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AUTOMATIC BOTTLE FILLING MACHINE

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Abstract

This project works at the design, development and testing of working model entitled Bottle Filling Plant. The model of Automatic Filling System is designed by using microcontroller and sensors to fill bottles. This fabrication system is used to reduce the human effort and increase accuracy of the plant, Saving of labor and time. Bottle filling machines are used in beverage and bottling industries. Some of the filling machines are commercialized as water vending machines whereby Reverse Osmosis water can be brought from by using money. The machine found on the market is high in price, requires complex changes in hardware and program configuration if varied liquid volume is required to be filled and most of the time it is not fully automatic. The purpose of this project is to develop an automatic liquid filling machine. The automatic liquid filling machine is developed to be lower in price compared to the other filling machines in the market. The machine is also easy to operate and user friendly, where simple steps are needed to operate the machine. The system operates as designed to do the operation. User will place bottle at the right place. System will start filling bottle with liquid and once bottle removed from there, liquid filling will stop automatically.

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. This problem faced by small industries compels us to take up this project. Our project is meant for small industries. It aims to eliminate problem faced by small

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scale bottle filling system. With this system that operates automatically, every process can be smooth, and the process of refilling can reduce workers cost and operation time.

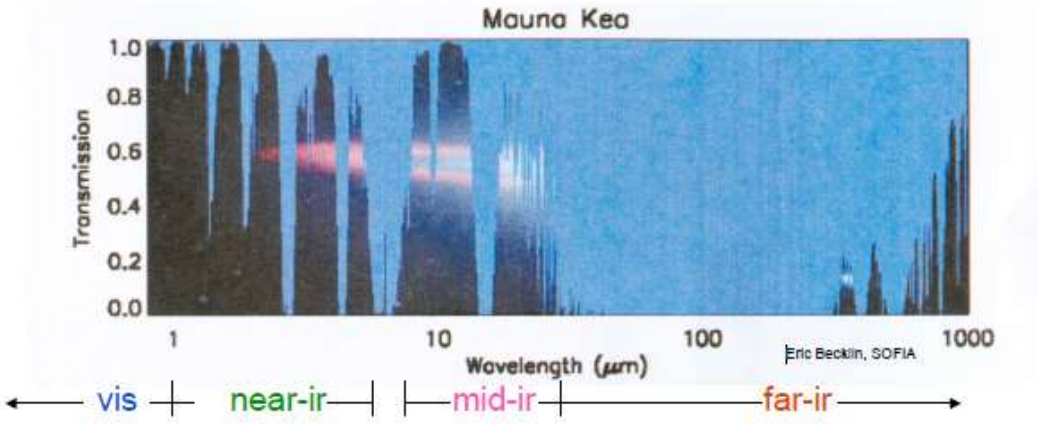
WORKING PRINCIPLE (WATER FILLING SYSTEM)

The components of the Bottle Filling System are controlled by the Microcontroller. Figure gives the pictorial representation of the various components of the bottle filling system controlled by the means of the Arduino based Microcontroller. The bottle filling process starts with the user input given through keyboard. The user input is fed into the microcontroller. The microcontroller subsequently triggers the dc motor drive circuit. This switches on the DC servo motor. The proximity sensor is capacitive in nature and triggers the microcontroller to actuate the solenoid valve, switch off the motor and start the valve to fill the liquid. When the required volume is filled, the microcontroller cuts off the excitation current to the solenoid valve.

COMPONENTS

- Sensor
- Controller
- Relay
- Pump

IR stands for “Infra-Red”. Infrared detectors/sensors are transducers of radiant energy.IR Sensor is a sensor that sends and detects IR Radiation/Signals. Infrared radiation is the portion of electromagnetic spectrum having



wavelengths longer than visible light wavelengths, but smaller than microwaves, i.e., the region roughly from 0.75μm to 1000 μm is the infrared region. Infrared waves are invisible to human eyes. The wavelength region of 0.75μm to 3 μm is called near infrared, the region from 3 μm to 6 μm is called mid infrared and the region higher than 6 μm is called far infrared. (The demarcations are not rigid; regions are defined differently by many).

