



# Automatic Vessel Filling System Using Raspberry-pi

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## ABSTRACT

Filling is a task carried out by a machine that packages liquid products such as cold drinks or water. Traditional methods of bottle filling involved placing bottles onto a conveyor and filling only one bottle at a time. This method is time consuming and expensive. Our paper aims at filling of bottles. The filling operation takes place in a synchronized manner. It also includes a user-defined volume selection menu through which the user can input the desired volume to be filled in the bottles. The entire system is more flexible and time saving. The filling operations are controlled using a microcontroller (arm 7 processor using raspberry-pi). This is because raspberry-pi is very flexible, cost effective, space efficient and reduces complexity. By programming the raspberry-pi in python we control the entire system. Raspberry-pi is used to monitor the process.

**Keywords:** Bottle filling, Traditional method, Raspberry-pi, Monitoring, Python

## I. INTRODUCTION

The field of automation has had 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. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provides human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an increasingly important role in the world economy. One of the important applications of automation is in the soft drink and other beverage industries, where a particular liquid has to be filled continuously. For these kinds of applications. The trend is moving away from the individual device or machine toward continuous automation solutions. Totally Integrated Automation puts this continuity into consistent practice. Totally Integrated Automation covers the complete production line, from receipt of goods, the production process, filling and packaging, to shipment of goods. Our project is also an application of automation wherein we have developed a vessel filling and capping system .The various processes are controlled using a RASPBERRY PI.

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### Objective:

The main objective of the project is to Design and Develop a Automatic liquid filling in bottles by using Raspberry Pi. To develop a filling machine which can fill different sizes of containers on the bases of height same principle can be used in different industries like medicine, oil, chemical industries for filling liquid to different sized component by one machine.

## II. LITERATURE SURVEY

### Bottle Filling Machine Based On Geneva Mechanism

#### Finding

This project was discussed about the design and implementation of automated multiple water filling machine using Geneva mechanism. Generally, the function of the machine is to fill the water automatically into bottles through a moving bottle plate. This project is the combination of Geneva and electrical synchronous motor system. This project is divided into four sections, the loading section, the bottle plate section and filling section, where the whole sections is controlled by Geneva. The entire system is more flexible and time saving.

## Conclusion

The thesis presents a automated liquid filling to bottles of different height using Geneva mechanism. A total control is made in a filling is achieved. The present system will provides a great deal of applications in the field of automation, especially in mass production industries where there are large number of components to be processed and handled in a short period of time and there's need for increased production. The solenoid valve to this system developed is flexible, quickly and easily. This will increase the total production output; this increase in production can yield significant financial benefits and savings. This concept can be used in beverage and food industries, milk industries, medicine industries, mineral water, chemical product industries and manufacturing industries.

## Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue

## Finding

In this paper we introduce the notion of water level monitoring and management within the context of electrical conductivity of the water. More specifically, we investigate the microcontroller based water level sensing and controlling in a wired and wireless environment. Water Level management approach would help in reducing the home power consumption and as well as water overflow. Furthermore, it can indicate the amount of water in the tank that can support Global Water types including cellular data loggers, satellite data transmission systems for remote water monitoring system. Moreover, cellular phones with relative high computation power and high quality graphical user interface became available recently. From the users perspective it is required to reuse such valuable resource in a mobile application. Finally, we proposed a web and cellular based monitoring service protocol would determine and senses water level globally.

## Conclusion

Water is one of the most important basic needs for all living beings. But unfortunately a huge amount of water is being wasted by uncontrolled use. Some other automated water level monitoring system is also offered so far but most of the method has some shortness in practice. We tried to overcome these problems and implemented an efficient automated water level monitoring and controlling system. Our intension of this research work was to establish a flexible, economical and easy configurable system which can solve our water losing problem. We have been used a low cost PIC 16F84A microcontroller in this system which is the key point to reduce cost. We have successfully experiment the system in lab and therefore proposed a web based water level monitoring and controlling network which flexibility would offer us to control this system from any place via internet even with different type of devices. This could have a substantial benefit from this research work for efficient management of water.

