AUTOMATIC FILLING SYSTEM FOR INDUSTRY

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ABSTRACT

The project is aimed at automatic bottle filling and leakage sensing. This project will automatically detect the bottles using IR sensors. The overall system is liberated from human interventions. The efficiency of this system is high and it helps in automatic bottle filling and leakage sensing. Control system is the main part which includes AVR programming to control various components in this system. It is aimed to eliminate the various problems faced by small scale industries while filling the bottles. This system works automatically and reduces working and operation costs respectively.

KEYWORDS- Bottle Filling, disk, Process Automation, leakage sensor, position sensor, bottle, steeper motor, pipe.

INTRODUCTION

The field of automation has a notable impact in a wide range of industries beyond manufacturing. Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. Also growth in Food industry and Healthcare industry has seen a rapid increase in demands of beverages as well as medicines. A typical manufacturing facility of this kind will require precision as well as velocity in filling operation, to achieve both manually is tedious task. Also to operate manually in hazardous chemical industries is safety concern to workers. Non-precision will not only lead the economic loss in the beverage industry but also a danger to consumer health in healthcare industry. To make automated bottle filling machine to achieve both accuracy and speed in filling, is requirement of the time. Production managers are being challenged to reduce cost, wastage and downtime. Filling is a task carried out by a machine that packages liquid products such as cold drinks or water. The bottle filling project serves as an interdisciplinary engineering design experience. It introduces aspects of computer, electronics and mechanical engineering. This system provides the provision of mixing two number of liquids in fixed proportion. It's remote control and monitoring makes the system easily accessible. It is less costly, cheap and widely used technology. This project looks on reducing the cost of automation in small scale industries.

The AVR microcontroller is relatively cheap and widely available. 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. This work generally emphases on small industries. It aims to eliminate problem faced by small scale bottle filling system. With this system that operates automatically, every process can be smooth and the process of refilling can reduce the man power cost and operation time

Need of project:
The system has proved to work effectively avoiding unnecessary spill or wastage of liquids. The system also provides high accuracy and precision in proportion of liquids mixed. Although proposed system illustrates the mixing process of two liquids, any number of liquids may be mixed in varying proportions. Another challenge in front of industry is, continuous increase in the production volume, reduction in the cost and operate safely. Most important application of automation is in soft drinks bottle filling. Our project having three sections includes the Sensing the bottle on the disk then dispensing the desired amount of liquid into the bottle by the pump which is below the tank of the liquid. Then it will move the bottle over the disk. This system Reduce the human efforts and physical work, Replacing human work by technologies, Economy improvement, Perform the tasks which are beyond the human capabilities of size, weight, speed.

Objective:
1. To Detected bottle if it is place or not.
2. To rotate the disk at the particular angle under pump.
3. To fill the bottle with the required proportion.
4. to sense the faulty bottles if it is not then send to the next position.

Component Selection:

1 Steeper Motor: Steeper motor is used to rotate the disk and stop at the particular position where the Bottle is placed.

2 AVR controller: The ATmega328P is a single chip-controller. Arduino UNO board supports Arduino IDE in which the code is written and tests are performed. Arduino IDE provides multiple functionalities and huge community support. Serial monitor and plotter can be used for easy debugging and data plotting 32- represents its flash memory capacity that is 32KB. 8- Represents its cpu type that is of 8 bit. p - Simply denotes that it needs less power to work than it earlier version.

3 Relay: In relay driver circuit there are transistor, diodes and the relays. Relay driver circuit is used to control the pumps. This block can drive the various controlled devices. We are using +12V dc relay.

4 IR Sensor: IR Sensor is used to detect the initial position and to detect the bottle is placed on the disk or not. It consists of Transmitter and Receiver.

5 Leakage Sensor: Leakage sensor is used to detect if there is any leakage in the bottle.

6 Pumps: Pumps are used to pump the liquid from the two containers through two tubes and fill the bottle.

7 Connecting wire: Connecting wire is used to connecting one circuit to another circuit. Connecting wire is made of the Aluminum or alloy and it is flexible.

8 Plywood: Plywood is used to mount the electrical component. Relays, DC gear motor, Belt rolling assembly, capping assembly are placed on plywood.

9 Disk: The bottles are placed on the disk and disk is controlled by the steeper motor. The disk is also made up of plywood.

10 7805 Regulator IC: The purpose of the 7805 regulator IC is to provide undesirable quantity voltage desirable quantity voltage.

11 Linear Power supply: The power supply is used to provide the power to the whole system. 4.11 Transformer: The transformer is used to convert the AC 230v into the DC 12v power. Which is required to our system.

