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Design of Automatic Candy Mixer using Blynk and NodeMCU ESP8266

by Hugeng Hugeng, Khefin Khefin, Meirista Wulandari

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Abstract Candy has many variations based on shape, texture, and taste. The more variations of the product have an effect on more consumers, Candy products also have a lot of variety, which makes mixing candy an interesting task. The mixing process of candies is usually done by weighting them manually with conventional scales, so there are some deficiencies to be improved. The automatic candy mixer using Blynk and NodeMCU ESP8266 has been designed to be able to help with the process of mixing and weighting candy automatically. This device allows users to choose weight and candy types to be mixed, whether it is one type of candy or more, from the Blynk application and is operated using a microcontroller and sensor. The utilized sensor is a load cell sensor with 1% of calibration inaccuracy.

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Design of Automatic Candy Mixer using Blynk and NodeMCU ESP8266

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ABSTRACT: Candy has many variations based on shape, texture, and taste. The more variations of the product have an effect on more consumers, Candy products also have a lot of variety, which makes mixing candy an interesting task. The mixing process of candies is usually done by weighting them manually with conventional scales, so there are some deficiencies to be improved. The automatic candy mixer using Blynk and NodeMCU ESP8266 has been designed to be able to help with the process of mixing and weighting candy automatically. This device allows users to choose weight and candy types to be mixed, whether it is one type of candy or more, from the Blynk application and is operated using a microcontroller and sensor. The utilized sensor is a load cell sensor with 1% of calibration inaccuracy.

KEYWORDS: Candy; automatic; NodeMCU; blynk

1. Introduction

Candy is a type of snack product that is generally made of sugar or sweetener, water, food flavorings, and food coloring. There are various types of candy based on shape, texture, and taste. Several types of candy are often mixed into one package so the consumer can obtain a variety of candies in one package. The variety of a product is one of many factors that might impact on customer satisfaction. The greater the variety of products, the more appealing they are to consumers [1]. Candy, as a product that has plenty of variations in shape and taste, motivates a small industry to develop an automatic device for mixing it. Mixing candy is an activity for mixing a variety of candies into one package. The mixing process of candies involves the type and weight of candies. A type of candy could have a different weight. Weighing is a process to measure the sum of candies' weight. The weighing process in conventional candy stores is usually done manually using conventional scales. This conventional scale has some deficiencies that need to be improved.

Due to [2], automatic weighing and packaging machines for small-scale industries and grocery stores can manage to do all the processing steps for weighing and packaging the product without any external help. According to [3], an automatic weighing and packaging machine is the cheapest machine which would automate this process of weighing and packaging with almost negligible chances of error in weight measurement. Based on two previous research studies, an electronic sensor known as a load cell could improve weight

measurement cell sensor assists the process of weighing to become more efficient [4]. By applying a load cell sensor on a digital scale, the weighing process could be done in detail. Therefore, an automatic mixing candy machine could be designed and developed with some additional features such as the Blynk application and the WiFi module ESP8266 NodeMCU. In this research, we designed and implemented an automatic candy mixer that can be operated wirelessly.

2. Materials and Methods

The implemented automatic candy mixer that uses Blynk and NodeMCU ESP8266 consists of a mixer Android application module, a processing module, a container module, and a weighing module. Figure 1 shows the block diagram of the device. The Blynk app is an Internet-of-Things (IoT) platform that allows remote control of electronic devices [5-6].The Blynk application can be used as an Application Programming Interface (API), making it a mixer application module which displays a selection of virtual buttons and widgets representing the desired candy type and weight options [7].

The NodeMCU is an Arduino board which runs on the ESP8266 module [8]. The ESP8266 module is used for WiFi network connectivity between the microcontroller itself and the WiFi network. The features of the ESP8266 are able to enhance some WiFi-enabled devices that are enabled to program and connect to the Internet uncomplicatedly [9]. The NodeMCU serves as a data processing center, receiving data from the mixer application module over the WiFi network.