## III. BLOCK DIAGRAM

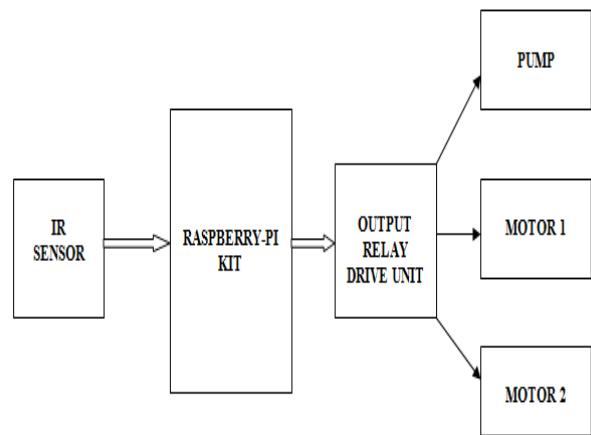


Fig 1. Block diagram of process

Once the bottles are detected in the input side the conveyor motor switches ON and it starts moving in the forward direction. The bottles then reach the desired position for filling and the conveyor stops. The corresponding pumps in process tank switch ON and filling operation takes place. For e.g. if only bottle 1 is present then pump 1 switches ON and pump 2 and pump 3 remain switched OFF. There are three tanks present in the filling side namely: process tank, concentrate tank (tank 1) and tank to store water (tank 2). Tank 1 and tank 2 have low level and high level sensors (LLS and HLS) respectively. Process tank has three level sensors (LLS, HLS and MLS). MLS is used to denote the middle level of the tank. When the liquid in the process tank reaches below low level (LLS) pumps in tank 1 and tank 2 switches on and the process tanks get filled. When the level of liquid reaches high level (HLS) the pumps in tank 1 and 2 switch off. The whole system is only works on the commands of raspberry-pi processor. Motor operation and pump operation is monitor by kit itself. As per the signals coming from main kit the conveyer belt moves. The switching of relay is done by raspberry-pi kit itself. Level sensor plays an important role in automatic vessel filling system. This system is useful for filling any liquid in particular vessel.

## IV.CIRCUIT DIAGRAM

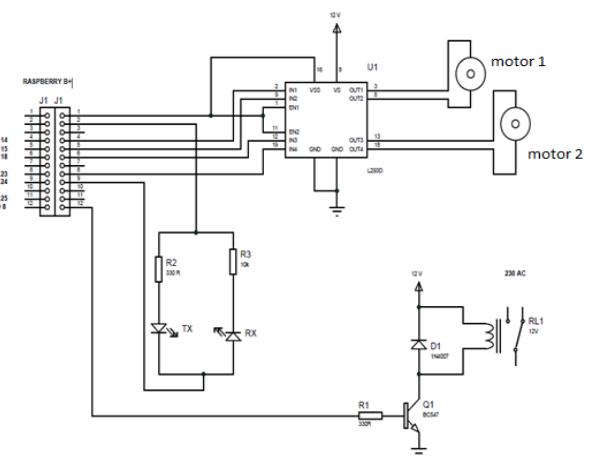


Fig 2. Circuit diagram

## V. RESULT

We have successfully done the process of vessel filling automatically by using raspberry -pi technology. Large number of vessel having same dimensions is filled with any liquid in mass quantity.



## VI. CONCLUSION

Here we have completed the project report where in we have learnt a lot of practical implementation aspects such as simulation techniques, hardware implementation, power handling capacity and so on. Automation plays an increasingly important role in the world economy. One of the important applications of automation is in the soft drink and other beverage industries, where a particular liquid has to be filled continuously. The trend is moving away from the individual device or machine toward continuous automation solutions. Our project is also an application of automation where in we have developed a vessel filling system .The various processes are controlled using a RASPBERRY PI.

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