



IOT Based Automatic Bottle Filling System using Arduino

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ABSTRACT: The main aim of low-cost Industrial Automation is to increase Productivity and quality of products and reduce the cost of production. The overall system is liberated from human interventions. The Arduino Uno microcontroller is relatively cheap and widely available. In small industries bottle filling operation is done manually. The manual filling process has many shortcomings like spilling of water while filling it in bottle, equal quantity of water may not be filled, delay due to natural activities of human etc. Automation promotes cost oriented reference architectures and development approaches that properly integrate human skill. This can be achieved by introducing very simple devices such as limit switches, electrical relays, solenoid valves, sensors. Use of simple devices utilizing relatively cheap and readily available components, to minimize or eliminate human effort in certain operations is called Low Cost Automation.

KEYWORDS: Arduino Uno microcontroller ,UM sensor, stepper motor ,solenoid valve ,conveyor belt, IOT

I. INTRODUCTION

The current scenario in industry is to embrace new technologies to proceed towards automation .the literature reviews has revealed various methods of bottle filling system .The technique involves PLC based automation for bottle filling and capping and packaging system. But this technique is costly .Despite of all such advance technologies small industries are still involved in manual filling of bottles. They might be discouraged to adapt new technologies as they are costly .the study and literature survey emphasize on reduction in cost using. In this project we can program the Arduino to automatically detect the bottle using IR or ultrasonic sensor and allow the bottler to fill by stopping the conveyer belt for some time. Then again move the belt and stop when the next bottle is detect.

II. RELATED WORK

[1] "Topic: Proximity sensors with optical and electrical sensing capabilities" Publisher: Prashanth .s.s.Holenaspipun

Filed: - 12/01/2005

Patent No.:- US 9088282 B2

Description:- A fluid management and dispensing system and method. The system is used to atleast partially fill containers with fluids according to a recipe. The filled containers may then be used in conjunction with, for example, "vaping" devices (e.g., electronic cigarette devices) to provide desired flavors to a consumer. The system includes a rotatable turret assembly with nozzles, a rotational motor, and a linear actuator. A container to be filled is position e data delivery station. The system can actuatethe rotational motor to rotate the turret assembly to a desired circumferential location. The system can actuate the linear actuator to translate the turret assembly to desired lateral location. After a particular nozzle of the turret assembly is aligned with a container, the fluid can be dispensed into the container .The dispensing system may be connected to a network, which may provide recipes for the fluid Mixtures.



[2] “Topic: FABRICATION OF PNEUMATIC OPERATED SODA FILLING MACHINE”.

Publisher: K. Kamalakkannan¹ Ajithkumar. B2 Ananda Badmanaban. B3 Ganesh Balaji.R. N4 Krishna Kumar.G5

Description:- The main objective of the project is to Design and Develop an Automatic liquid filling to bottles of different height with Microcontroller Integration. The present machines are that it can fill only a particular type of containers of specific volume, and the filling amount is as set by the operator. To develop a filling machine this can fill different volume of bottles on the bases of volume. This can use in different industries like medicine, oil, chemical etc. This work generally emphases on small industries.

[3] “Topic: AUTOMATIC BOTTLE FILLING” Publisher: Mallaradhya.H.M, K.R.Prakash

Description: Automatic bottle filling 3rd may 2015 in this research paper the researcher Jaymin Patel department of physics and electronics of Hemchandracharya north Gujarat University, Patan has develop a bottle filling system based on certain specifications. More features can be added to this system as follows, depending on the size, shape and weight of the bottles, filling operations can be implemented. Automatic liquid filling to bottles of different height using programmable logic controller 14th July 2013 in this research paper the researcher Mallaradhya.H.M, K.R.Prakash have design and develop an automated liquid filling to bottles of different height using plc. A total control is made in a filling is achieved. The programming to this system developed is flexible, quickly and easily.

[4] “Topic: AUTOMATED BOTTLE FILLING SYSTEM USING MICROCONTROLLER VOLUME CORRECTION”

Publisher: Ashwini P. Somawanshi , Supriya B. Asutkar , Sachin A. More

Description: Automated bottle filling system using microcontroller volume correction 3 March 2013 the objective of this experiment is to verify that the amount of insecticide solution dispensed by the machine into the bottle is within the specified tolerance — 200 ml to 240ml. The experiment starts by loading empty 250ml bottles on the conveyor. The machine is then turned on. Wait until all bottles are filled and measure the actual volume dispensed into the bottles using a beaker and record. By this method correction in volume is achieved and cost of manufacturer and customer is reduced by reducing loss of filled liquid.



