

# Design and Development Automated Food Maker

Rakshitha M J<sup>1</sup>, Mr. Madan G<sup>2</sup>, Dr. K R Prakash<sup>3</sup>, Mr. Shivaraj C S<sup>4</sup>

<sup>1</sup>M. Tech CAID, Dept. of Electrical & Electronics Engineering, The National Institute of Engineering, Mysuru, Karnataka, India

<sup>2</sup>Manager, Incubation center, The National Institute of Engineering, Mysuru, Karnataka, India.

<sup>3</sup>Professor & Head, Center of Automation Technology, The National Institute of Engineering, Mysuru, Karnataka, India.

<sup>4</sup>Assistant Professor, Dept. of Electrical & Electronics Engineering, The National Institute of Engineering, Mysuru, Karnataka, India.

\*\*\*

**ABSTRACT:** -Today our lives are hurried and busy. We want to experience more and achieve more. This pursuit of fitting more into each day leaves little time for the most important factor which affects our quality of life- the food we eat. Many great innovations have come which help us to monitor our health, sleep, steps, pulse to live better. But the problem of eating fresh & healthy without any hassle is yet to be addressed. Unfortunately, mornings are hectic for most people, especially families with children. In the current day situation it is very difficult to cope up with hunger pangs. Most people usually rush through the meal, gobble down whatever's handy in the kitchen, or grab a quick, on-the-go bite. That's where the Automated food Maker comes to the rescue. It's all about making a fresh food that one can grab and go. All it needs is to add the necessary ingredients and then selecting the preset menu of various dishes. In a very quick time, a perfectly cooked food is ready to eat. The user can customize their food with a practically endless variety of fresh ingredients. It lets the user enjoy a homemade food, made their way, in the comfort of their own kitchen in a completely automated way. Cleanup is easy because all removable parts go in the dishwasher.

**Keywords-**Food technology; Automated food cook, app based cooking;

## I. INTRODUCTION

Food automation the one among the fast growing technology, today's food making machines are most popular and most of need. The Automated food maker machine is a pioneering concept in food manufacturing since it is designed to cook more than one kind of dishes. In the modern day situation, food maker is the eye catcher of the people who are not able to cook for themselves manually. Automation in food manufacturing has been a primary solution in improving the consistency, safety and accessibility of food in major consumer markets.

This paper explains about a simple low cost circuit and design which can be mainly used as to prepare consumer

food product. This was mainly made by considering present busy life style of the people. Food maker reduces the man power and time to certain extent. The Automated food maker is designed to deliver a whole new set of functionalities that will create a benchmark in the automated food making sector.

## II. PROJECT DESIGN

### 1. Containers:

#### a) Solid ingredients containers:

For the implementation of the device, two types of containers were chosen. One is the outer container made up of stainless steel to store ingredients of larger quantity. Another one is the inner container made up of plastic to store ingredients of smaller quantity. The containers have built in screw mechanized extruders which can be actuated using geared DC motors to get the accurate ingredients. Here DC motors of 90rpm are used to extrude the ingredients at a rate of 300gms/min.



Figure.1. Outer container



**Figure.2. Inner container**

b) Liquid ingredients containers:

Any Indian dish cannot be prepared without using oil and water. The Automated food maker includes separate containers for getting the oil and water individually into the cooking vessel and also the flow follows different mechanisms. The oil, usually is required in small quantities and hence a small container of 500ml is used for storing vegetable oil. This oil container is attached with a solenoid valve which has a output valve diameter of 6mm. This solenoid valve is actuated by a 24V DC supply which will make the oil flow into the cooking vessel for the desired time. The same mechanism cannot be used for getting the water into the cooking vessel since large amount of water is needed for every dish and also the pressure is not sufficient to get the forced water flow. For this to eliminate, a large container of 5L capacity is chosen and a submersible water pump which can pump water up to 1m high against gravity. Both these individual mechanisms are used to get exact quantity of liquid into the cooking vessel.



