ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 3| March 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

A NOVEL MICRO CONTROLLER BASED MULTI FOOD FLOUR MAKING MACHINE

Pradeep M, Karthika, Sangeetha, Ayyappa Srinivasan M G
St.Mother Theresa Engineering College, Vagaikulam,Thoothukudi

ABSTRACT

To replace the labor-intensive local method of mixing flour for both home and commercial purposes, a mixing machine was built. The machine's originality lies in its ability to interchange both the mixer basin and the stirrer to suit the type of material being mixed. The purpose of the machine is to improve the sanitary processing of flour into dough for bread baking and other related wheat products that are consumable by humans. The mixer does away with the messy and time-consuming traditional method of preparation. The mild steel U and square channel (1270 x 1000 mm) metal sheet that covered the whole frame with the exception of the underside was welded to form the frame. The transmission system and the 1:40 gearbox were placed in the U-Channel square base. The machine was made to combine components and 25 kg of flour into dough in under 25 minutes. The machine's efficiency is 87%. The machine's components include a driver pulley, V-belt, gearbox, stainless basin, stirrer, shaft, and a 2.5 horsepower electric motor running at 2840 rpm.

I.INTRODUCTION

Finely ground cereal grains or other starchy plant parts are used as flour, a fundamental element in baked goods and a food product in many other applications. Bread is mostly made from wheat flour.One source of energy is wheat (carbohydrate). On the other hand, it has notable concentrations of other vital nutrients, such as fiber and proteins, as well as trace levels of lipids, vitamins, minerals, and phytochemicals that may support a balanced diet [1]. Just that many emerging nations, including Nigeria, have seen a steady rise in bread consumption in recent years.

Finely ground cereal grains or other starchy plant parts are used as flour, a fundamental element in baked goods and a food product in many other applications. Bread is mostly made from wheat flour.One source of energy is wheat (carbohydrate). On the other hand, it has notable concentrations of other vital nutrients, such as fiber and proteins, as well as trace levels of lipids, vitamins, minerals, and phytochemicals that may support a balanced diet [1]. Just that many emerging nations, including Nigeria, have seen a steady rise in bread consumption in recent years.

Mixing flour to make dough has long been a key step in the food industry's production process. The necessity for an inexpensive flour mixing machine is growing since it is now necessary to mix flour for baked goods even in many houses [3]. Another culinary tool is the mixer, which rotates a set of beaters in a bowl of food to be prepared using a gear-driven mechanism. It does the repetitious chores of beating, whisking, and stirring automatically. A mixer can also be used to knead dough when beaters are employed in place of dough hooks [4, 5, 6, 7, 8].
The size of a stand mixer ranges from compact countertop versions for domestic usage to massive commercial units. Stand mixers provide the mixing action by either rotating the mixing container (spiral mixers) or the mixing device (planetary mixers) vertically [9].The mixing and kneading procedures are integrated into every mixing equipment on the market today [2]. A technique that produces a well-developed gluten network by homogeneously combining and hydrating the ingredients is necessary for making bread dough [4, 6, 10,11, 12].

Nevertheless, small and medium-sized bakeries continued to find dough mixing to be unaffordable. Intimate mixing of the components to be combined is necessary for the main goal of solid mixing. This isn't that easy because there isn't a single mixer design that can meet every mixing need. It takes time and energy to mix flour since appropriate hygiene requires that contamination be avoided. Existing flour mixing machines have drawbacks such as needing a lot of time, money, and cleaning [13, 14, 15]. Given this drawback, a machine that can combine up to 25 kg of flour with minimal cleaning requirements and ease of use will be built.

II. PROPOSED METHODOLOGY

This study built an automated flour processing machine for pressed coconut pulp using the developmental research process. According to Richey and Klein (2005), developmental research is a way to create new protocols, approaches, and tools based on a thorough analysis of specific cases. It covers assessment in addition to product design and development.The framework of developmental research frequently consists of several stages,

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 3| March 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

including analysis, design, development, testing, and assessment. This study examined the prerequisites for enhancing the efficacy and efficiency of the apparatus.

Fig.1. Shows the block diagram of the apparatus.

