

SMART FOOD DISPENSING MACHINE

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Abstract

India is home to largest number of malnourished children in the world. One of the major causes for malnutrition in India is economic inequality. The high number of underweight children under five a result of malnourishment and poor nutrition education. Women who suffer malnutrition are less likely to have healthy babies. Millions of children's sleep hungry across India and world, as they do not have money nor work to get money to buy food to eat and live happily. Author therefore intended to provide a solution by constructing food-dispensing machine, which dispense food to needy people. This food is distributed to needy peoples those who collects waste plastic bottles from street and insert it into machine. People who insert bottle in machine can have choice to select option to have food of packed dry food, reward money or grain. This machine can have capability to check number of bottles inserted in machine. Therefore, that person will get amount of food equal to number of bottles inserted in machine. By this way, the huge amount of waste plastic bottle can be easily collected and hungry people will have access to food whenever they need it. Not only hungry peoples, anyone can have access to this machine i.e. old peoples, small children's etc.

Keywords: Bottles, Dispensing, Food, Machine, Malnutrition, Nutrition, Plastic, Waste.

1. Introduction

One of the major causes for malnutrition in India is economic inequality. Due to the low social status of some population groups, their diet often lacks in both quality and quantity. Women who suffer malnutrition are less likely to have healthy babies. Deficiencies in nutrition inflict long-term damage to both individuals and society. Compared with their better-fed peers, nutrition-deficient individuals are more likely to have infectious diseases such as pneumonia and tuberculosis, which lead to a higher mortality rate. In addition, nutrition-deficient individuals are less productive at work. Low productivity not only gives them low pay that traps them in a vicious circle of under-nutrition, but also brings inefficiency to the society, especially in India where labor is a major input factor for economic production. On the other hand, over-nutrition also has severe consequences. In India, national obesity rates in 2010 were 14% for women and 18% for men with some urban areas having rates as high as 40% [6]. Obesity causes several non-communicable diseases such as cardiovascular diseases, diabetes, cancers and chronic respiratory diseases.

2. Literature Review

Indian Railways installed its very first 'Swachh Bharat Recycle Machine', at the Churchgate station in Mumbai

on June 5 2016[9]. These machines crush used plastic bottles and users got an instant reward in the form of discount coupons and mobile recharges. Each machine, which cost Rs 7 lakh, has the ability to crush 500 bottles in a day[9]. The Railways is hoping that if this initiative works out, the number of used plastic water bottles on rail tracks will soon become a thing of the past, at least in some parts of Mumbai. These machines could soon be in nine other stations in the city: Mumbai Central, Dadar, Bandra (local), Bandra terminus, Santacruz, Andheri, Goregaon, Borivali and Bhayandar in the future.

In return for their bottles, commuters can choose between getting coupons (for discounts of 5% to 10% at Sahakari Bhandar and Reliance Fresh or Paytm credits) or to donate the equivalent amount to Wockhardt Foundation. Most users have opted for the coupons. Railway officials says that the feedback they are getting is that commuters feel pride at contributing to the Swachh Bharat scheme and are happy to get getting coupons.

Sarah Tantray, general manager, Wockhardt Foundation, said that they were happy to contribute to the Swachh Bharat scheme: "I appeal to passengers to help us and the railways to be clean." Ms. Tantray said that the foundation has not approached Central Railway for a similar arrangement at their stations, but it does want to install machines in high-traffic areas like airports, bus stations, schools and colleges, and shopping malls and super markets, and they had talks with food and beverage franchises to machines in their premises as well. The

recycled material can be used to make fabric for T-shirts, bags, towels and other such items. Western Railway has deployed staff near the machines to guide the passengers in how to use the machines.

3. Objective

There are three main objectives behind making this machine as follow:

- To avoid plastic waste.
- To serve unutilized food to needful peoples.
- To utilize unused manpower to clean plastic waste.

In Swachh Bharat Recycle Machine, users will get an instant reward in the form of discount coupons and mobile recharges[9]. However, this reward i.e. discount coupons and mobile recharges are not useful to all peoples as well as small children's, because some peoples do not have smartphone or paytm account to redeem these coupons. So this invention aiming to develop a smart food dispensing machine which collect the plastic waste and not only gives coupons as a reward but also it will gives option to user to have nutritional chocolates, packed food, packed unutilized food or grain from machine. So every person can able to get benefit from this machine. All the social functions and social joints in India (specially the northern and central parts), for instance weddings, canteens, hotels, social and family functions, households, throw leftover food as a waste food.

