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Smart Food Dispensing Machine

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Abstract: India is home to largest number of malnourished children in the world. The high number of underweight children under five a result of malnourishment and poor nutrition education. Women's with lack of malnutrition will gives birth to unhealthy 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

The main reason for malnutrition in India is economic inequality. Over 22% population of India below poverty level. Some of them do not get food at proper time. They sleep hungry whole day. Women's with lack of malnutrition will gives birth to unhealthy babies. Shortage of proper nutrition in body will cause long term damage to body. As compared to well-nourished people, peoples with malnourished are more likely to infectious diseases of gastroenteritis and measles which cause to a higher mortality rate. Lack of nutrition also effect on working capability of people. Peoples with insufficient nutrition are not able to do work efficiently. Such persons with low efficiency in work will paid low & because of low payment they are not able to buy good nutritional food and trap in circle of under-nutrition .This cause major impact on economic growth of our country.

2. Literature Review

On June 5, 2016, Indian Railways established the first 'Swachh Bharat Recycle Machine' at Churchgate Station, Mumbai [9]. These devices crush the used plastic bottles and offer instant rewards to users. These reward is in the form of discount coupons and mobile recharge. Cost of each machine is 7 lakh rupees. It has a capacity to crush and store 500 bottles in a day

Railways expects that if this initiative works, then there will be less number of waste plastic bottles on railway tracks. Railway is planning to install this machine to Dadar, Goregaon, Borivali, Santacruz, Mumbai Central, Bhayandar , Bandra terminus, Andheri and in the future.

In 'Swachh Bharat Recycle Machine' commutators are getting 5-10% discount coupons on Sahakari Bhandar and Reliance Fresh or Paytm credits in return for their bottles. Machine also have option of donate the reward money, if he do not want to redeem the reward. But most of the peoples will choose the reward option. The commutators of railway feels pride at contributing to the Swacch Bharat scheme. They are happy for getting coupons in return for their bottles.

The waste plastic material collected by machine is used to make fabric for utensils, T-shirts, towels, bags, roads, toys and other such items. To guide the passengers on how to use the machine, the railway has deployed personnel near the machine.

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' commutators are getting reward in form of 5-10% discount coupons [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, and 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. Fig. 1 shows the proposed system architecture. All functionality of machine is automated.

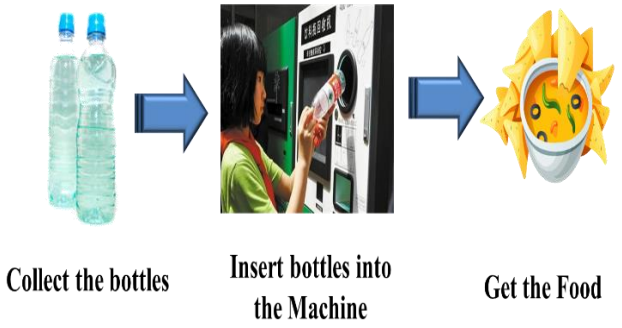

Fig. 1 Proposed System Architecture

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. 2. 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. 3 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.

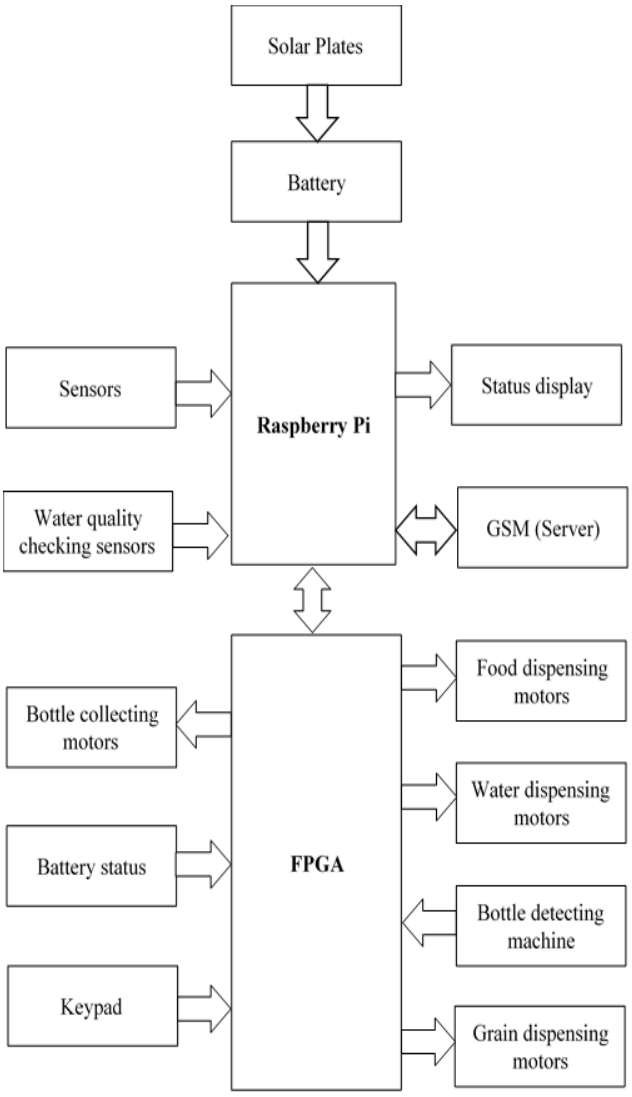

Fig. 2 Block diagram of system

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. 3. 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.

