Design Build an Automatic Granulated Sugar Vending Tool Microcontroller Based

Yusriza Eka A'shar[1], Aad Hariyadi[2], Mohammad Abdullah Anshori[3]
[1,3] Digital Telecommunication Network Study Program,
Electrical Engineering Departement, State Polytechnic of Malang, 65141, Indonesia
[2] Telecommunication Engineering Study Program,
Electrical Engineering Departement, State Polytechnic of Malang, 65141, Indonesia

[1]yusrizaekaa@gmail.com, [2]aad.hariyadi@polinema.ac.id, [3]anshori_ma@polinema.ac.id

Abstract—**Trader and distributor of 50 kg of cane sugar from Kebonagung in the District Batu Kota Batu will be packed again, then it will be re-sell to trader small or consumer direct in accordance with request order. Every order of sugar will be made per pack, namely 1 kg, 2 kg and 3 kg and the amount are according to request and there are also those who place orders online via WhatsApp. Sugar distributors are currently still using manual scales to pack the sugar and must measure the sugar to produce a scale according to the weight of the sugar. This study designed an automatic tool to overcome this problem by designing a Microcontroller-Based Automatic Sugar Vending Tool with a sugar capacity of 10kg and a load cell of 5 kg and a sugar ordering application . The resulting tools and applications are can produce tools selling granulated sugar automatically based on purchase weight, a minimum purchase of 500 grams while a maximum of 3 kg, based on a nominal amount of money (rupiah) a minimum purchase of IDR 7,000 while a maximum of IDR 42,000 and after weighing the sugar can be packaged directly using a sealer and the application can be used to place sugar orders between sellers and customers with orders of 1 kg, 2 kg, 3 kg, the quantity ordered, find out sugar orders and delivery costs. The success rate of measurement on the load cell is 10 times with a weight the percentage of success is 99.00%.**

Keyword— Application, Microcontroller, LOAD CELL, Trader Distributor, Sugar, Sugar Cane.

I. INTRODUCTION

The development after the development of technology in these various fields aims to increase the value of quality and facilitate the activities carried out by humans. For example, in trade, one of the supporting factors in the process of selling sugar is scales. The current weighing of sugar is still done manually by distributor traders so that it requires labor And time Which long [1]. Method weighing sugar Which There is Now Still done in a manner manuals by trader distributor with measure especially formerly forget heavy Which in accordance so that method Work the need time Which Enoughlong and thorough. From the results of a survey that was carried out directly to the location, there were as many as 20 SMEs selling sugar in carrying out their daily operations, many sugar traders in Batu City still use manual scales. Basically, there are two types Traders are wholesalers or distributors and small traders or retailers. Wholesalers is intermediary between producer with merchant's retail. Trader big buy product to producer in amount big to resell to retailers. TraderSmall traders are traders who sell goods direct to consumer end For necessity personal [2]. By Because That, inprocess packaging trader sugar very many orders for the purchase of sugar. Sugar which is important commodity Indonesian society and world international.

Besides rice, corn and tubers root, the benefits of sugar as a source of calories for society, Wrong One food main just for meet basic needs and main sweeteners Which used as material raw on food and Drink. Sugar divided several types include cane sugar made fromsugar cane and is usually used to sweeten tea, coffee and other, sugar sand rough Which has a larger and coarser texture than sugar sand on generally, sugar beam Which made of from sari sugarcane. shape resemble dice block with pure white color, rock sugarobtained from the processing of ordinary granulated sugar so that easy late. shape is chunk sugar resemble rock colored white,where the level of sweetness of rock sugar is lowercompared to sugar [3]. Sugar production from the Kebonagung factory is packed in sacks large which usually weighs 50 kg each respectively the sack for distributed to trader distributor sugar sand the. Trader distributor sugar sand sugarcane Which sell sugar to consumers need to package sugar cane in a sack into a bag plastic with heavy certain in accordance with The usual size for sale is 500 grams up to 3 kg.

Application of ordering sugar made online is currently still using via Whatsapp to make order transactionsby seller and customer. See example this, this research has the aim of give solution overcome it, whichpreviously use method manuals developed in a manner automation for trader distributor and can done purchase based on nominal Money as well as online ordering application. To do the weighing process that will be packaged to in pocket plastic through process measuring and adjusting the weight of the sugar in weigh [4]. Digitalization and automation Which used to traders will be designed and applied so that make it easy trader while doing weighing and sell buy in life daily. Based on explanation Which be delivered,

objective Which want to achieved in study This is make tool weighing Which will used Power capacity 10 kg and *LOAD CELL* 5 kg with purchase offline based on heavy with maximum weighing of 3 kg and a nominal amount of money with minimum Rp 5,000, maximum purchase 42,000 and application booking sugar in a manner on line.

