Automated Cooking Machine using PLC and HMI

Patel Reema[1], Kunwar Jay Kumar D.[2]

jaykumar1305@gmail.com , *reemapatel05.rp@gmail.com*

Abstract-**The proposed model of automated cooking machine is the basic model which we further used in cooking or food industry. Because in food or cooking industry one could not able to provide manual faults. Recently everything is based on technology where we have to serve technology by automated systems .by this automation technology we can reduce the man power and with reducing the errors. And also we achieve the reduction of huge wastage of manual handling Up to now, most of the peoples are still cooking in the kitchen, which makes them fatigued and also makes air polluted. With the development of numerical control technology, it becomes more and more urgent to apply the related technology to the automated cooking field.**

As per recent technological need in food industry we are going to present the model for automated cooking machine. This automated cooking machine comprises with three systems viz, stepwise addition of ingredient's, stirring, frying etc. An automated cooking machine includes a steel bowels, hot plate, oil and water pump, stirrer and a panel mounted adjacent to the machine. A program logic controller and HMI control each of the devices to carry out cooking process. With such an automated cooking machine can stir fry and deep fry like a human cook and easy to keep good repair.

Keywords- **Cooking process, mechanical and electrical design, programme generation.**

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.

II. OBJECTIVES

This is a paper for automated cooking machine. The major reason for making this project is listed below. We are going to introduce a new machine which has a wide scope in our daily as well as in our professional life. This machine reduces the quantity of labors.

This machine will perform its functions with hygiene.

To reduce manpower by automated design of the machine. This automation will gives various types of menus in different machines by single persons I.s a single person can

handle multiple machines. By implementing automation we can able to reduce the wastage of food. When this model is being implant in large industry it is best to avoid the accidents which were happened during large scale production in food industry. In this automated cooking machine we can order recipe for long term and number of sheifs are able to save one type of recipe in different ways which is password protected for individual sheifs.

This machine has following objectives:-

- It will perform automatic cooking.
- It will make different kinds of vegetables.
- As per the quantity of people we can reduce or increase the quantity.
- We are able to store or save the recipes.
- Taste will be repeated as per requirement.

Mechanical Parts and its working:-

1) Bowls: - Place ingredients in bowels. (Quantity 5 Bowls.)
2) Liquid tank: - Place Food oil and water. (Quantity 2 Tank)
3) Main shaft: - All bowels fitted on main shaft for bowels rotary movement up to 180.
4) Motor with reduction gear box: - Gearbox reduces the speed and increase rotary torque. (Quantity 5 Motors)
5) Motor with pump: - Pumping oil and water(Quantity 2 Motors)
6) Induction cooker: - It will provide a temperature for proper cooking as per requirement. (Quantity 1 No.)
7) Stirrer: - It will mix all the ingredients present in pan. (Quantity 1 No.)
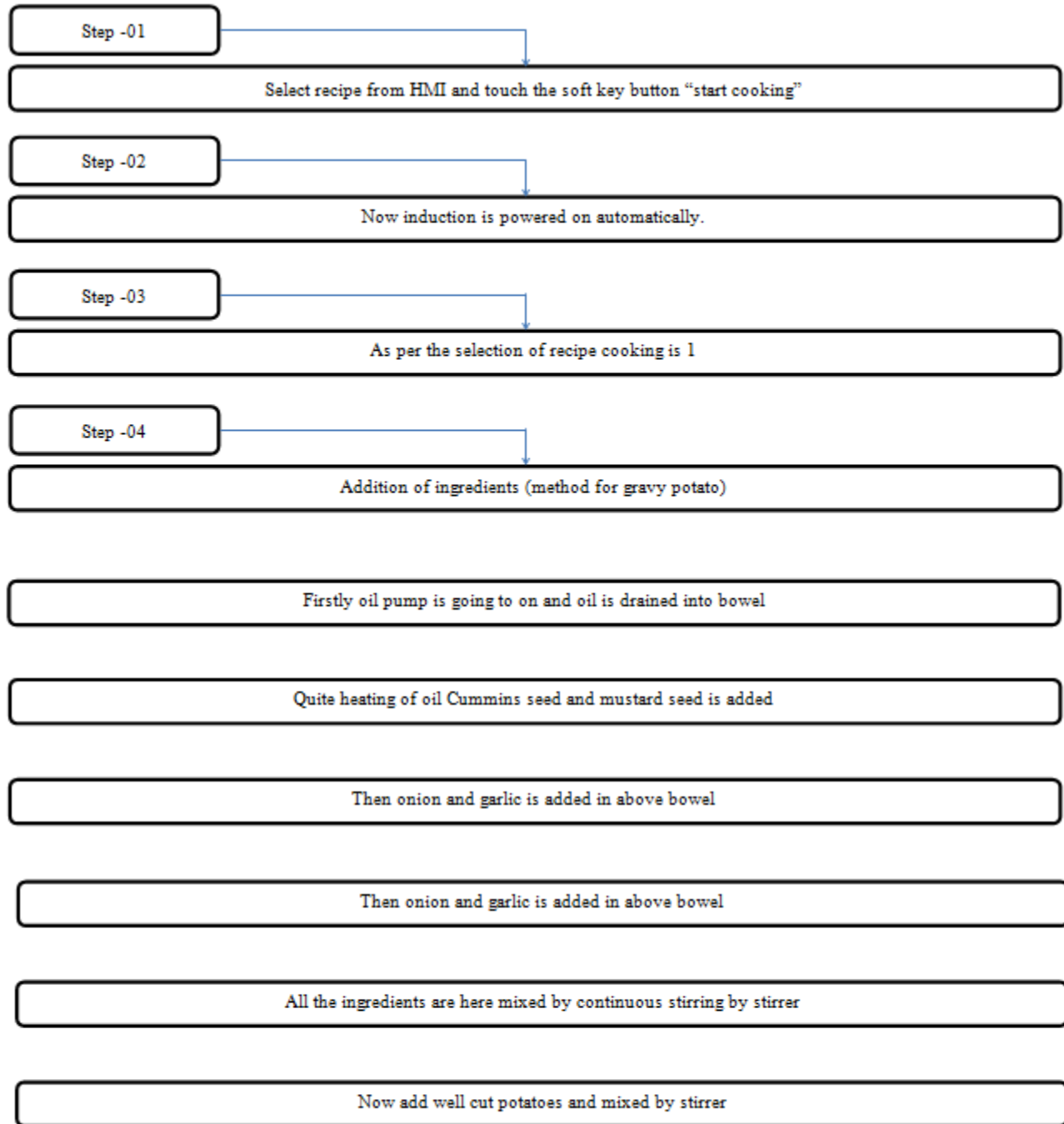
Electrical Parts and its working: **-**