12 WI-FI Module: The WI-FI Module is used to connect the system remotely, so we can operate by the mobile also

Working:

In automatic filling system, the whole process must be completed without interference of human in it. The project used AVR controller which control the various component in the system. Our project consists of a Pumps connected with a pipe to fill the bottle. Pumps are placed in the two containers for the two different solution. This pumps are control by the relays. Which are 12v dc relays. The bottle are placed on the rotating disk which controlled by the steeper motor. Steeper motor rotates at particular angle and stop under the filling pipe. The bottle is filled using that pipe with one liquid in particular proportion. Then second pump is on and fill the second liquid with particular proportion. IR sensors are used to detect the presence of bottle and also detect the initial position of the disk. Leakage sensor is used to detect if any leakage in the bottle. If any leakage is detected then system will stop.

Block Diagram:

Circuit Diagram
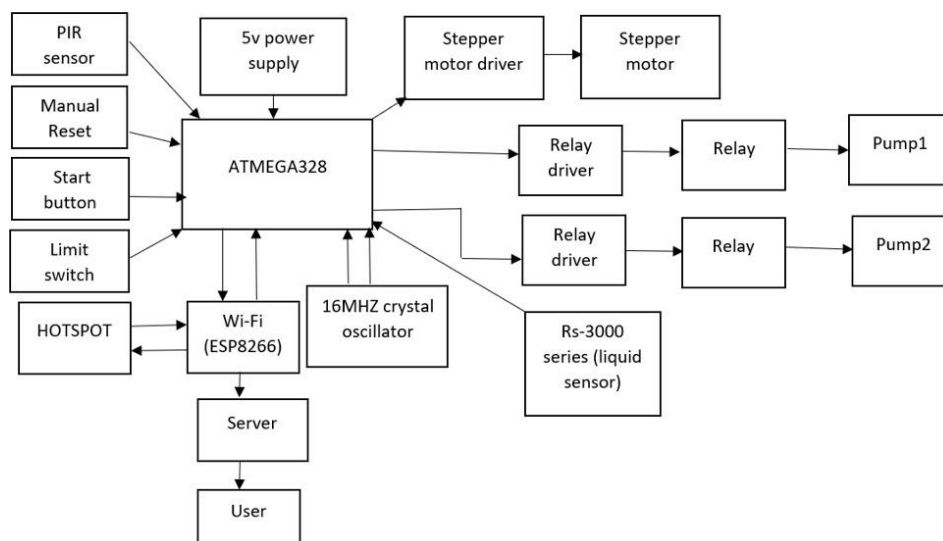
MAIN CIRCUIT DIAGRAM
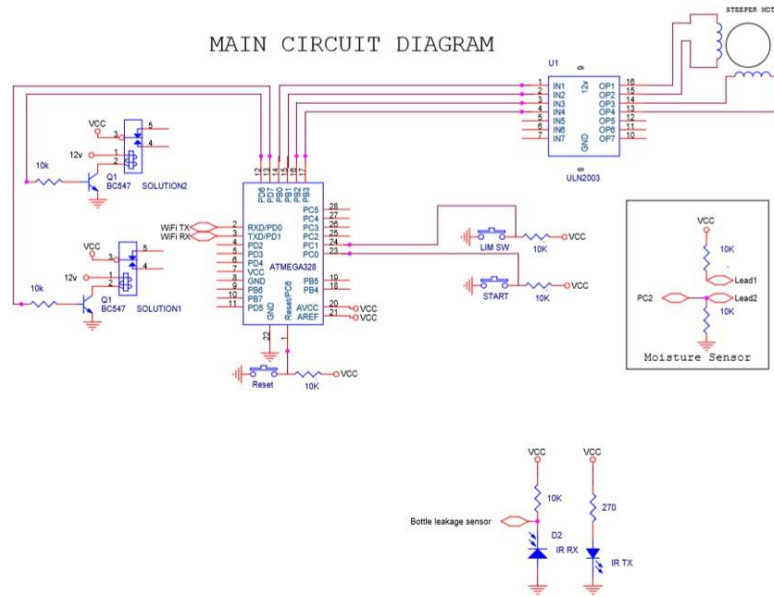
Advantages:

1. Higher Production speeds.
2. Reliability and consistency- Automatic filling machine can be allow for repeatable, reliable and consistent fill with each cycle, with based on level, volume, weight or other measurement.
3. System Helps in avoiding any spill or wastage.
4. It reduces human errors and improve accuracy of the system.

Disadvantages:
1. If the system is used in chemical industries, it may difficult for maintenance and cleaning.

Application:

1. In the food industries.
2. Chemical industries which uses highly acidic solutions.
3. Medical products like glucose bottle etc.
4. Mineral water industries.

Future Scope:
1. In future we can also build the system which also detects the faulty bottles.
2. More features can be added as depending on the size, shape and weight of the bottle, filling operation is performed.
3. Clapping operation can also be implemented is bottle is faulty and send for recycling.

Conclusion:
1. The system can perform the task of autonomous quality control system used in industrial production and it is most suitable for small
2. Scale industries as definite process is set by programming.
3. Our aim of this work is to establish a flexible, economical, easily configurable, reliable system which makes our project eco friendly because all small components that are required will be taken from scraps. This will make our project cheaper. Our project is giving us complete build up of embedded work done.

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