II. METHOD

A. Diagram Blog

Figure 1 is diagram block on planning system which done for prepare based tools and applications microcontroller.
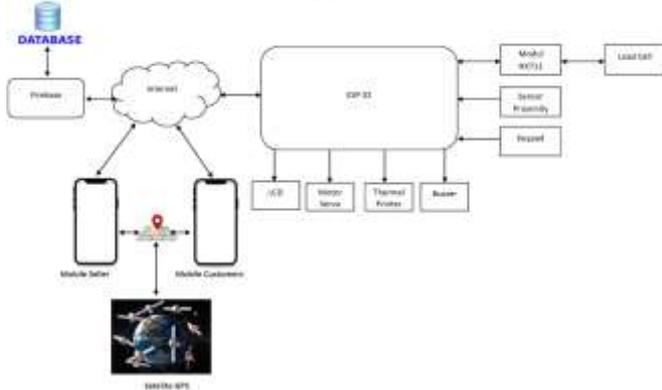

Figure 1. Blog diagrams of how tools and applications work.

Microcontroller is a computer system Which whole or part big the elements packed in One chip IC, so thatoften called single chips microcomputer. Generally a microcontroller IC is composed of one or more processor cores (CPUs), memory (RAM And ROMS) And device inputs And output programmable [5]. In figure 1 isblock diagram tool to know the work processof the device, sensors and outputs are used for connected to ESP 32 as microcontroller. The proximity sensor is a sensor that functions as a sugar detector. This sensor takes advantage of the presence of electromagnetic radiation so that it can report detected objects [6]. Sensors load cell is something tool the transducer produce that output proportional to the applied load. The load cell is a dispensing device signals proportional electricity with burden received [7]. These load cell sensors will be used to measure the weight onsugar sand that is start 500 grams until 3 kg. Motorcycle Servos is a device as modifier energy electricity Become a mechanic with speed acceleration control and accuracy Which tall.Circuits that use servo motorswill produce a digital input as well analog [8]. Motorcycle servo will usedfor the process of opening and closing the box Which turn by 180 °.

LCD (Liquid Crystal displays) as media come on stage Which use liquid crystal asmain viewer [9]. LCD will display information on the unit price and heavy Which used moment processsuse tool. Keypad part important from somethingdevice electronics requiring human interaction. Keypad used is keypads 4x4 [10]. Keypad on design tool This will used for enter the unit price and weight on sugar sand. ESP32 microcontroller Which introduced And developed by expressive System HalThis make planning hardware onESP32 becomes very easy because only need A little component external [11]. ESP 32 function microcontroller for process

results inputs and results output. Buzzer is A component electronics Which function For changevibration current become vibration sound [12]. The buzzer is used when there is a supply of sugar runs out it will produce a sound that signify supply sugar run out. On the application using android study for the program. Android Studio is Integrated Development Environment (IDEA) official for development application Androids [13]. For firebase database is used to store customer data and storage of the amount of sugar that has come out. Firebase is a service from Google For provide convenience even easier for application developers in develop the application [14]. Whereas GPS used for knowing location seller and customer which through satellite GPS [15].

B. Tool Design and Tool Planning Series

Tool design is used to determine the location placement sensors and output moment makingtool and planning Which will used to make tool. On planning tool measurer sugar sand automatic aim to put tools or components neater and sturdier so as to avoid disturbance or damage tool. Tool size with long 50 cm, width 40 cm, height 100 cm and powercontainer sugar on maximum tool 10 kg, as shown in the Figure 2.
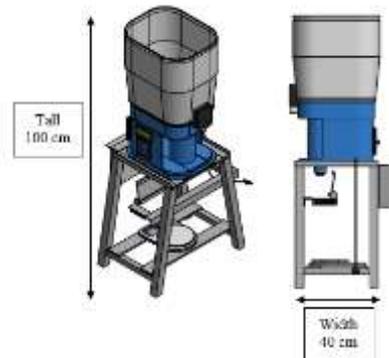
Picture 2. Tool planning design from the left side and right side with a height of 100 cm and a width of 40 cm.
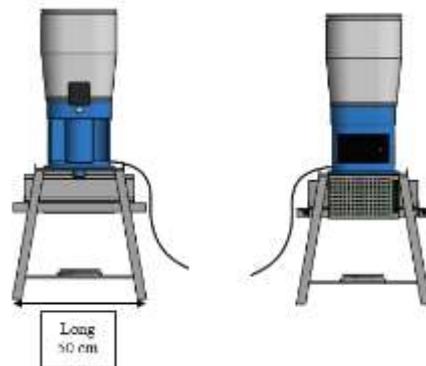

Picture 3. Tool planning design from the front and back with a bottom length of 50 cm.

Figure 3 depicts process Work tool that consist,

1. For Power tamping sugar sand sugarcane Which used maximum is 10 kg and a *LOAD CELL* with a capacity of 10 kg. *Proximity* sensor and *buzzer* are used to detect sugar supply.