The container module consists of a PET plastic jar, an MG90S servo motor, and a PCA9685. PET plastic jars are used as containers to accommodate the candy to be mixed or weighed. This transparent plastic makes it easy to monitor the volume of candy it holds. A MG90S servo motor is used to open and close the valves on each container. The PCA9685 is an I2C-bus for optimizing servo motor applications that controls a 16-channel servo motor controller [10]. PCA9685 is used to allow the microcontroller to control more servo motors.

The weighing module consists of a load cell, an HX711, and a servo motor. The load cell is used to detect the weight of the candy flowing from the container module. The output of the load cell will be passed to the HX711. The HX711 serves to amplify the output generated by the load cell so that it can be processed by the microcontroller [11]. The servo motor serves the flow of the results of weighing candy into the candy container and ready to be packaged.

3. Results and Discussion

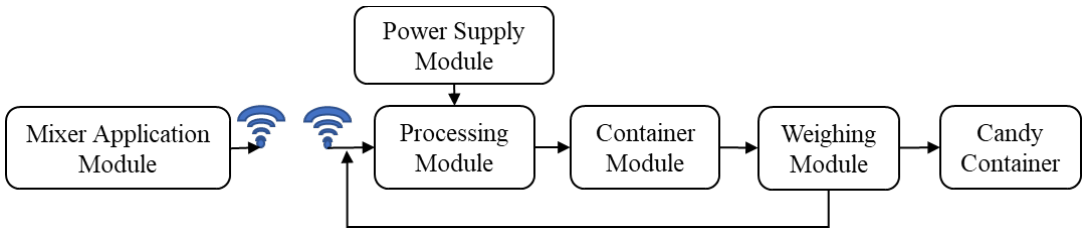
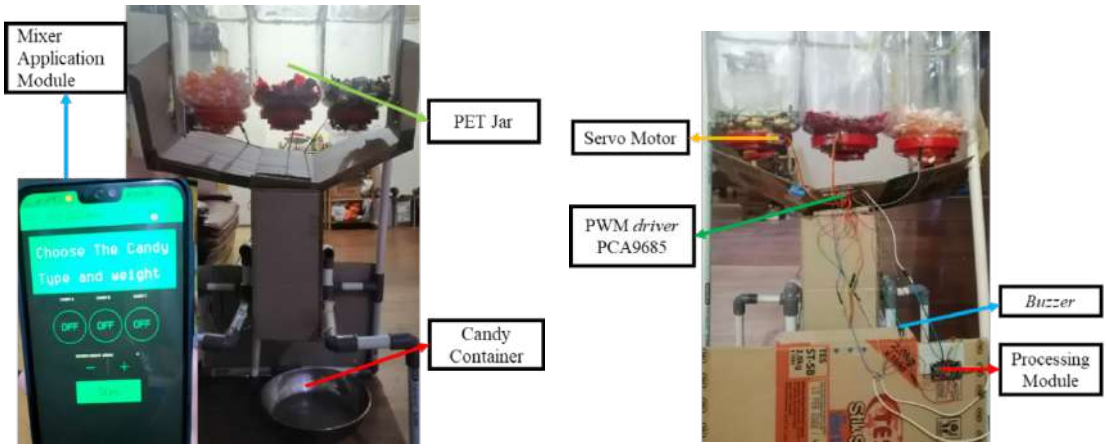


Figure 1. Block diagram of automatic candy mixer.

Based on the block diagram in Figure 1, an automatic candy mixer is created. The realization of the candy mixer weigher can be seen in Figure 2. Figure 2(a) shows the front view of an automatic candy mixer consisting of a PET jar and a mixer application module. Figure 2(b)

shows a rear view consisting of a processing module and a container module consisting of a PCA 9685 servo motor. The processing module is wired directly to the container module and weighing module. The mixer application module connects wirelessly with the processing module via a WiFi network.



(a) (b)

Figure 2. Realization of automatic candy mixer (a) Front View; (b) Rear View.

Figure 3. Realization of mixer application module.