III. PROPOSED SYSTEM

A. Block Diagram :

Figure shows the block diagram of Proposed System. It consist of controller, various sensors and required softwares.

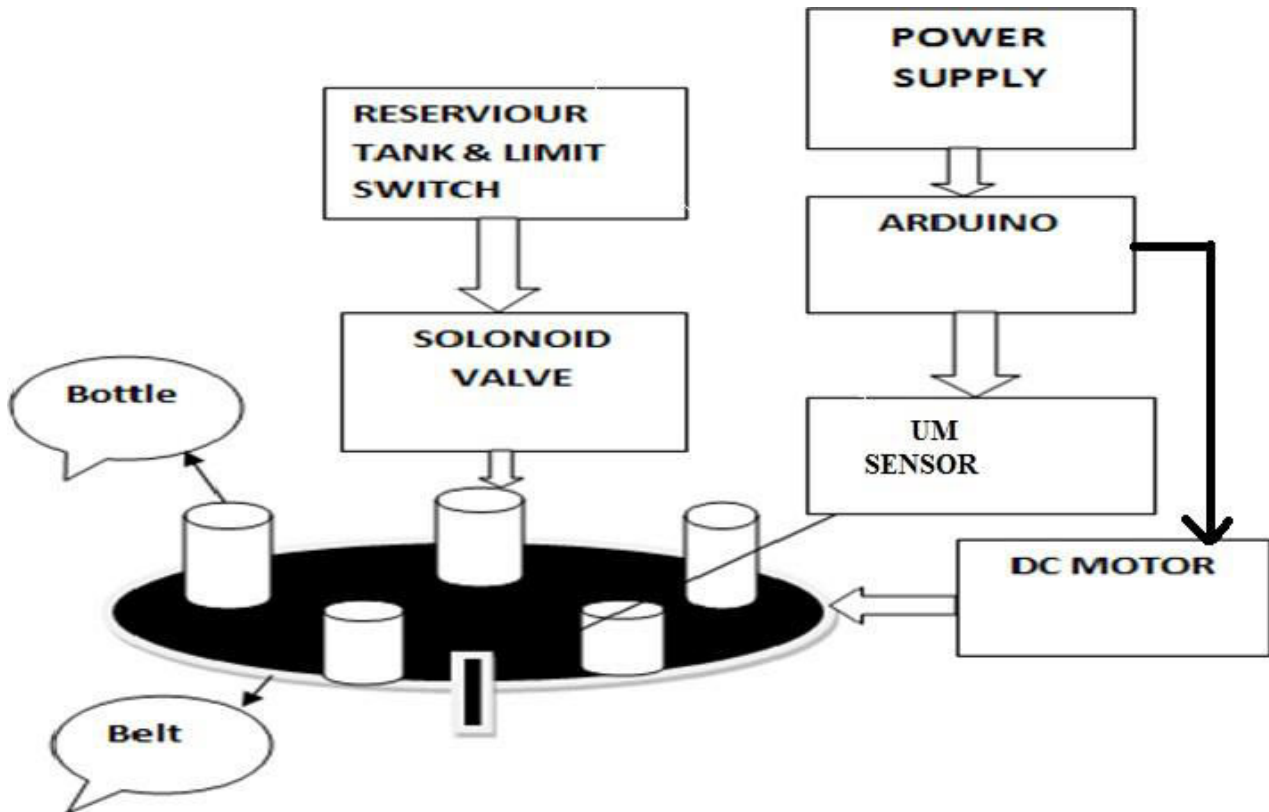


Fig. 1. Block Diagram of IoT based automatic bottle filling system using arduino.

[1] PowerSupply:

Here we used 230V AC power supply. The main function of this block is to provide the required amount of voltage to essential circuits. Voltage is given to the SCR. 12V adapter is used to give +5V to the PIC Controller.

[2] Microcontroller(Nano):

Microcontroller is a controller which will receive the signals from the frequency receiver and sending element and compare them and give a control signal.

[3] Solenoidvalve:

A solenoid valve is an electromechanically operated valve. The valve is controlled by An electric current through a solenoid.

[4] Conveyerbelt:

To carry material from one place to another, safely and efficiently, conveyer belts are used. It is most economic way to transport bottles and also the safest. Belt is made up of rubber and consists of three wheels which rotate the belt.