2. When tool light up, enter keypads for choose price and heavyafter according to choice Which will be used.
   - For do weighing started from 0 or process tare that isto initial setting pressing the A button on *the keypad.*
   - For choice First with determine heavy like 1 kg, 2 kg and 3 kg, then push B button on *the keypad.*
   - For choice second with enter based on nominal Money pressing the C key on *the keypad.*
   - For start weighing with push knob D on *keypads.*
3. For LCD will displays choice based on choice Which in usein accordance pressing a key on *the keypad.*
4. After selecting the weight option issued (example 1kg), then the motor servo will turn on to open valve on sugar.
5. If you choose an option based on nominal money (example IDR 7,500), so servo motors will light up for open valve on sugar.
6. sensors load cell will weigh sugar in accordance by choice (e.g. 1kg), with walk process the LCD will displays information heavy Which issued.
7. If choose based on nominal Money (example Rp 7,500), so load cell sensor will weigh sugar in accordance with results Which issued isheavy based on purchase nominal Money. With walk process the LCD will displays information heavy Which issued.
8. After the load cell sensor has finished weighing the sugar, the servo motor will close. Sugar output itself can be seen on the LCD screen
9. After finishing weighing the sugar, the sealer will glue the plastic together so that the sugar is packaged.
10. Thermals the printer that is next to will emit note asproof sugar payment transactions.

The design that will be made to facilitate system creation requires a series of systems. Below Figure 4 shows the electronic circuit of the microcontroller-based cane sugar measuring system hardware.
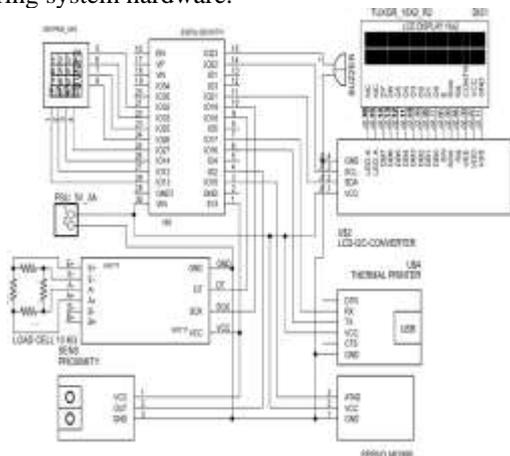
Picture 4. Electronic circuit of microcontroller-based cane sugar measurement system hardware.

C. Application Design

1) *Application Logo:* App logos play an important role in establishing brand identity, communicating value and creating a strong first impression on users. A logo is not just a visual element, it is also a representation of the app's brand image and identity. With the right logo design, an app can differentiate itself from competitors, make recognition easier, and increase a positive impression on users. Therefore, design application used by customer and the seller has a logo and meaning on the logo. On logos application picture basket is shopping sugar can do booking through application, picture tick is right choice fast service and app name is my sweet sugar Which It means sugar my sweet.

Figure 5. The logo used for an application called my sweet sugar.

2) *Customer Application Design:* For design application customer register your full name, address, telephone, email and password, as shown in the Figure 6.

Figure 6. Application design for customer login and registration.

On the first menu is buy products, when you press buy products then will appear product Which for sale that is sugar sand with choice heavy 1 kg,2 kg and 3kg as well as price from sugar, as shown in the Figure 7.

Figure 7. Application design for product menus and product purchases.

On the second menu is the transaction. This transaction to see history booking sugar Which has ordered, as shown in the Figure 8.

Figure 8. Customer purchase transaction history menu.

3) *Seller Application Design:* For design seller application login as seller with e-mail and password Which has made, thenthere is choice of products to sell, as shown in the Figure 9.

Figure 9. Design applications for login and products sold to owners.

On menu to two application seller that is menu transaction Which used to view sugar ordering transactions, as shown in the Figure 10.

Figure 10. Design transaction order history for customers.

On the third menu, namely the seller profile which includes the seller's profile name,location, phone number and e-mail, as shown in the Figure 11.


Figure 11. Sugar seller profile design.

D. Flowchart System Work

Study This use diagram flow (*flowchart*) For help process analysis of solving problem.

Following flowchart method Work tool *LOAD CELL* and print note, as shown in the Figure 12.
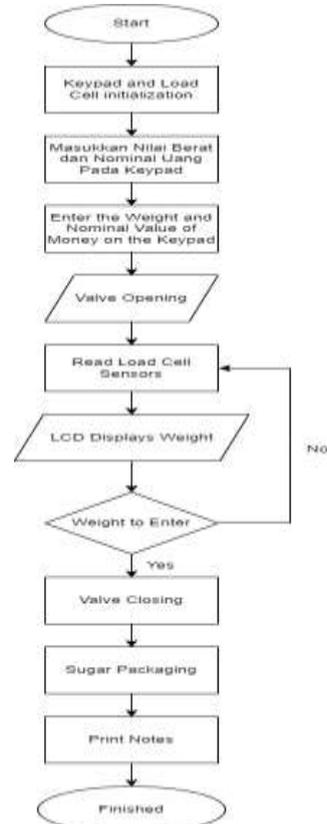
Picture 12. Flowchart tool for how a cane sugar measuring tool works.