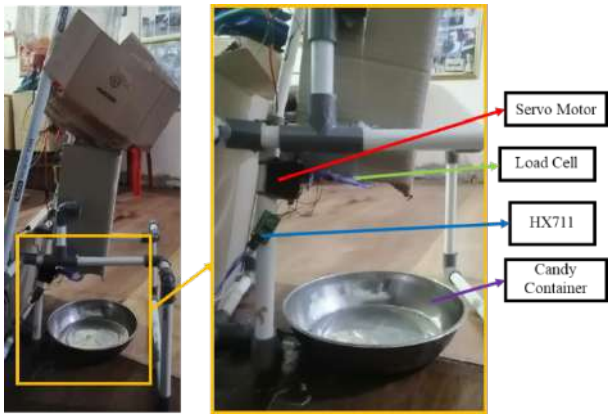


Figure 4. Realization of weighing module.

Several modules, such as the mixer application module and the weighing module, were tested. The mixer application module was tested to ensure the ability of the mixer application to connect and send commands to the processing module wirelessly. The mixer application module includes four virtual buttons and one H-step widget that are shown in Figure 3. Virtual buttons have two states: high and low, which indicate whether the key is pressed or not pressed. The result is that the mixer application was able to connect and send commands to the processing module properly.

The weighing module was designed by integrating a load cell with the HX711 and processed by NodeMCU. Figure 4 shows the realization of the weighing module. The weighing module is compared to conventional and digital scales. Comparisons were made to determine the accuracy of the weighing module from the average presentation of weighing results. The comparison of the weighing module with a conventional scale can be seen in Table 1. A comparison of the weighing module with a digital scale can be seen in Table 2.

Table 1. Comparison of weighing module with conventional scale

Conventional Scale (grams)	Weighing Module/Load Cell Sensor (grams)	Weight Difference (%)
50	53	6.00
100	101	1.00
150	156	4.00
200	203	1.50
250	255	2.00
300	304	1.30
350	353	0.80
400	401	0.25
450	450	0.00
500	501	0.20
550	552	0.36
600	598	0.30
650	653	0.46
700	705	0.70
750	752	0.26
800	801	0.10
850	854	0.47
900	900	0.00
950	951	0.10
1000	998	0.20
Average Weight Difference (%)		**1**

(a) (b) (c)

Figure 5. The shape of candy used: (a) candy A; (b) candy B; and (c) candy C.

Some cases were applied to determine the ability to mix candy. The cases include 2 things: the first is the type of candy, and the second is the weight being weighed. The type of candy used includes all the possible types of candy to choose from. The weight that was chosen is 500 grams. The type of candy used for weighing or mixing is hard candy. These hard candies also come in different flavors and sizes. The shape of the candy can be seen in Figure 5. The purpose of the cases is to show that the automatic candy mixer using blynk and NodeMCU can weigh various types of candy available at a certain weight. Table 3 shows the results of the tests carried out by weighing all the choices of types of sweets selected up to 500 grams. The weighing process was carried out by the weighing module. Based on the results of the pictures and measurements, the types of candy selected can be weighed appropriately and can also be mixed accurately.

Table 2. Comparison of weighing module with digital scale

Digital Scale (grams)	Weighing Module/Load Cell Sensor (grams)	Weight Difference (%)
50	51	2.00
100	101	1.00
150	150	0.00
200	200	0.00
250	249	0.40
300	300	0.00
350	351	0.30
400	400	0.00
450	450	0.00
500	500	0.00
550	549	0.20
600	598	0.33
650	647	0.46
700	699	014
750	747	0.40
800	798	0.25
850	848	0.23
900	895	0.56
950	947	0.31
1000	996	0.40
Average Weight Difference (%)		**0.35**