According to the report in the journal, up to 40 per cent of the food produced in India is get waste. This invention smart food dispensing mechanism will collect unutilized consumable food, wrap them in good packaging and store them into the machine with food time and expiry time. If that packed food is not collected by anyone before expiry time then machine will automatically throw them in garbage bin. This machine can be used or operated by NGO's, government, hotels, restaurants, canteen etc. The status and alerts of this machine wirelessly updated to people who are register and have access to fill machines excess food or leftover food. This status includes amount of food remaining in machine, number of peoples access the machine, amount of bottle collected etc. The machine can also have option to power by solar energy and battery. Collected plastic waste is crushed and kept into the container. All functionality of machine is automated.

4. Implementation

Food dispensing machine is an embedded system in which Raspberry pi and FPGA will be used for controlling all functions of vending machine as shown in Fig. 1. The Raspberry Pi is a low cost, credit card sized computer and FPGA is an integrated circuit which will be programmed in the field. Fig. 2 shows the mechanical layout of the machine. At starting Raspberry pi initialized all devices i.e. display, GSM module, sensors. After initializing system, it continuously checks if start button is pressed. Once start button is pressed then machine will opens the bottle-collecting lid. When person inserts the bottle in

collector machine, it will close the lid once all bottles are put inside the machine. The various sensors will check whether it is plastic waste or any other waste. If collected waste bottle is plastic bottle then that bottle will be crushed and kept into the container. If it is not plastic waste then that waste will be discarded and thrown out from another hole. When this process is over machine will again open the lid to accept another bottle. Sensors in machine will counts the number of plastic bottles and sends this count to controller.

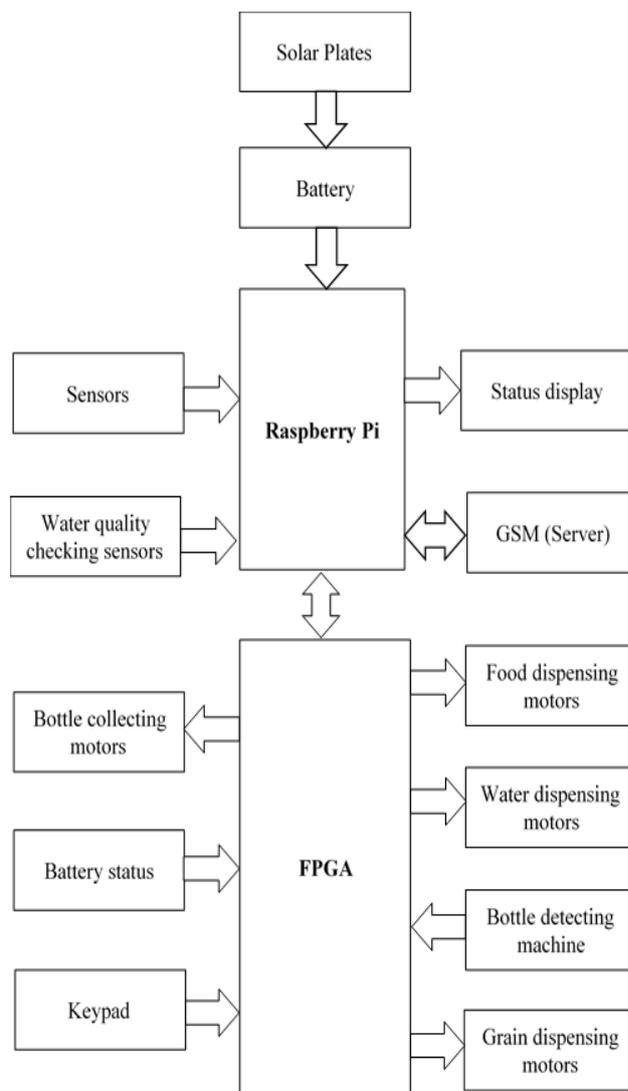


Fig. 1 Block diagram of system

After pressing start button again controller will shows options to user for accessing reward against collecting bottles. If person selects option of nutritional chocolates then Raspberry pi will sends command to FPGA to turn ON nutritional chocolate dispensing mechanism. Machine will dispense nutritional chocolate through chocolate dispensing nozzle as shown in Fig. 2. If person selects option of packed food, then Raspberry pi sends command to FPGA to torn on packed food dispensing mechanism. Machine will dispense food through food dispensing nozzle. If person selects option of grain, then Raspberry pi sends command to FPGA to turn on grain dispensing

mechanism. Machine will dispense grain through grain dispensing nozzle. If person selects option of reward, then Raspberry pi asks for phone number to user by displaying message on display. Person can enter mobile number using keypad. Then machine will send reward on that mobile number. Every details of user and food gets updated on server by using GSM module.