Following for flowchart sensors *proximity* and *buzzer* is used to detect inventory sugar, as shown in the Figure 13.
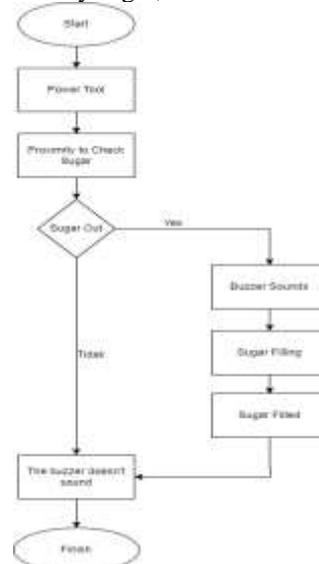
Picture 13. Flow diagram of how buzzer and proximity work.

To use this application, customers must scan the available QR code or send the application via WhatsApp by the seller. After that, the customer will install the application. After successfully installing the application, customers can enter it and register by filling in information such as name, address, telephone number, email, and password that will be used to log into the application. After registration is complete, customers can place orders for sugar by entering the desired amount, and then proceed to the payment process to complete the order transaction. After the order has been packed by the seller, the customer will receive a notification through the application confirming that the order has been packed and ready to be picked up or delivered, as shown in the Figure 14.
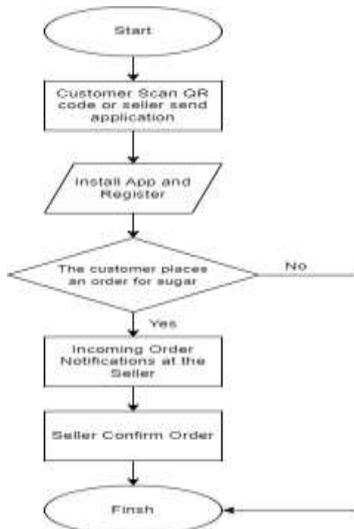

Figure 14. Flowchart of ordering sugar via application.

III. RESULTS AND DISCUSSION

A. LOAD CELL Calibration

Calibrate *the LOAD CELL* to get float calibration results by assembling *the LOAD CELL* connected to the HX711 module after that it is connected to ESP 32 and to the Arduino program select *example- hx711- calibration*. For the *calibration program*, the DOut pin is connected to D18 ESP 32, while SCK is connected to pin 19 ESP 32 and then uploads the calibration program to Arduino, as shown in the Figure 15.
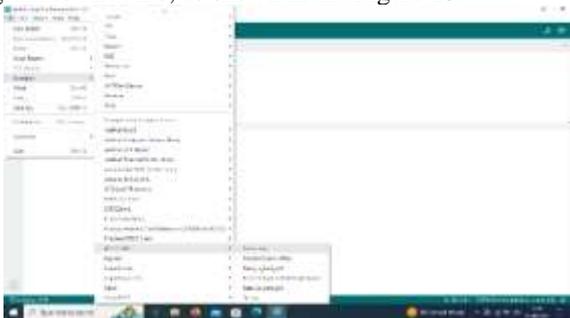

Figure 15. Load cell calibration in the Arduino application.

Open in serial monitor to start calibration by pressing t and not putting weight on *LOAD CELL*. After starting, place a weight of 1000 grams on *the LOAD CELL* which will read the weight placed, which is 1000 grams, as shown in the Figure 16

Figure 16. Provide a load of 1kg during the calibration process.

The serial monitor will display the results of the calibration value, which is 251.79, the value obtained during the calibration process to correct or calibrate the output generated by the load cell. The main function of the calibration value is to correct or compensate for inaccuracies or shifts that may occur in the load cell output, as shown in the Figure 17.

Figure 17. Monitor serial results.

To save the calibration result value stored in EPROM press y and get the load cell calibration result value with a weight of 1000 grams which can be seen in Figure 3.21 Load cell output val, as shown in the Figure 18.
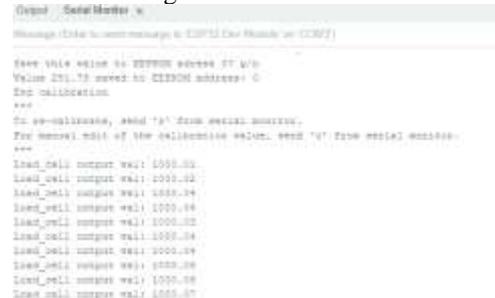

Figure 18. Calibration Results.

B. The Whole Range of Tools

Suite whole system istesting Which done after all system in configuration. Configuration the sensors Load cell as sensors measuring heavy, Motorcycle Servos as mover open closed sugar, Keypad as give input mark on heavy and the nominal amount of money and the LCD to display the characters or writing the weight value. Proximity and buzzer are used to detect when there is sugar supply. All of these components are configured with ESP 32 with embedded program code to control all of these components.

