Automatic Lemonade Dispenser Machine

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Abstract: Lemonade is a very common drink that is enjoyed by people during summer season. Different people have different tastes, some may like more sugar and other may be fond of extra lemon syrup. In this paper, the prototype of an automated lemonade dispenser machine has been discussed; which will dispense the three liquids namely sugar syrup, lemon juice and water in different quantities as per the requirement of the user/customer. This machine design has three basic components: the microcontroller, pumping motors that pump the specified amount of a liquid into mixing container and mixing motor assembly for proper mixing of liquids at adequate speeds and for a specified amount of time.

Keywords: Microcontroller, Pumping Motor, Lemon Juice, Mixing Motor

I. INTRODUCTION

As summers arrive, people look forward to drinking lemonade to get relief from the scorching heat. More and more vendors set up shops and stalls for selling lemonade. Lemonade is currently being prepared by two ways: 1) Manual preparation, 2) Semi – automatic preparation

1. *Manual Preparation*

In this method, all work is done manually and by hand; all the raw products are assembled and then lemonade is prepared by mixing the products in assumed proportions by the person who is preparing it. This is the most common way of preparing lemonade.

2. *Semi-Automatic*

In this procedure, work is done semi- automatically by a person who has a liquid sugar syrup dispenser machine that provides sugar syrup and a machine for the extraction of lemon juice. By this way, vendor gets the sugar syrup and lemon juice and prepares the lemonade by mixing these in water. These machines help the vendor to minimize his time and efforts for slicing of lemons and then extracting its juice, and for mixing of sugar in water. This method is generally not in practice due to the machinery cost. Vendors mostly prefer manual way of preparation of lemonade than to buy fancy machinery for half of the work.

Although the number of vendors is enormous but still there is no provision of lemonade in office and other work environments, as it is not possible to station one person specifically for the job of making lemon juice. An automatic lemonade dispenser machine has been proposed in this work. The basic use of this machine is to replace and minimize human labor and limitations linked to human labor like timing, speed, skill etc.

II. MATERIALS AND METHODS

The microcontroller is the heart of this automatic system, that monitors and is responsible for all important functions in the machine. Other than the microcontroller, it has 3 individual pumps that are each in separate container containing separate liquids like sugar solution, lemon juice and water. A mixer motor is connected in a fourth container, where water, sugar solution and lemon juice will be mixed, and the lemonade drink would be ready to serve. With the help of the switches that are connected to the microcontroller, the different settings can be done to adjust the flavor of the lemonade

as per the taste of the person. For example, if we want strong lemon flavor, we will press a switch. The pump connected to the lemon juice container will work for more time, and we will get more of lemon juice and normal sugar syrup. Similarly, to get more sugar in lemonade, another switch can be pressed. One switch can be reserved for default settings, to prepare the most common flavor of lemonade. At a time, a specific motor starts to work and pumps an amount of the liquid in the mixing container connected via pipes.

The second use of the microcontroller is to command the mixing motor to mix all the components that are being poured into the mixing container, for a certain period and at a certain speed. The pumps and motor carry out the most basic and most useful work of displacing and mixing different liquids to make perfect lemonade. The flowchart of the process in shown in Fig. 1.

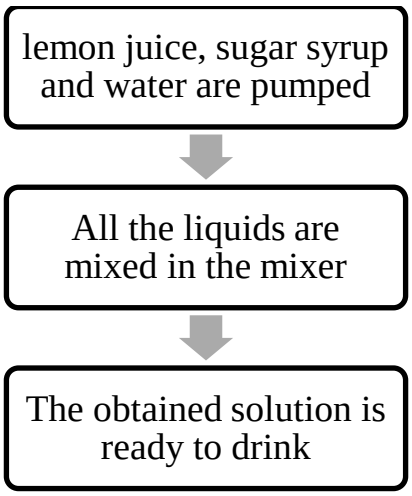

Fig. 1: Flowchart for the working of the automatic lemonade dispenser system

III. BLOCK DIAGRAM

The block diagram of the automatic lemonade dispenser system is shown in Fig. 2.

Microcontroller

The microcontroller of 8051 family specifically AT89c51 has been used in this work. The various functions of microcontroller are mentioned below:

i) Setting specific timings for pumps to operate so that when a switch is pressed a specific amount of a liquid is pumped into the mixing container.

ii) Setting specific timings for the mixing motors to operate.

Pumps: Pumps have been used to pump specific liquid in specific ratios to the mixing container for preparation of the lemonade

Pump 1: for sugar solution

Pump 2: for lemon solution

Pump 3: for water

Mixing Motor

This motor helps to properly mix all the components that are present in the mixing container for the preparation of perfect lemonade before it can be consumed.

Push Buttons

Push buttons are used for three different settings to get different tastes of lemonade.

i) First push button is programmed with default settings of equal amount of sugar and lemon and a glass of water.

ii) Second push button is programmed for more lemon juice and default settings of sugar and water.

iii) Third push button is programmed for more sugar syrup and default amount of lemon juice and water.

