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Need Based Automatic Liquid Filling System With PH Indication

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Abstract – This paper is a simple automated device has been designed and constructed in order to fill the bottle with a given volume of the liquid with PH indication. PH value indicates whether liquid is good or not for drinking and the PH meter measure and displays the PH reading on display unit. In traditional liquid system, liquid gets wasted due to leaky tap. So to avoid wastage of liquid, flow of liquid will be controlled based on users need. In this mechanism using a user defined volume selection menu and automatically filling necessary quantity of liquid.

Key Words: **PH Sensors, IR pair, Arduino, Relay, 16*2 LCD display**

INTRODUCTION :

Automation is used to reduce human work in the production of goods. Automation greatly decreases the need for human sensory and mental requirements. Automation plays in industrialization. One of important application of automation is in soft drink and in order industries where a particular liquid filled continuously.

Our system is also an application of automation where in we have developed a bottle filling with PH indication. The various processes are controlled using Arduino.

PROCESS DESCRIPTION :

This description gives detail information of various processes taking place in a complete bottle filling system. The detection and filling operations takes place in a sequential manner. When no bottles are kept in the input the system is reset. Depending on the number of bottles fed into the input side, the corresponding bottles are filled. The process is also provided with a user defined volume selection menu.

A. BLOCK DIAGRAM

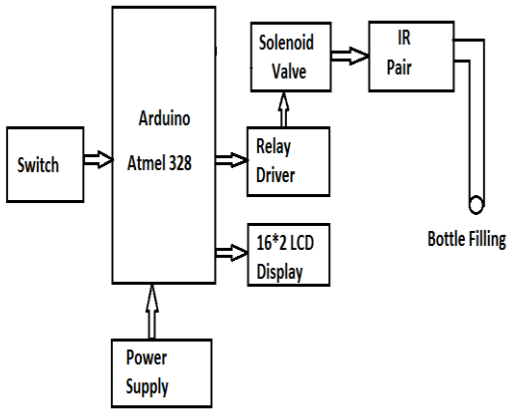

Figure 1: Block diagram

INPUT MODULE :

The input include IR sensor. The pair of IR sensor whose output given as an input to Arduino. Pair of IR sensor which is used to detect the bottle at the input. The input given through relay circuits not directly through IR pair.

PH sensor: On the PH scale a very acidic solution has a low PH value such as 0,1, or 2 which corresponds to a large concentration of hydrogen ions. All need to do is follow the included instructions for calibrating the probe and connect it to the included PH circuit.

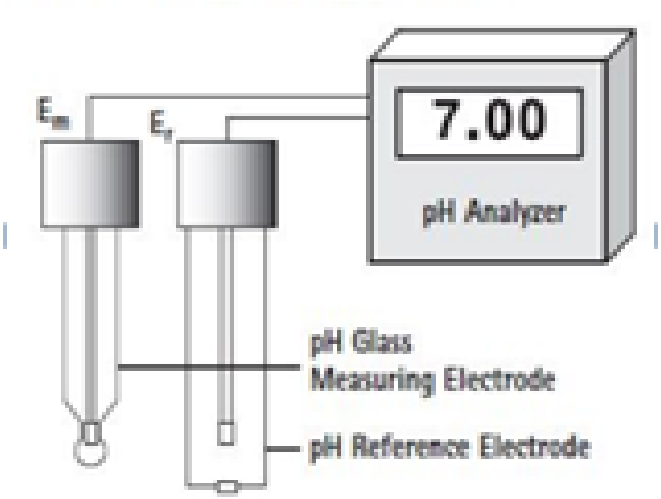

Figure 2: PH sensor

Arduino (UNO R3) :

Atmel ATmega328P8-bit Microcontroller, with 32KB of Flash memory for application programs, 2KB of SRAM, and 1KB of EEPROM for non-volatile data. The clock speed is 16MHz.

Figure 3: Arduino

IR pair :

The IR LED and Photodiode pair to detect the obstacle in-front of it. We are going to program the Arduino such that, if an obstacle is present before the IR LED and Photodiode pair with in the threshold range then filling will start.

The photodiode is operated in Reverse bias condition i.e., the long leg of photodiode goes to ground and the short leg is connected to 5 Volts supply through 3 Kohms resistor. When the photodiode detects IR rays from the IR LED which is reflected by an obstacle the photodiode conducts then, the current goes to the ground through the photodiode so, the current to the analog pin A0 of Arduino is low so that, we will get low values (around 500) from the analog pin A0 of Arduino. In case of no IR rays falls on the photodiode the photodiode doesn't conduct so the current from the digital pin 2 goes to analog pin A0 of Arduino will be around 900.

Figure 4: IR pair

Relay :

Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also set of contacts. The main operation of a relay comes in place where only a low-power signal can be used to control a circuit.