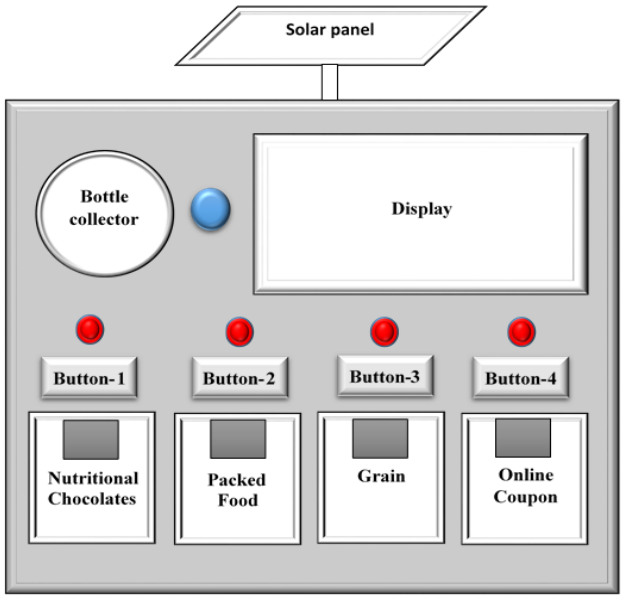

Fig. 3 Layout of system

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 motor is type of motor whose angular position is controlled with PWM (Pulse Width Modulation) signals as shown in Fig. 4. Servo motor have 3 wires, in which two wires are used to power up the servo motor and third wire is control signal wire through which control signal from controller is given to servo motor. Each pulse should have minimum width of 1 ms and maximum width of 2 ms. When 1 ms pulse given from controller servo angle sets to 0 degree and when 2 ms pulse given to servo then servo angle sets to 180 degree. This servo is used to control lid of machine and to dispense food packets from machine.

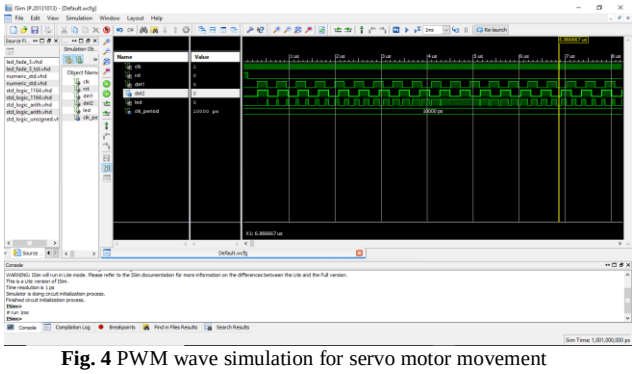

Fig. 4 PWM wave simulation for servo motor movement

6.2 Zybo and keypad interface:

Matrix keypad has of a set of buttons like alphanumeric keyboard which consist keys usually marked with letters or number. This keys are arranged in matrix form. Code is written on zybo board to read the status of keyboard. The row and column pin of matrix keypad is connected to port of zybo board. As shown in Fig. 5 Zybo FPGA board continuously reads the keypad status and actuate the respective leds. This keyboard is used to select and navigate the required option in food dispensing machine.

Fig. 5 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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References

[1] Dumpayan, W. G. P., De Mesa, M. L. M., Yucor, N. D. F., Gabion, E. T., Reynoso, J. D., & Geslani, G. R. M. (2017). Two-way powered microcontroller-based plastic bottles "drop-and-tap" reverse vending machine with stored value system using radio frequency identification (RFID) scanner technology. 2017IEEE 9th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM). doi:10.1109/hnicem.2017.8269433

[2] Karin, M. F., Noor, K. S., & Zaman, H. U. (2016). Hardware based design and implementation of a bottle recycling machine using FPGA. 2016 IEEE Conference on Systems, Process and Control (ICSPC). doi:10.1109/spc.2016.7920701

[3] Hong Gu, Shuang Qiao, & Jiang Tian. (2006). A Wireless Vending Machine System Based on GSM. 2006 6th World Congress on Intelligent Control and Automation. doi:10.1109/wcica.2006.1713637

[4] Krishna, V. V. S. V., Monisha, A., Sadulla, S., & Prathiba, J. (2013). Design and implementation of an automatic beverages vending machine and its performance evaluation using Xilinx ISE and Cadence. 2013 Fourth International Conference on Computing, Communications and Networking Technologies (ICCCNT). doi:10.1109/icccnt.2013.6726639

Websites:

[5] http://cpcb.nic.in

[6] https://www.who.int

[7] https://www.tomra.com/en/collection/reverse-vending

[8] http://www.reversevending.co.uk/

[9] https://www.scoopwhoop.com/These-Swachh-Bharat-Machines-Will-Crush-Used-Plastic-Bottles-And-Give-You-Recharge-Coupons-In-Return/