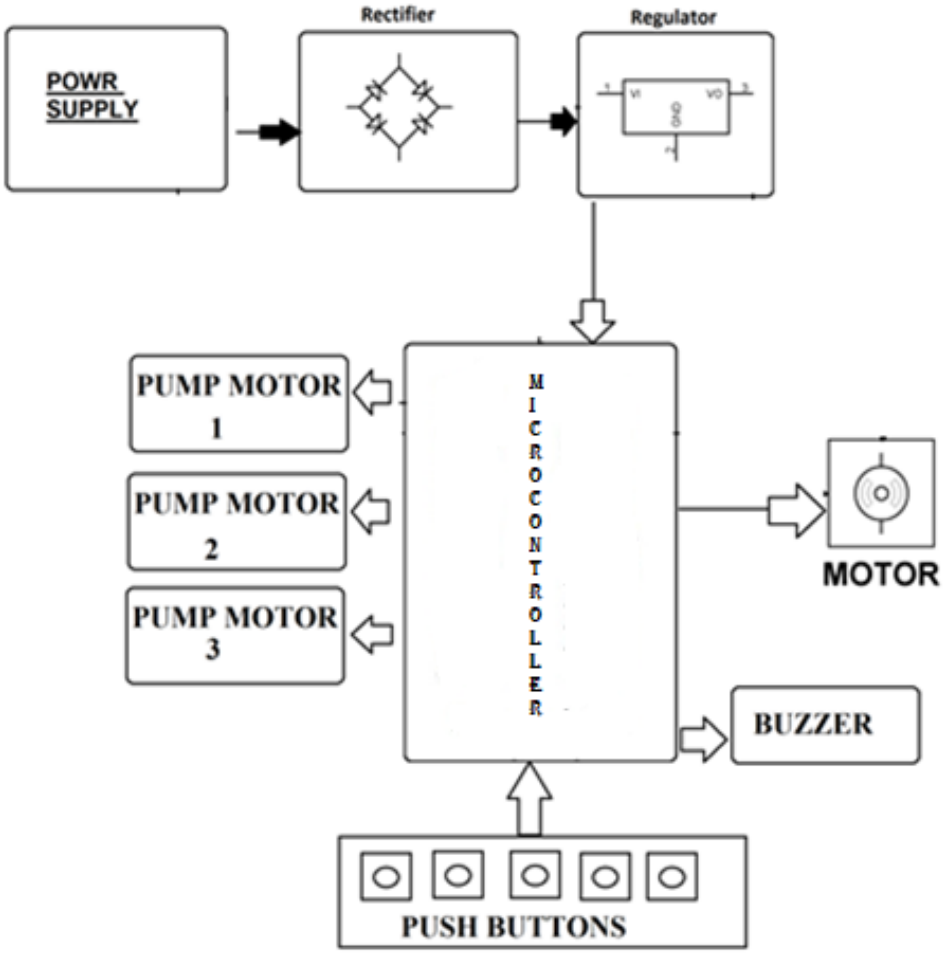

Fig. 2: Block diagram of the automatic lemonade dispenser machine

Power Supply

We need power supply circuit for converting mains AC voltage to a regulated DC voltage. This circuit consists of step-down transformer, rectifier and a regulator.

Buzzer/LEDs

A buzzer can be connected to indicate that the preparation of lemonade is done. In our work, we have connected 4 LEDs to indicate the various steps in preparation of lemonade i.e. pumping of water, followed by pumping of sugar solution and then lemon solution. At each step, one of the LED glows to indicate the step being done. Fourth LED glows when mixing is being done in the last container.

IV. RESULT

The automatic lemonade dispenser machine is shown in Fig. 3.

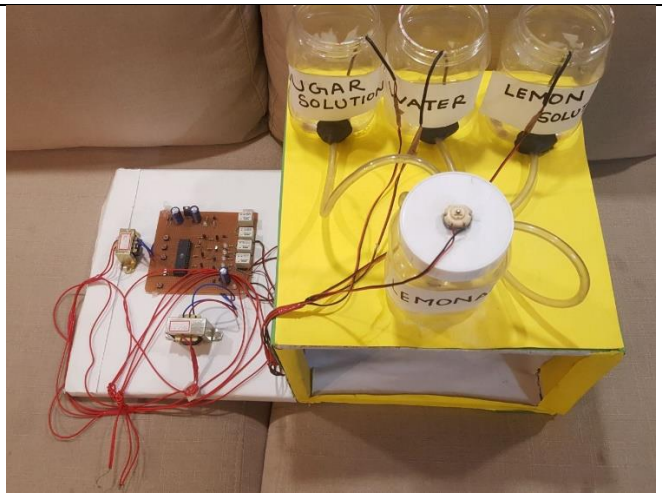

Fig. 3: Automatic Lemonade Dispenser Machine

Advantages

The proposed machine has many advantages, which are listed below:

- Refreshing experience in summers.
- Easy to install in offices.
- Hassle free preparation of drink.
- All weather availability of lemonade.
- Hygiene can be maintained.
- Standardized lemon juice strength and sugar solution strength; thus, ease of getting standard taste every time.
- Variety of taste options available

V. CONCLUSION

As technological advancements are being done day by day. Automatic systems are gaining rapid popularity. So, with the advancements in food and beverage sectors such advancement in machines such as lemonade dispenser is also a leap towards future. It makes the task easy and minimizes the human efforts. Moreover, hygienic and standardized solutions of lemon and sugar are now available, so people can consume the refreshing lemonade anytime of the day with no efforts at all.

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical statement: The authors declare that they have followed ethical responsibilities

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This volume is dedicated to Late Sh. Ram Singh Phanden, father of Dr. Rakesh Kumar Phanden.