When the button is pressed the Arduino board will put pin 2 in HIGH state, meaning 5V on pin 2. This voltage is used to drive the transistor that will switch ON the relay and the load (in our case the fan) will be powered from the main power supply

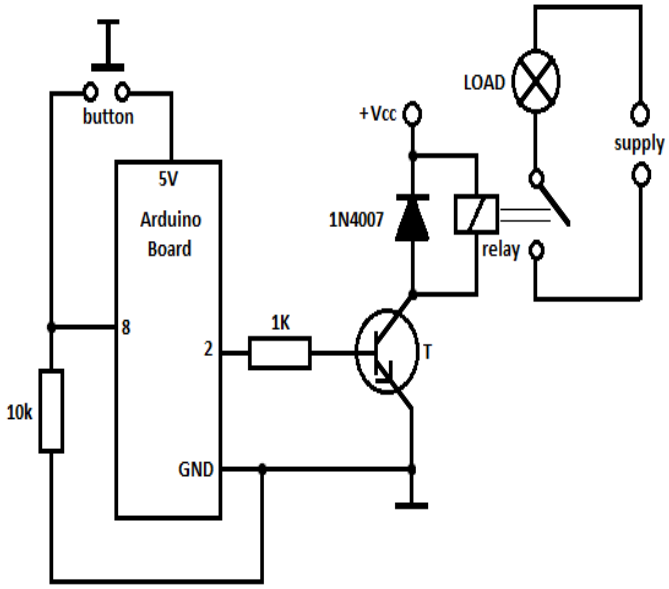

Figure 4: Relay

16*2 LCD Display :

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16*2 LCD display is very basic module and is very commonly used in various devices and circuits. Easily programmable; have no limitation of displaying special and even custom characters animations.

A 16*2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5*7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data resister stores the data to be displayed on the LCD. Click to learn more about internal structure of LCD.

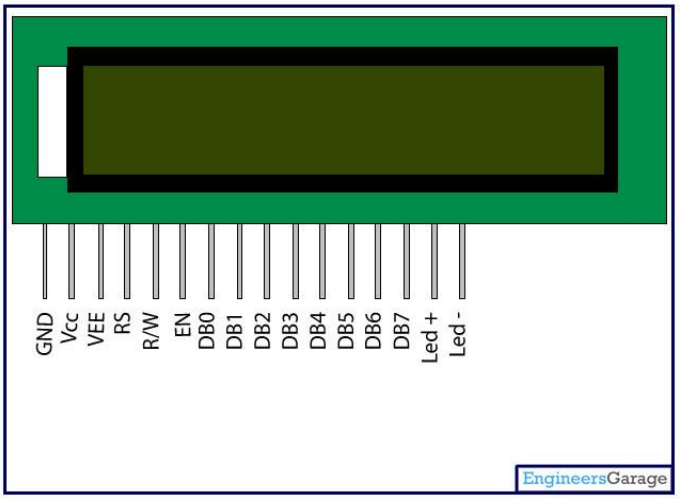

Figure 5:16*2 LCD Display

Solenoid valve :

A solenoid valve is an ordinary valves can have many ports and fluid paths. A 2-way valve, for example, has 2 ports; if the valve is **open**, then the two ports are connected and fluid may flow between the ports; if the valve is **closed,** then ports are isolated. If the valve is open when the solenoid is not energized, then the valve is termed **normally open** (N.O.). Similarly, if the valve is closed when the solenoid is not energized, then the valve is termed **normally closed**.

Figure 6; solenoid valve

User-Defined value:

The filling operation is taking place with a user defined volume selection menu. The desired volume fed depending on the volume the filling of water takes place. The filling is done using timing operations. Thus the solenoid valve remains on for the preset value of the timer and switches of once time is out. Once the filling process is done the Arduino becomes reset.

Bottle Detection and Filling Operation:

At the input side bottle is kept in position in their respective holders which are fixed. IR sensor is used to detect the presence of bottle in the holder. Depending on the output of the sensor the filling operation takes place. A time delay is given in order to set the status of bottle. If bottle is present the corresponding status bit in Arduino is set to 1 else it is set to 0. If a particular bottle is not present the corresponding solenoid valve remains OFF.

Conclusion :

This was created as fully automatic liquid filling system. The system meets the demand of high-speed production using the least mechanism requirements. The system has proved to work effectively avoiding unnecessary spill or wastage of liquids .This was to develop a liquid filling and capping system based on certain specifications. This was successfully implemented. A lot of additional features like into the Arduino an user defined volume specification etc. were added in the different stages in our work and the desired results were obtained. More features can be added to this system as follows: depending on the size, shape and weight of the containers, filling and capping operations can be implemented.

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