlling a mechanism or system. An actuator requires a control signal and source of energy. The control signal is relatively low energy and may be electric voltage or current, pneumatic or hydraulic pressure, or even human power.

3.4 LCD DISPLAY

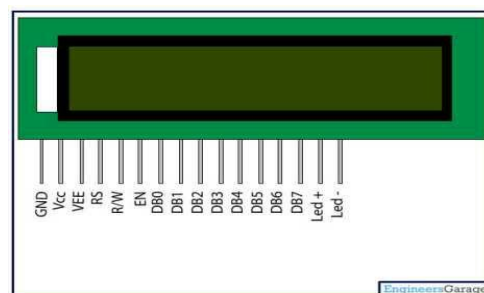


Fig 6 LCD display

The LCD display used for the, display the correct weight of milk pouch by sensing weight of every pouch, Weight sensor sense the weight of milk pouch then this information transferred to the Arduino processor. Then processor displays information on LCD display.

3. Future Scope

The need of time is to develop android based application and get count of packets on mobile phone any time any where[5].

REFERENCES

- [1] Conveyor Equipment Manufacturers Association (CEMA). "Belt Conveyors for Bulk Materials" pp. 200-205.
- [2] BB-Process Industries (2000). Variable-speed drives for Belt Conveyor Systems. pp. 1-7.
- [3] 5. Vanamane, S. S., Mane, P. A. and Inamder, K. H. (2011). Design and its Verification of Belt Conveyor System Used for Mould Using Belt Comp Software. Int. Journal of Applied Research in Mechanical Engineering. Vol. 1(1) pp. 48-52.
- [4] Taiwo, A., Jekayinka, S. O. Mechanical Maintenance and Repairs. Orsome Ventures Ltd, Ibadan. pp. 50-70.
- [5] suhas.B Katkar., et al. "Android Based App To Prevent Crop Diseases In Various Seasons." International Research Journal of Engineering and Technology (IRJET) 3.03 (2016).

BIOGRAPHIES

Bhagat Akshay : Appeared B.E at Electronic and Telecommunication Department of Annasaheb Dange College of Engineering and Technology ,Ashta, Maharashtra, India.

Deshmukhe Satyam : Appeared B.E at Electronic and Telecommunication Department of Annasaheb Dange College of Engineering and Technology ,Ashta, Maharashtra, India.

Khot Pramod : Appeared B.E at Electronic and Telecommunication Department of Annasaheb Dange College of Engineering and Technology ,Ashta, Maharashtra, India.

Mr. Patil K. N is working as Assistant Professor, in Electronic and Telecommunication Department of Annasaheb Dange College of Engineering and Technology ,Ashta, Maharashtra, India. His qualification is M.E.(Electronics)