After through process processing Which eat time Enough long that is not enough more 3months then the tools prepared for Design Get up Tool Seller Sugar Sand Automatic based microcontroller, can resolved as-anywhere served on following picture, as shown in the Figure 19 and Figure 20.
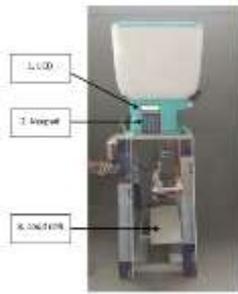
Picture 19. The equipment from the front consists of an LCD, keypad and load cell.
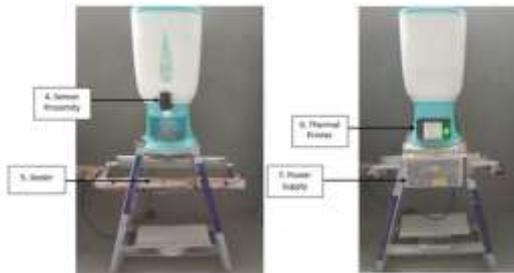

Figure 20. From the front there is a proximity sensor and seller, while from the back there is a thermal printer and power supply.

Process Work tool Which generated This isas follows;

a. LCD Which function for displays the results of the data from the weight in the form of writing and number.
b. Keypad used for enter selection by pressing the appropriate button function each knob in keypads i.e. button A for tare, button B for gram input, C button for price input and D For processing weighing.
c. Load Cell that functions to perform weighing in accordance with heavy sugar which in choose or amount nominal price Which entered.
d. Thermals Printers Which function for print note transaction booking sugar Which will displays print price and heavy.
e. Working Proximity Sensor and *Buzzer* to detect sugar supply. If sugar supply is still there then *the buzzer* is notlit while when the supply of sugar finished hence *the buzzers* will sound.

C. Testing Overall Tool

The results of the overall tool testing are carried out by testing the overall components based on the function of each component. The following is the overall tool testing carried out:

1) *proximity* sensor will detect sugar, if the sugar supply runs out, *the buzzer* will *buzz*, if the sugar supply is still there, *the buzzer* does not ring and the sugar can be weighed, as shown in the Figure 21.

Figure 21. *Put sugar in a sugar container with a capacity of 5kg.*

2) On the LCD will appear stand by which means waiting for input on the tool process. After that, the first option is to press the B button by selecting based on grams, namely 1000 grams or 1 kg, as shown in the Figure 22.

Figure 22. Enter the 1000 gram option on the keypad.

3) After choosing to process, press button D, simultaneously the servo motor will open the valve on the sugar and *the LOAD CELL* weighs the sugar. When the sugar weighs less than 100 grams the servo motor will close 90°, if the sugar weighs less than 50 grams the servo will close 110°, when the sugar weighs less than 3 grams the servo will close 180° and the weighing process can be monitored on the LCD display, as shown in the Figure 23.

Figure 23. The sugar weighing process can be seen via the LCD screen.

4) To do the weighing again, return it to the initial setting by pressing the A button, namely Tare; as shown in the Figure 24.
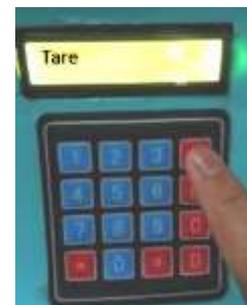
Figure 24. zero the weight to select next.

5) Entering the second option, which is based on the nominal amount of money, press the C button to enter the nominal amount of money, as shown in the Figure 25.

Figure 25. Enter the purchase option based on the price which is IDR 7000.

6) After choosing to process, press the D button then the weighing process will begin. Simultaneously the servo motor will open the valve on the sugar and the load cell weighs the sugar. When the weight of sugar is less than 100 grams, the servo motor will close 90°, if the weight of sugar is less than 50 grams, the servo will close 110°, when the weight of sugar is less than 3 grams, the servo will close 180° and the weighing process can be monitored on the LCD display, as shown in the Figure 27.

Figure 26. Weighing of Money Nominal Inputs.

7) After the weighing process is complete, the sealer will package the sugar directly. The way sealear works utilizes the heat generated by the heat element on the sealer and the motor moves 80° which makes the plastic finally stick and pack the sugar automatically, as shown in the Figure 28

Figure 27. The seller automatically packages the plastic after weighing it.

8) After the packaging process is complete, the thermal printer will print a transaction receipt. Payment for offline purchases is made in cash or money cash, as shown in the Figure 28.

WEIGHING RESULTS

WEIGHT : 1059
PRICE : Rp. 14000

WEIGHING RESULTS

WEIGHT : 510
PRICE : Rp. 7000

Figure 28. Printed purchase receipt.

9) The results of the scale can be packed directly on the plastic after being *sealed.*

Figure 29. Sugar packing results automatically by the seller.

10) For the results of each sugar scale that has been issued data can be seen and stored on firebase as has been done, namely weighing 500 grams and 1000 grams of sugar, as shown in the Figure 30.