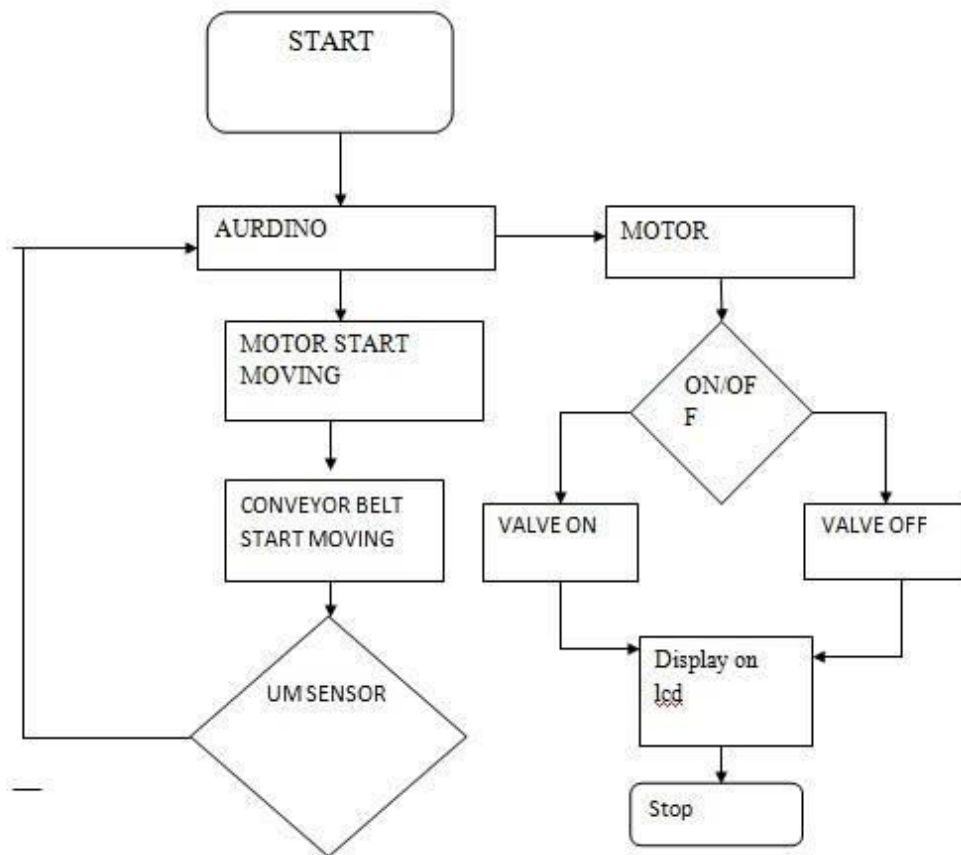
[5] UM Sensor: It is ultra sonic sensor use sound waves to measure how far away you are from an object. It converts electrical energy into acoustic waves and vice versa. Here HC SR04 ultra sonic sensor has being used which generates ultrasonic wave at 40KHZfrequency



IV. METHODOLOGY

Firstly an empty bottle is placed on the conveyor belt. The motor is turned on and the conveyor belts starts to rotate and thus it moves the empty bottle. An IR sensor which is placed below the hopper senses the presence of bottle. The conveyor stops working and pump will remain on till the desired period. Filling process continuous until the bottle is completely filled, after which the pump is turned off and the conveyor belt starts. Now the bottle is forward to its final position. At final position, an optical sensor is placed which detects the presence of filled bottle and displays the number of filled bottles.

Flow chart



V. RESULT

The proposed system is used for bottle filling system which is to be done automatically, by using the stepper motor the conveyor belt is moving accordingly to that, so we placed six bottles and got perfect result as per required. The bottles get detected by the UM sensor and valve is getting on when the bottle is detected and fill the water according to its level. As the bottle is filled the valve get turn off. And this process continues till the entire bottles are filled. We use IOT to save the data in order to maintain that stock of filled bottles. We got all the result as per required.

VI. CONCLUSION AND FUTUREWORK

This system can perform the task of autonomous quality control system used in industrial production and it is most suitable for small scale industries. The production of goods is being increased by automation system. Consequently, it can develop economic growth. The main goal of this paper is to implement “arduino based automatic bottle filling”. The cost of machine installation is cheap and it is a less time consuming work as compared to manual bottle filling technique. If properly maintained, it can run for a long period of time. In this machine, arduino has been used to control the overall system by using arduino coding. This is achieved by using sensors, relay switches, solenoid valve, dc motor and plunger. The overall process is more reliable. The operation of the machine is easy. This concept



can be used in beverage and food industries, milk industries, oil mills, etc. Using appropriate pump, solenoid valve in which case precise timing is needed would increase productivity. A non-intrusive water level sensor could be used instead of timing valve. Another sensor could be used in the beginning which can sense the bottle and start conveyor belt automatically. Using automatic capping system can also save time. The system can be redesigned for increase bottle size and productivity.

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