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Automatic Orange Juice Vending Machine

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Abstract: *The purpose of this project to construct automatically operated orange juice vending machine. The operation of this machine very easy comparatively to other machine, with good efficiency. The machine cost was less and easy to manufacture. Power consumption is low. We added one rotating wheel which can take orange one by one. The dimensions are 3 ft. height and 1.5 ft. in width and 1.5 ft. length. The two rollers and three blades are used to remove the juice from orange. A DC motors are used to drive the roller and blades and IR sensor sense the coin which we insert in the coin insertion box. The blades are used for the cutting purpose of orange. The two DC motors are used for rotating the blades and roller. In this machine does not required any other equipment to pressing action, for extraction of orange juice. Two blades are fitted parallel to each other and one blade below the parallel blade, due to this pressing action can achieve efficiently. The function of roller in this machine it can extract juice from small pieces of orange which crush by blades. The automatically operated mechanical unit consists of a pair of motors, relays, roller and blades. The gear casing was constructed using 2mm thickness of mild steel sheet. The electronic parts consist the control unit, sensor and relays. The 3 motors are attached with L293D motor driver IC which is controlled by 8051 microcontroller. The sensor is used for the monitoring the PH of juice.*

Keywords*: Vending Machine and system, DC motors, microcontroller, Rotating wheel*

I. Introduction

Automatic Orange Juice Vending Machine is the new concept to sell the Fresh, natural Juice to the customer without any high cost. The oranges are most popular fruits for juice purpose orange fruit is a specialized type of berry contain vitamin 'C'. Oranges are used for building and maintain immunity. It contains several organic acids such as citric acid and other components; which give it a distinctive flavor; and high amounts of vitamins A, B and C. It gives freshness and energy for human body.

The system start with various parts but it contain main controller part which controls the operation of machine Automatic orange juice machine provide high quality juice to the customer with less effort. Customer need to insert coin in the insertion box, IR sensor the coin and working of vending start. It gives fix quantity of juice to the customer i.e a glass. Ph and temperature sensor is used for showing the acidity and alkalinity of the juice it gives data to user. The machine can move from one place to another without any effort. Efficiency of machine is good compare to other machine.

II. Material AndStages

- **Stages**

1. First Stage: Manual operation
2. Second Stage: Orange rotating wheel
3. Third stage: Cutting operation and collection of juice in box

- **Materia**l

1. Microcontroller 8051
2. Motor Diver IC L293D

3. IR Sensor
4. DC Motor
5. Gear assembly
6. Cutting Blades
7. Rotating wheel
8. Crusher Box
9. Roller
10. Roller Box
11. Level Sensor
12. PH sensor
13. Temperature sensor
14. Frame Structure

III. Process Methodology

1. **First Stage**: Manual operation

   a) Switch on power.
   b) Insert coin.
   c) IR sensor sense coin.
   d) Place orange in the orange tray.
   e) Rotating wheel start.

2. **Second Stage**: Orange rotating wheel

   a) Rotating wheel collect the orange at specific time interval which is set in microcontroller program.

3. **Third stage**: Cutting operation and collection of juice in box

   a) Crusher collect oranges from spinner to chop orange in small pieces .
   b) Roller press the pieces at high pressure due to this orange juice flow from the orange juice tray and collect in box.
   c) Roller and Crusher is the heart of the system.

A. IR Sensor:

IR Sensor is used as a coin detector. When we insert the coin in coin insertion box. It detect thecoin due to change in electromagnetic radiation. Its operating voltage is 5v.

B. PH and Temperature Sensor:

PH and Temperature sensor is used for measuring(monitoring) pH and temperature of orange juice.

C. Level Sensor:

It is used in juice collecting box to sense the level of juice in the box. It send the level measuring data to microcontroller due to this we control the rotating wheel, roller and crusher

D. Rotating wheel

It is wheel which can be used for the taken orange in the orange tray. With the help of orange tray it passes towards the crusher and roller. Rotating wheel drive/rotate with DC motor

System Design:

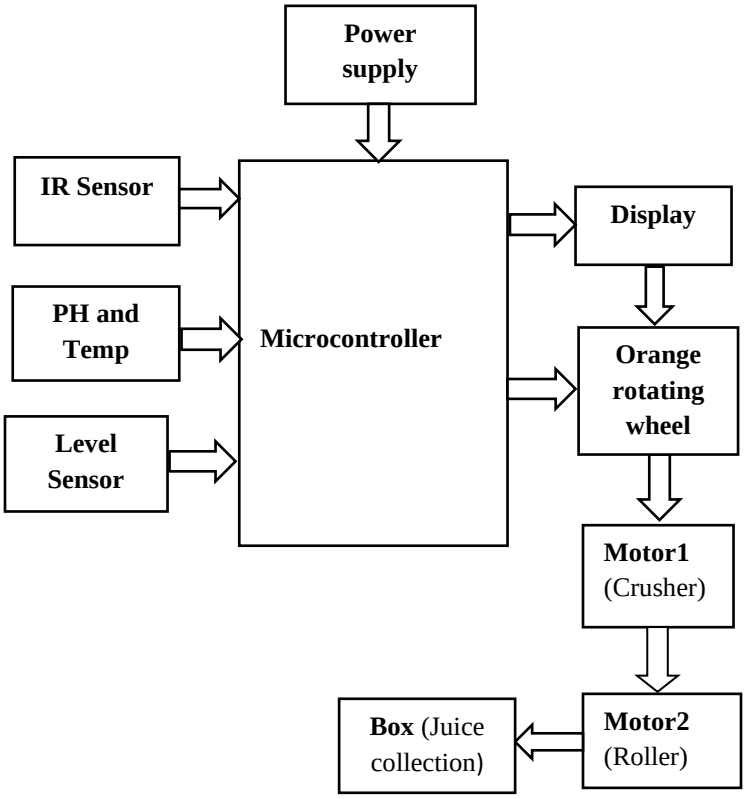

Figure1: Block Diagram of vending machine

Power Supply 5V Diagram:

5V power supply required for system

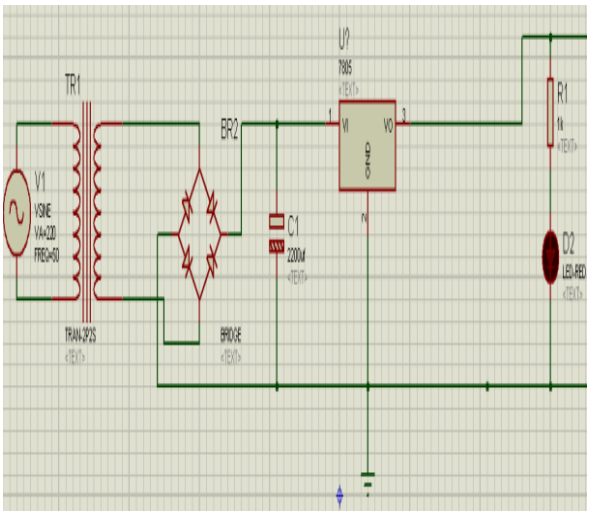

Figure2: Power supply circuit Diagram

Mechanical System:

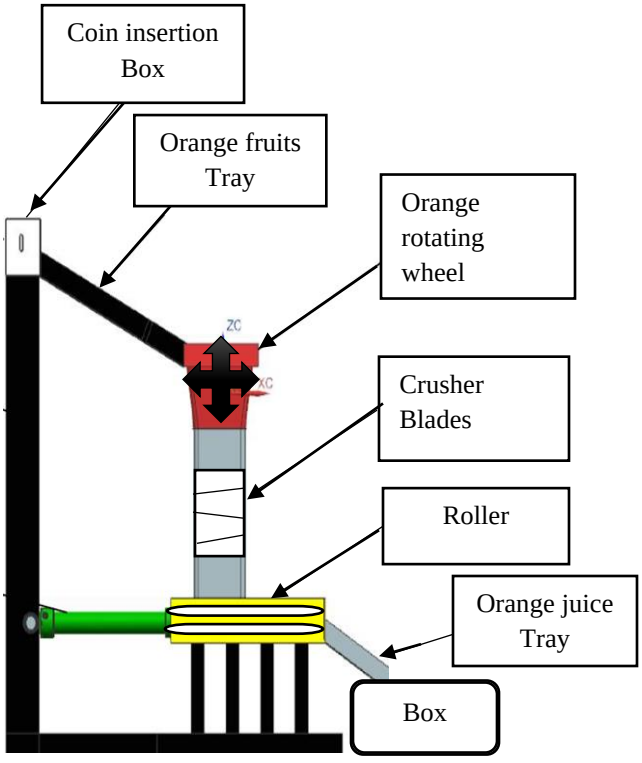

Figure3: mechanical Diagram vending machine

IV. Literature Survey

1. In article [1.1], Sylvester A. Aye et al., shows that The orange juice extraction has been designed and constructed using scientifically and engineering principles[1.1]. The juice extraction is achieved by means of small sharpened blades on a shaft which rotates with the aid of the bevel drive[1].
2. In article [1.2], Preetilatha R et al., shows that Vending machines have become an increasingly important distribution channel in public and private sectors[1.2].It also says embedded based systems are designed to achieve a low cost, portable and accurate system[1.2].
3. In thesis [1.3], M.S. Wani et al., described the Automation is the rage of the engineering field[1.3].We have found from the review on the lemonade machine few drawbacks are seen such as high investment cost compare to other, additional man power, impact of environment , time consumption caused by the lemonade machine[1.3].
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V. Conclusion

In this system, we introduce a smart automatic vending machine which can control the operation of orange juice. To implement the system we develop a sensor and DC motor combination which consists of a rollers, motors, sensors, and controllers. The former is installed in the machine and the later interacts with a customer. By the application, a customer identities the cleaning status of the machine as well as inputs his/her own preference on the taste of juice. The efficiency of the system is more as because of DC motor which is connected to the gear assembly. The power loss is less. The Time required for the juice is minimum and it is more relevant.

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