- Visible: 0.3 – 1.0 μm;
- Near-IR: 1.0 – 5.2 μm;
- Mid-IR: 8 – 25 μm;
- Far-IR: 25 – 1000 μm; airborne, space

Relays and transistors compared

Like relays, transistors can be used as an electrically operated switch. For switching small DC currents (< 1A) at low voltage they are usually a better choice than a relay. However transistors cannot switch AC or high voltages (such as mains electricity) and they are not usually a good choice for switching large currents (> 5A). In these cases a relay will be needed, but note that a low power transistor may still be needed to switch the current for the relay's coil! The main advantages and disadvantages of relays are listed below:

Advantages of relays.:

- Relays can switch AC and DC, transistors can only switch DC.
- Relays can switch high voltages, transistors cannot.
- Relays are a better choice for switching large currents (> 5A).
- Relays can switch many contacts at once.

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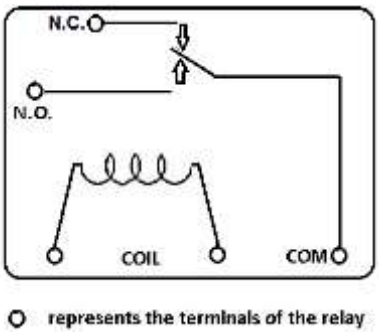
Disadvantages of relays.:

- Relays are bulkier than transistors for switching small currents.
- Relays cannot switch rapidly (except reed relays), transistors can switch many times per second.
- Relays use more power due to the current flowing through their coil.
- Relays require more current than many ICs can provide, so a low power transistor may be needed to switch the current for the relay's coil.



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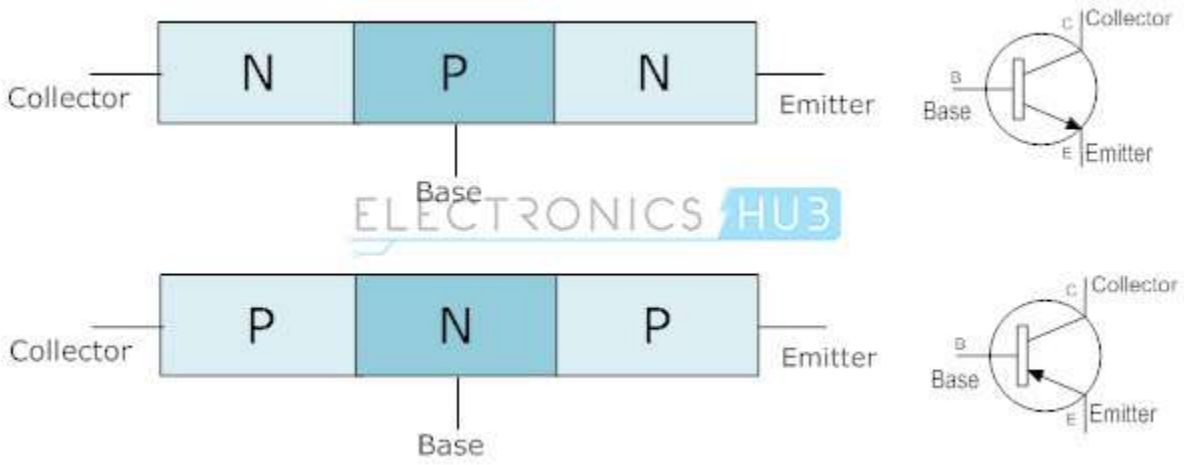

In the symbol of a transistor the arrow indicates the direction of the current flow.

The positive and negative states of voltage and direction of current flow are always in an opposite direction in PNP transistor with respect to NPN transistor. However, the operation performed by the NPN and PNP transistors are the same.

CONCLUSION

In this project we developed a automatic system for bottle filling in industries and big plants. This system will reduce cost to the company for manufacturing products. This is a very efficient and low maintenance system

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