Figure 30. Sugar Output Storage Results in Firebase.

D. Scan Qr Code or Apk Delivery

On application test results are used for seller and customers as sugar ordering transactions. *Quick Responsecode* is type the barcodes at first used to track inventory in parts manufacture vehicle And Now Already used in various industrial trades And service. Scans *qr code* used to get the application if the customer has not owned the app or the seller sends the apk through the customer's Whatsapp, as shown in the Figure 31.

Figure 31. Scan Qr Code or Apk Delivery to install the app.

E. Customer Application Testing

For customers who do not have an account can do registration especially formerly with enter, as shown in the Figure 32.

Name Complete : Yusriza Eka
Address   : Tlogomas
Telephone   : 083834672212
Username   : yusizaeka@gmail.com
Password   : yusriza123

Picture 32. login and customer registration on the application.

After you have finished creating an account, log in on application by entering a username and the generated password. Allow location according to the customer's location point with GPS that has been actively used for sugar delivery costs in the Batu City area, as shown in the Figure 33

Picture 33. Allow enable location to know customer location

1) *Buy Products:* For do booking select Buy Product on application. The option to buy 1 kg of products costs IDR 14,000, 2 kg costs IDR 28,000 and 3 kg IDR 42,000 then selects the amount to order, as shown in the Figure 34.
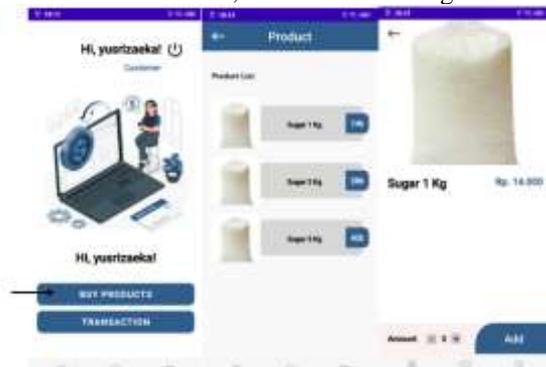
Picture 34. Display of products sold and sugar purchases.

2) *Order Basket:* To view the order, open the order basket click process for payment, as shown in the Figure 35.
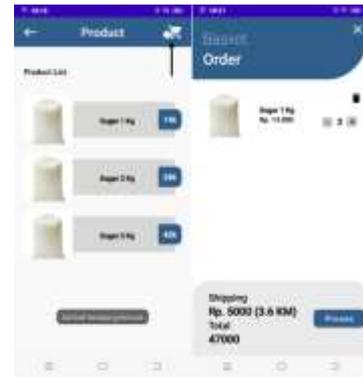
Figure 35. See purchase details in the basket image.

3) *Do Payment:* For do payment through number account or Gopay Which has listed on application then uploaded evidence of transfer on application, as shown in the Figure 36.

Figure 36. Customers make payments online.

4) Transaction depicts in the Figure 37.

Figure 37. View the purchase history of sugar transactions in the transaction menu.

F. *Seller* Application Testing

Login on application seller with enter username: yusriza@gmail.com then password: 12345678. On application profile seller displays address, number phone and e-mail profile seller.

Picture 38. Login to the seller application with the account you created then check the seller profile.

1) *Product:* The product menu on the seller's application will display the price and weight of sugar sold. Sellers can also edit product photos and prices if they wish make changes or updates, as shown in the Figure 39.
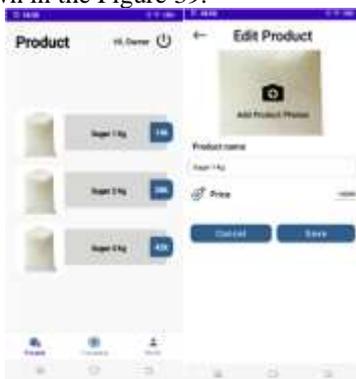

Picture 39. Sellers can view and edit the sugar products they sell.

2) *Transaction:* In part menu transaction seller see transaction order sugar Which ordered by a customer, as shown in the Figure 40


Picture 40. In the transaction menu, the seller sees the history of purchases and sales.

In part menu details transaction seller see transaction booking and if you have done the sugar order process, click the order process on the application so customers know when order has been processed, as shown in the Figure 41.
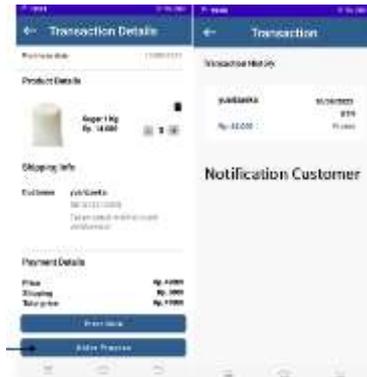

Picture 41. Process Packaging

If the sugar order has been packaged, click finish orders, customer applications order status becomes order finished, as shown in the Figure 42.
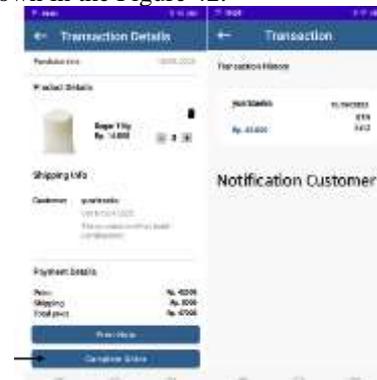
Picture 42. If the seller has finished packing, you can click finish order.