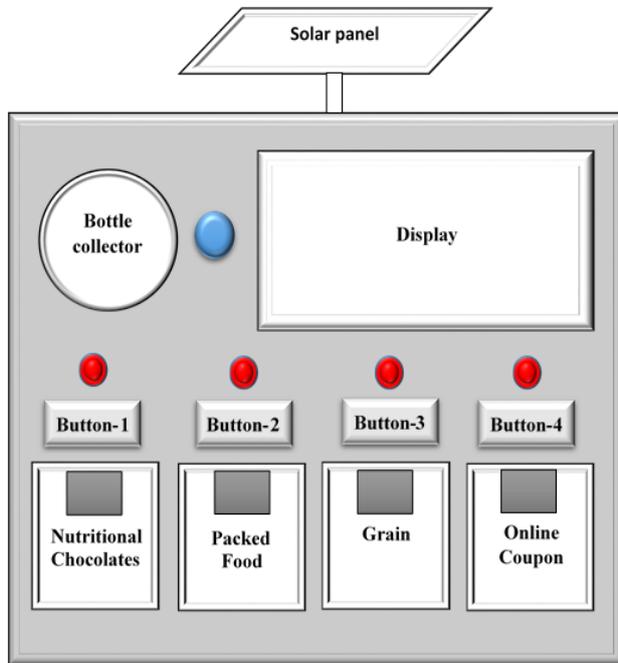


Fig. 2 Layout of system

Whole system is battery operated. Battery is charged using solar panels. Status of battery is updated on server. By this way machine will dispense food to those people only who do some work i.e. waste bottle collection.

5. Advantage of machine

- Spreads environmental awareness.
- Collected plastic directly processed.
- Reduce air and water pollution.
- Limit waste in landfills.
- Leftover consumable food is properly used.
- All status of machine can be monitor from anywhere.
- Waste plastic bottles gets collected properly.
- Whole system is powered by solar power.

6. Results

6.1 Zybo and Servo interfacing:

Servo control is achieved by sending a servo a PWM (pulse-width modulation) signal as shown in Fig. 3, a series of repeating pulses of variable width where either the width of the pulse (most common modern hobby servos) or the duty cycle of a pulse train (less common today) determines the position to be achieved by the servo. The PWM signal might come from a radio control

receiver to the servo or from common microcontrollers such as the Arduino.

Servos are connected through a standard three-wire connection: two wires for a DC power supply and one for control, carrying the control pulses. The parameters for the pulses are the minimal pulse width, the maximal pulse width, and the repetition rate. Given the rotation constraints of the servo, neutral is defined to be the center of rotation. Different servos will have different constraints on their rotation, but the neutral position is always around 1.5 milliseconds (ms) pulse width.

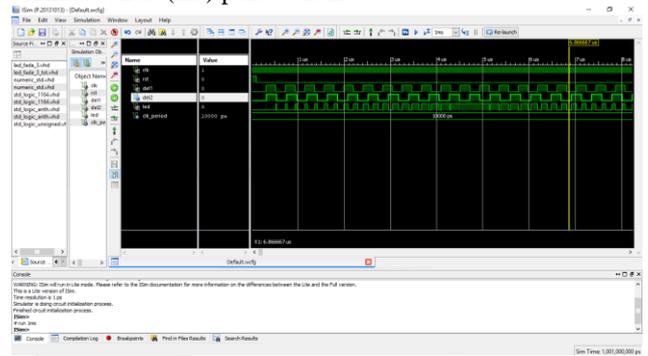


Fig. 3 PWM wave simulation for servo motor movement

6.2 Zybo and keypad interface:

Matrix keypad consists of a set of buttons similar to an alphanumeric keyboard provided with keys usually marked with letters or numbers and various extra keys. Embedded systems which require user interaction must be interfaced with devices that accept user input such as a keypad. Keypads arranged by matrix format, each row and column section pulled by high, all row lines and column lines connected by the I/O pins. Fig. 4 shows interfacing of keypad with FPGA.



Fig. 4 FPGA and keypad interfacing

7. Conclusion

The vending machine and bottle shredding technology are already available. Here in this paper, author combining these two systems to make smart food dispensing machine, which collects bottles and dispense unutilized food to needful peoples. By this way the huge amount of waste plastic bottle can be easily collected and hungry people will also have access to food whenever they need it. This helps to reduce air and water pollution. It spreads environmental awareness among the peoples.

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