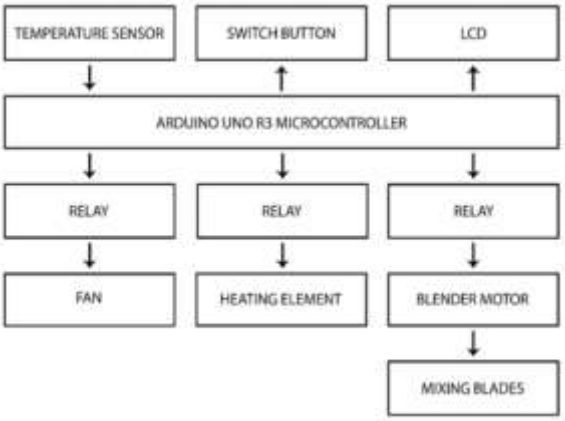

Fig.1.Block Diagram

The Arduino UNO R3 and C++ programming language were utilized by the researcher. The circuit's design by the researcher relied on a relay's capacity to open and close circuits. The max6675 and K-type thermocouple are mounted on the Arduino in order to collect and measure the temperature in order to run the uploaded software. To regulate every step of the coconut flour-making process, a 5V 4-channel relay is attached to the heating element, blender motor, and DC fan that processes the squeezed coconut pulp. The machine has a latch button switch because the software modifies the argument it should use to continue until it is finished, and it does so by frequently checking the status of the switch.

The Schematic diagram has been shown in fig.2

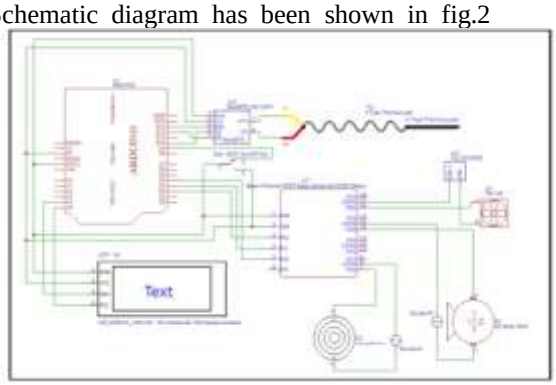

Fig.2.Schematic Diagram

The manual procedure had an influence on the researcher's programming and design of the Arduino code. The hardware components, iterations, and software system are created through iterative testing and cycles until the desired result is achieved. Temperature and process length are the two primary factors that must be altered or continuously monitored in order to develop a workable automated procedure for the machine.

The Ktype Thermocouple with Max6675 module converts unquantifiable data from raw data using its own Arduino library. However, the process duration reduces the constant duration by one second every second by using for-loops. To reduce the amount of wiring that connects the LCD to the Arduino, the program code additionally makes use of the I2C LCD display library.

The Arduino based code has been shown in fig.3

Fig.3.Arduino Coding

III.HARDWARE

Times New Roman or Times typeface should be used throughout the entire document. Fonts of type 3 are not to be used. If necessary for particular applications, different font styles may be utilized.

The following are the elements:

1.Heating element

2. The ingredient that was utilized in this study's drying procedure. The infrared heater quickly reaches the operational temperature by converting electricity into radiated heat and transferring it to colder locations.

3. AC Motor: An AC brush motor operates on 220V of alternating current. The motor is linked to the blades that are necessary for turning the crushed pulps of coconuts into flour.

4. DC fan: The fan helps the heating element during this study's air fry, or drying process. Also employed for the machine's exhaust are two 12 volt fans.

5. Arduino: The machine's embedded system uses an Arduino Uno R3 microcontroller. It can manage the various inputs and outputs needed for this investigation and is easy to use.

6. 5V 4-Channel Relay: Relays are electrically powered switches that join the machine's small current circuit to its bigger current circuit.The heating element, DC fan, and motor blender are examples of AC and DC equipment whose operation switches are controlled by this.

7. Thermocouple K-type using Max6675 module:

Because of the machine's construction, the thermocouple sensor may operate at high temperatures. It is situated within the processing area, where it operates continually and collects information to start a debate.

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 10| Issue: 3| March 2024|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

8. Switching Power Supply: The machine's electrical equipment is supplied with and kept steady with DC voltage input by the Power supply, an electronic device.
9. 16x2 LCD with I2C Display: This LCD can show 16 characters on 2 lines. It is employed to show the machine's duration and temperature during each loop.
10. Blade: The crushed coconut pulp is divided into smaller pieces by the sharp blades.
Fig.4 shows the Hardware Prototype of the machine

Fig.4 Protypical model

It is easy to integrate software and hardware together. The 5V 4 channel relay is linked to the processing components, motor, heating element, and DC fan, and the Arduino is uploaded with the program code. The heating element and grinding motor performance are taken into account while adjusting the repeating stages and cycles in the Arduino code. The combined components operate quietly and trouble-free. However, the machinevibrates when the grinding process starts, it disrupts the wire of the LCD, and it sometimes malfunctions.