3) *Print Notes:* After the sugar ordering process is complete, click print a receipt as proof of the online sugar ordering transaction, as shown in the Figure 43.
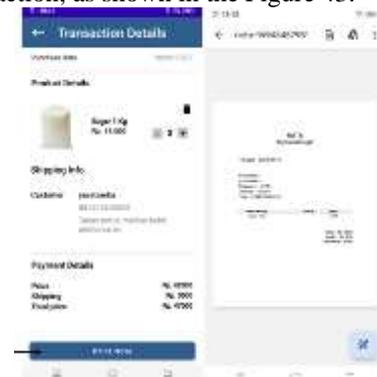
Picture 43. Print transaction purchase receipts online which can be done by sellers and buyers in the application.

G. Testing LOAD CELL

Testing data load cell based on heavywith weigh 1 kg, 2 kg and 3 kg liketable Which in show on Table 1 Results Testing Load Cell Based on Heavy. Load cell data testing based on nominalmoney shown on Table II Results Testing Load Cell Based on Nominal Money.

TABLE I
DATA LOAD CELL BASED HEAVY

Heavy	Weighing Results	Information
1 Kg	1018.92 Grams	On the results of the scales using a load cell weighing 1 kg, the results are 1018 grams or 1 kg 18 grams.
2 Kg	2013.37 Grams	On the results of the scales using a load cell weighing 2 kg, the results are 2013 grams or 2 kg 13 grams.
3 Kg	3016.10 Grams	On the results of the scales using a load cell weighing 3 kg, the results are 3016 grams or 3 kg 16 grams.

TABLE II
LOAD CELL BASED ON NOMINAL MONEY

Nominal	Gained Weight	Information
IDR 7,500	588.51 Grams	Based on the purchase results based on a nominal Rp. 7,500, the weight obtained is 588 grams.
IDR 18,500	1302.09 Grams	Based on the nominal value of the Rp. 18,500 purchases, the weight obtained was 1 kg 302 grams.
IDR 28,000	2071.34 Grams	Based on the nominal value of the Rp. 28,000 purchases, the weight obtained was 2kg 71 grams.
IDR 35,000	2590.40 Grams	Based on the purchase price, based on a nominal value of IDR 35,000, the weight obtained was 2 kg 590 grams.
IDR 42,000	3085.91 Grams	Based on the purchase result, based on a nominal value of IDR 42,000, the weight obtained was 3 kg 85 grams.

H. Measurement GPS

1) *Distance 3 km:* Distance measurement can do use laptops open google maps application by determining the distance location seller and customer. On moment do measurement, point beginning (Jl. Ikhawan Hadi) And point Which aim (customer) then will get mark distance < 3 km like on figure 44 Which it means free cost send, as shown in the Figure 44.
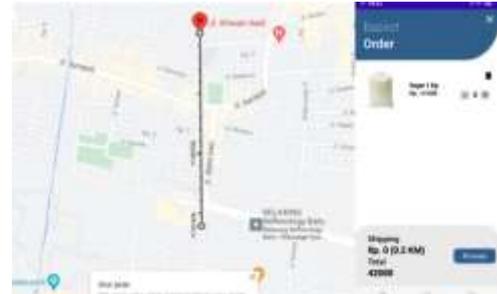
Picture 44. Delivery costs for orders within <3 km is free.

2) *Distance > 3 km:* Measurement from Jl. Ikhawan Hadi to point customer distance > 3 km witha maximum of 7 km as shown in figure 45 which It means shipping cost IDR 5,000, as shown in the Figure 45.
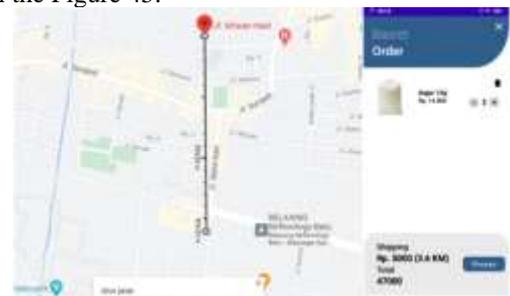
Picture 45. Delivery costs for orders within 3 km are IDR 5000.

3) *Distance > 5 km:* Measuring customer distance > 5 km as seen in Figure 46, means the customer did not receive the order, as shown in the Figure 45.

Picture 46. Delivery fees for distances >5km are not accepted due to remote locations.

I. Data Results Testing Load cell

After following the test procedure, the following measurement results are obtained, as shown in the Table III.