1) HMI: - Human Machine Interference use for data entry and store recipes. 7.5" Schneider Make.
2) PLC: - Programmable Logic controller handles all operation as per written by engineer. DVP14SS and Expansion Digital I/O Module Delta Make.
3) Power Supply: - Provide safe power to all electrical equipments. Schneider or Standard makes.
4) Limit Switches: - Bowls position sensing.

5) Level Switches: - Water and Oil Level Sensing.

NOTE: - All the bowels used in this project are made up of fibre and glass which is not harmful to health, and which is a approved by Indian government standards.

III. METHODOLOGY

In Indian or western food recipe there are different types of stages for making particular food. so here we are presenting three types of food recipes i.e. potato with gravy, dry spicy flower, spicy ladyfinger.

Step -01

Select recipe from HMI and touch the soft key button "start cooking"

Step -02

Now induction is powered on automatically.

Step -03

As per the selection of recipe cooking is 1

Step -04

Addition of ingredients (method for gravy potato)

Firstly oil pump is going to on and oil is drained into bowel

Quite heating of oil Cummins seed and mustard seed is added

Then onion and garlic is added in above bowel

Then onion and garlic is added in above bowel

All the ingredients are here mixed by continuous stirring by stirrer

Now add well cut potatoes and mixed by stirrer

Now addition of chili powder, turmeric and salt is carried out

Lastly water is added by water pump

At the rest all the ingredients are boiling.

Indication switch will give indication to stop the recipe and finally our food is ready to serve.

IV. EXPERIMENTAL VERIFICATION

Figure 1- Front view of cooking machine.

In the above fig.1 of cooking machine each ingredient is added step wise with addition of oil and water with the help of motor and limit switches.

Figure 2-Top view of cooking machine

In the above fig.2 the stirrer is shown which works for deep mixing of all ingredients.

V. RESULT AND ANALYSIS

As per the experimental verification done above the following result is obtained

a.   Test repeatability is carried out.
b.   Material wastage reduced and profit is increased respectively.
c.   The food being cooked by this way is hygienic.
d.   When we use this machine at commercial level labor cost will be reduced .

REFERENCES

[1].   ARPN Journal of Engineering and Applied Sciences. Vol 9,No 12,December 2014.
[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