

Automated Cooking Machine Using Programmable Logic Controller (PLC)

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ABSTRACT

By observing day to day life, most of the people still cooking in the kitchen as they have a very busy schedule. It takes lots of time in kitchen to cook food, which makes them fatigued. The proposed model of cooking machine which is fully automated totally based on Programmable logic controller. Now the technology has become so vast and now everything is based on the technology in each section. So with the development of this project, it becomes more and more urgent to apply this in all related field. There is much need in food industries, hotels, kitchen, canteens, etc. So we are going to present this automated machine using programmable logic controller, which will be very beneficial to everyone. This machine is divided in three sections viz, induction cooking, addition of ingredients as per requirement, stirring, etc. This machine not only cook food in quantity but also maintains the quality. As in this machine, the input can be provided with HMI. In this recipe can be selected with the proper required quantity of ingredients with the input of number of members. As per the requirement of food we can cook food fast by giving less time delay and also by increasing the power of induction. This system is designed in such a way that time is minimized and ease of work is expected

Keywords:- PLC, DVP

I. INTRODUCTION

The automation of cooking process generally created for the human welfare. Because now a days in food industry manually taste and quality should not be repeatable but by automation we can perform this repeatedly by reducing the errors. The automation always gives fruitful results in industry. This automated cooking machine gives improved quality, reduced manpower and time which results in increased profit with reducing the food wastage. This kind of cooking system is one of the areas that have received the most attention in terms of automation. We are going to introduce a new machine which has a wide scope in our daily as well as in our professional life. In our day to day life time has become a most important factor. In that cooking is basic necessity for human being since food is the one of the basic human needs. There are many tools which makes human task easier until now cooking equipment being used is still hand tool. So various systems are developed which reduces the time and human efforts. By considering this factor I introduce “Automated Cooking Machine using PLC”.

II. OBJECTIVES

- 1)As this is a automated cooking machine the execution of this machine is fully automated, there is no need to perform the operations manually .
- 2)This machine have the capacity to store number of recipes’ in it .So that it will make a different types of recipes.
- 3) We can increase or decrease the quantity of ingredients.
- 4) We can edit in the recipe based on the quantity
- 5) This machine can give us the same taste as per requirement
- 6)Can be easily operated having simple functions.
- 7)It consumes less time .

III. SYSTEM DEVELOPMENT

According to different cooking methods, this machine can perform the following functions that are Stir fry dishes, pan fry dishes, Deep fry dishes, soups and many more Indian recopies. This machine basically based on mechanical and electrical parts with programming of PLC.

A. Electrical parts:-

1)PLC:- Programmable logic controller is an digital electronics device that uses programmable memory to store instruction and to implement specific function, such as logic, sequence, counting, timing and also arithmetic. Arithmetic controls the whole execution of machine and helps to process. In this system the use of DVP14SS PLC AND Expansion Digital I/O Module delta make is done.

2) HMI :-Human Machine Interface is for data entry, editing in recipe and can store in it. HMIs are also referred to as man machine interfaces. In this 7.5”Schneider make is used.

3)SMPS :- Switched mode power supplies are used for dc to dc conversion. This has the advantage over tapping the battery at the 12V position.

4)Power supply :-It provides power to all the mechanical and electrical parts. Input voltage–120 –240 VAC ,Output voltage – 24VDC,Output current – 2.5Amp.

5)Level switches:-This switches are used for pumping the liquid out such as water, oil, milk by sensing.

6) Limit switches :- It sense the position of bowls and it also help to return it back to their original position.

7)MCB(Miniature circuit breakers):-This circuit breaker is an automatically operated electrical switch designed to protect an electrical circuits from damage caused over current or overload or short circuit. Its basic function is to interrupt current flow after protective relay finds the faults.

8)External gears- these are used to increased the revolution per minutes generally 7 rpm motor is not available in market that’s why we use these external gears for increasing the revolutions per minutes i.e. 3.5 rpm to 7 rpm.

9)Magnetic stirrer-it is used in machine for proper mixing of ingredients in recipes. It is attached with 10 rpm gear motor by fitting the assembly in stainless still (graded 304) shaft and plates. These plates are bends such that there no destruction of

any material of ingredients but proper mixing is carried out. This whole assembly of stirrer moves up to 90 ° .

10)Electrical gear motor-these are used in machine for bowls movement. Like forward and reversed movements which is regulated or controlled by PLC. The motors output is 3.5rpm at 12 V DC and 600-1000m amp.

B. Mechanical Parts :-

1)Induction cooker :-It will provide proper temperature for cooking as per requirement of the recipe.

2)Bowls: - It is use to place ingredients .

3)Liquid tank: - Use to place oil, milk, water, etc which is in liquid form (Quantity 2 Tank)

4)Shafts: - All bowels fitted on individual shafts for bowels rotary movement up to 135.

5)Motor with reduction gear box: - Gearbox reduces the speed and increase rotary torque.

6) Pumping motor: -Help to pump oil and water

7)Stirrer: - It helps to mix all the ingredients present in pan .So that food can properly cooked.

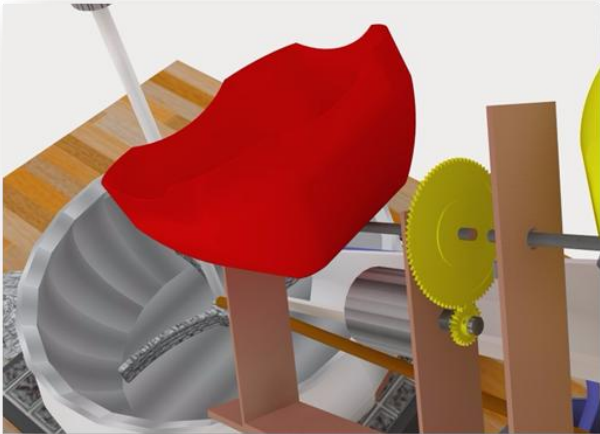


Fig 1. Side view of bowl with gear motor.



Fig 2 .Front view of Machine.

IV. CONCLUSION

This work is presented by using PLC and HMI based automated cooking machine. as per the results this machine can use in industrial level in food industry. As per the results we can use this machine with elaboration in food industry to carry out test repeatability with the particular speciality of taste. Wherever we can able to maintain the hygiene by this way then this machine will avoid material wastage and labour cost will also reduced by using the automation technology.

V. RESULT ANALYSIS

As per the experimental verification, following results are obtained

- a) Taste repeatability is carried out.
- b) Time is less consumed
- c) This machine not only cook food in mass quantity as per requirement but also gives the quality; which is very much important.
- d) Can edit in recipe and save it.
- e) This machine reduces the manpower, were the food is cooked in mass quantity
- f) Can be easily operated.

REFERENCES

- [1] A new automatic cooking machine for Chinese dishes, International Conference on Automation Science and Engineering Shanghai, China ,October 7-10,2016
- [2] Future Smart Cooking Machine System Design . TELKOMNIKA, Vol.11, No.4, December 2013, pp. 827~834.
- [3] Programmable Logic Controllers (PLCs) details are available at http://wold.keyence.com/products/programmable_logic_controllers/plc.html