TABLE III
DATA RESULTS TESTING *LOAD CELL*

No	Results Testing	Heavy (Kg)		
		1.0	**2.0**	**3.0**
1	Results 1	1.0	2.0	3,1
2	Results 2	1.0	2.0	3,1
3	Results 3	1.0	2,1	3.0
4	Results 4	1.0	2,1	3,1
5	Results 5	1.0	2.0	3.0
6	Results 6	1.0	2.0	3.0
7	Results 7	1.0	2.0	3.0
8	Results 8	1,1	2.0	3.0
9	Results 9	1.0	2.0	3.0
10	Results 10	1.0	2.0	3.0
Flat- Average (Kg)		10,1	20,2	30,3
Success (%)		99.00 %	99.00 %	99.00 %
Error (%)		1.00%	1.00%	1.00%

From table 3 displayed results whole testing and measuring the weight *of the LOAD CELL* 1 kg until 3 kg with 10-time test and obtained results average, success and percentage error counted use formula inlower this:

$$Average = \frac{\sum_{i=1}^{n} S_i}{n} \qquad (1)$$

Example of calculating the average weight of 1 kg.

$$Average = \frac{1.1 + 1.0 + 1.0 + 1.0 + 1.0 + 1.0 + 1.0 + 1.1 + 1.0 + 1.0}{10}$$
$$= 10,1 \ Kg$$

$$Present \ Success = \frac{x}{s} x \ 100\% \qquad (2)$$

Example of Calculation of Success Percentage for Weight 1 kg

$$Success = \frac{10}{10.1} x \ 100\% = 99,0\%$$

$$Percentage \ Error = \frac{s-x}{s} x \ 100 \% \qquad (3)$$

Example of Calculation of Percentage Error for Weight 1kg

$$Percentage \ Error \ for \ Weight \ 1 \ kg = \frac{10.1 - 10}{10.1} x \ 100\% = 1,00\%$$

Information:

For S1...Sn is the result of measuring and testing the load cell 10 times, S is the average result of load cell measurements and x is the weight of the scale.

J. Data analysis

From the survey results obtained by conducting a survey directly to the location, namely in Batu City as many as 20 UMKM still use manual scales. The test results show that with a direct offline purchase scenario by selecting options based on purchasing weights of 1 kg, 2 kg and 3 kg or purchasing based on nominal equipment money, the function of issuing these options is selected by the customer offline or directly. To order sugar online through the seller's application and customers communicate online to order sugar online with the desired weight and amount. *Proximity* and *buzzer* sensor testing can detect sugar supplies at a capacity of 10 kg. The *proximity* sensor detects sugar with a distance of 2 cm in front of the sensor when the sugar runs out, *the buzzer* sounds indicating the remaining supply of sugar is exhausted, if *the buzzer* does not ring, the sugar supply is still available.

From the data analysis table 4.3. The Test Result Data weighs sugar using *a* load cell with a weight of 1kg to 3 kg 10 times and calculations are carried out to calculate the accuracy of the load cell *sensor* according to the tests carried out on the weight of sugar, the average value of weight, percentage successes and errors. For testing as much as 10 times the weight of 1 kg with an average of 10.1 kg, the percentage of success is 99.00%, and the percentage error is 1.96%. Weight 2 Kg with an average of 20.2 kg, the percentage of success is 99.00%, and the percentage error is 1.00%. Weight 3 kg, with an average of 10.3 kg, the percentage of success is 99.00%, and the percentage error is 1.00%.

For the accuracy of the GPS location, it is done with Google Maps to determine the distance between the seller's location and the customer's location by drawing a line from the seller's location to the customer's location so that the location distance is obtained. The distance to the location obtained is in accordance with the specified shipping costs, for a distance of 3 km free shipping, distances > 3 km with a maximum of 7 km shipping costs Rp. 5,000 and locations > 7 km distance, they do not accept orders because the location is too far away.

IV. CONCLUSION

Based on results from making and testing on the system that has been made can obtained conclusions include, can produce automatic sugar vending tools for sugar traders based on weight and nominal purchases of money using a load cell as an efficient and effective weighing of sugar as well as sugar packaging that can be done directly using a sealer and an application that can be used as an online sugar order by sellers and customers. Tests were carried out with offline and online purchasing scenarios. For offline purchases directly by selecting options based on purchasing weights of 1kg, 2kg and 3kg or purchases based on nominal money, the tool can function to issue these options chosen by the customer offline or directly. To order sugar online through the seller's application and customers communicate online to order sugar online with the desired weight and amount. Load cell sensor test is shown in table 4.3, the results obtained are, the level of success obtained the accuracy value of the load cell sensor used for weighing sugar that is 99.00%. The seller can determine delivery cost, with a distance 3 km so free shipping, distance more from 3 km and maximum 7 km. There is cost Send Rp 5,000 And distance moreof 7 km does not serve because it exceeds the area Batu City.

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