IV.RESULTS

The table-I shows the results of the working model

Table 1. Evaluation of the project.

Parameter	Mean	Interpretation
Functionality	4.60	Highly Acceptable
Reliability	4.20	Moderately Acceptable
Efficiency	4.69	Highly Acceptable
Maintainability	4.38	Highly Acceptable
Portability	4.40	Highly Acceptable
OVERALL	4.45	Highly Acceptable

V.CONCLUSION

For increased efficiency, a flour mixing machine is developed for home users. This machine not only produces more hygienic mixed dough, but it also does away with the traditional method of dough preparation. The development of the flour mixing machine, which can now combine flour and components to create dough, shows how useful this type of food processing machinery is for manufacturing huge amounts while controlling costs. The flour mixing machine minimizes waste and operates quickly. This equipment is intended for use in restaurants and the bread-making sector, with the goal of enhancing individual health and hygiene.

VI.REFERENCES

1. *Agrawal, Y.C., Singgvi, A., Shodhi, R.S. (2017). Development of an Abrasive Brush Type Dough MixingMachine. Journal of Agricultural Engineering Indian Society of Agriculture, 20(3&4), 179–182Bakerpedia. Fermentation. Retrieved May 2, 2019*
2. *Akissoe, N., Hounhouigan, D.J., Mestres, C., &Nago, M. (2003). How Blanching and Drying Affect the Colour and Functional Characteristics of Yam (DioscoreaCayenensis-Rotundata) flour. Food Chemistry, 82, 257 – 264.*
3. *Ayodeji, S.P., Akinnuli, B.O. &Olabanji, O.M. (2014).Development of Yam Peeling and Slicing Machine for a Yam Processing Plant.Journal of Machinery Manufacturing and Automation,3(4), 74-83.*
4. *Babajide J.M. &Atanda O. (2008).Quantitative survey and anti-microbial effect of Pipiostig mathonnigil andKhayaivorensis on Traditional Dough Mixing, African journal of Microbiology Research, 2, 078-082*
5. *Bot, A.U.(2003). Development of Dough Mixing Machine,Peeling. Journal of Machinery Manufacturing and Automation,3(4),pg 74-83.*
6. *Curtis B.C .,Rajaram S.,Gomez Macpherson H (2002). Bread Wheat. Plant Production And Protection Series.*
7. *Faluyi Olufemi and Opadoja Dele (2018). Design and Fabrication of Porridge and Yam Flour Mixing Machine.International Journal of Science, Engineering & Environmental Technology (IJOSEET), 3(7), 47-54, ISSN 0794-9650*
8. *Food And Agriculture Organisation Of United Nations (1994). Cereals And Cereal Products.Retrieved April14, 2019*
9. *Kline, B.M., and Sugihara, F.K. (2014).A flour Mixing Machine: Development, Design and Construction Journal of Agricultural Engineering Research, 21, 361– 369*
10. *Okafor (2015). Design Of Power Driven Dough Mixing Machine. International Journal Of Engineering And Technology 5 (2) pp22-36*
11. *Okonkwo Betholomew Chidi (2014). Optimization Of Mix Ratio And Evaluation Of Thermophysical Properties On The Product Quality Of Composite Wheat - Cassava - Soy Flour Bread. University Of Nigeria Nsukka*
12. *Perry, R.H. (1998). Chemical Engineers Handbook. McGraw-Hill Book Company, Singapore.*
13. *Peter R. Shewry and Sandra J. Hey (2015). The Contribution Of Wheat To Human Diet And Health. Food And Energy Security 4(3), 178 – 202*
14. *Shigley, J.E., &Mischike, C.R. (2001).Mechanical Engineering Design(6thed.). New York, NY: McGraw-Hill Publication*
15. *Siraj A. Tamboli (2017). Smart Dough Making Machine. Imperial Journal Of Interdisciplinary Research (IJIR) 3(4), 1367 ISSN: 2454-1362*