Table 3. Result of overall system test

Sample case	Results	Explanation	Sample case	Results	Explanation
Candy A weighs up to 500 Gram		Candy A's Weight is Appropriate	Candy A and C weigh up to 500 Gram		Mixing Weight of Candy A and C is Appropriate
Candy B weighs up to 500 Gram		Candy B's Weight is Appropriate	Candy B and C weigh up to 500 Gram		Mixing Weight of Candy B and C is Appropriate
Candy C weighs up to 500 Gram		Candy C's Weight is Appropriate	All three types of candy weigh up to 500 Gram		The Mixing Weight of The Three Kinds of Candy Is Appropriate
Candy A and B weigh up to 500 Gram		Mixing Weight of Candy A and B is Appropriate			

4. Conclusions

Based on the testing results of the realized automatic candy mixer, it is concluded that the options for the type of candy and the desired weight through the blynk application can be

received and processed properly to weigh all kinds of candy options that can be chosen. The accuracy of weighing carried out by the load cell sensor has an average weight difference of 1% compared to a conventional scale and 0.35% compared to a digital scale. This shows that the weighing module using a load cell has an inaccuracy below 1%.

Competing Interest

The authors declare no financial or non-financial competing interests.

References

[1] Delarosa, M.; Dharmesti, D.; Nugroho, S.S. (2013). The Antecedents of online customer satisfaction and customer loyalty. *Journal of Business and Retail Management Research*, *7*, 2. https://doi.org/10.24052/JBRMR/123.

[2] Das, D.G.J.; Midha, K.; Kushwaha, O.S. (2021). IRJET- Automatic Weighing and Packaging Machine for Small Scale Industries and Grocery Stores. *International Research Journal of Engineering and Technology, 6*, 2129-2138.

[3] Hambir, P.; Joshi, N.; Karande, P.; Kolhe, A. (2019). Automatic Weighing and Packaging Machine. *International Research Journal of Engineering and Technology, 6*, 2131–2138.

[4] Guin, P.; Roy, A. (2016). Design of efficient loadcell for measurement of mechanical impact by piezoelectric PVDF film sensor. *AIP Advances*, 6, 095122. http://dx.doi.org/10.1063/1.4964148.

[5] Durani, H.; Sheth, M.; Vaghasia, M.; Kotech, S. (2018). Smart Automated Home Application using IoT with Blynk App. *2018 Second International Conference on Inventive Communication and Computational Technologies (ICICCT)*, 393–397. https://doi.org/10.1109/ICICCT.2018.8473224.

[6] Ginting, S.; Simatupang, J.W.; Bukhori, I.; Kaburuan, E.R. (2018). Monitoring of electrical output power-based internet of things for micro-hydro power plant. *2018 International Conference on Orange Technologies (ICOT)*, 1-7. https://doi.org/10.1109/ICOT.2018.8705786.

[7] Dhanalakshmi, S.; Poongothai, M.; Sharma, K. (2020). IoT Based Indoor Air Quality and Smart Energy Management for HVAC System. *Procedia Computer Science*, *171*, 1800–1809. https://doi.org/10.1016/j.procs.2020.04.193.

[8] Barai, S.; Biswas, D.; Sau, B. (2018). Estimate distance measurement using NodeMCU ESP8266 based on RSSI technique. *2017 IEEE International Conference on Antenna Measurements & Application CAMA*, *2*, 170–173. https://doi.org/10.1109/CAMA.2017.8273392.

[9] Mesquita, J.; Guimaraes, D.; Pereira, C.; Santos, F.; Almeida, L. (2018). Assessing the ESP8266 WiFi module for the Internet of Things. *2018 IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 784–791. https://doi.org/10.1109/ETFA.2018.8502562.

[10] Shende, A.P.; Anande, R.S. (2019). Motion Imitation Robotic Arm, (MIRA). *International Research Journal of Engineering and Technology, 6,* 352-358.

[11] Aprilyana, G.; Setioningsih, E.D.; Triwiyanto, T. (2019). Design of Force Meter for Traction Unit. *Indonesian Journal of Electronics Electromedical Engineering and Medical Informatics*, *1*, 57–60. http://dx.doi.org/10.35882/ijeeemi.v1i2.2.