**Figure.3. Oil container**



**Figure.4. Water container**

2. Electronic Modules:

a) Microcontroller :

The heart of the Automated food maker is the microcontroller. The microcontroller controls all the activities of the Automated food maker starting from the initialization of the system to prepare the cooked food. For this purpose a Arduino Mega 2560 microcontroller is used.

The microcontroller does the following,

- Driving DC motors and solenoid valves.
- Maintaining the Induction stove's Temperature.
- Maintaining the Delay for Ingredients' Flow.
- Control of the Mixer Assembly.

The Arduino Mega 2560 microcontroller has 54 digital input/output pins. Here 32 digital input/output pins are used to fulfill the above operations.

b) Node MCU:

NodeMCU is an open source development board and firmware based in the widely used ESP8266-12E Wi-Fi module. It allows to program the ESP8266 Wi-Fi module with the powerful and simple Arduino IDE or LUA programming language . With just a few lines of code one can establish a Wi-Fi connection and define input/output pins according to needs exactly like arduino, turning ESP8266 into a web server and a lot more. It is the Wi-Fi equivalent of ethernet module. These features make the NodeMCU extremely powerful tool for Wi-fi networking.

c) Relay modules:

Relays are switches that open and close circuit electromechanically/electronically. Two eight-channel relay modules and two four-channel relay modules have been used in the implementation of automated food maker. Eight-channel relay modules are used to actuate the dc motors in the outer container and the inner container for the flow of ingredients into the cooking vessel. One four-channel relay module is used to actuate the solenoid valves used for the flow of water and oil, another one is used control the various temperatures of the induction cooktop.

d) Motor Driver Module- L298N

In the implementation of automated food maker, a motor driver module L298N is used to drive two geared dc motors used in stirrer assembly. The L298N is made from discrete components which are integrated inside an IC. It converts low current signal to high current signal and then give it to the motor. It drives inductive loads such as

relays, solenoids, DC and stepping motors. L298N allows speed and direction control of two DC motors that has voltages between 5 to 35 volts, with peak current up to 2A.

e) Power supply circuit

DC power supply is required for the continuous and smooth operation of the DC motors which are used along with Ingredients containers. Voltage regulators 7805, 7812 and 7824 are fixed to derive +5 Volts, +12 Volts and +24Volts respectively. +5 Volts is connected to micro controller, +12 Volts is connected to speed controller circuit in mixer assembly and Relay units and +24Volts are connected to Geared DC motors and solenoid valves during the circuit Operation.

III. METHODOLOGY OF PROJECT

THE AUTOMATED FOOD MAKER IS A COMPLETELY AUTOMATED SYSTEM WHICH IS AN INTEGRATION OF VARIOUS SYSTEMS LIKE INDUCTION STOVE, CONTAINERS FOR STORING INGREDIENTS, A COOKING VESSEL, AND THE HARDWARE SYSTEM COMPONENTS LIKE DC MOTORS, VARIOUS RELAY CIRCUITS, MICROCONTROLLER AND WI-FI MODULE.

For the Automated food maker to start it's working the user has to switch on the power supply and open the "FooM" app. The app display, then presents the user with various dishes that he/she likes to cook. Once the user selects the dish, the app again asks the user for number of serves or the amount of food to be cooked. The user needs to confirm the number of serves. This action switches on induction stove, relay circuit and microcontroller.

The microcontroller reads this input and chooses all parameters to cook the set dish. Once the microcontroller initializes all the data according to the user's input and starts executing the programmed functions, the hardware parts of the system are initialized and they start working according to the program. The microcontroller program initializes the induction stove and sets the time and temperature accordingly. It then activates all containers containing ingredients to get the ingredients into the container by using the relay drive circuit. In the meanwhile, the stirrer assembly is also activated and it maintains the correct mixing of the ingredients. Finally the dish is cooked for the preset time and after the preset time is elapsed, the microcontroller switches off the entire system so that the container containing the cooked dish can be taken out and the dish be served.

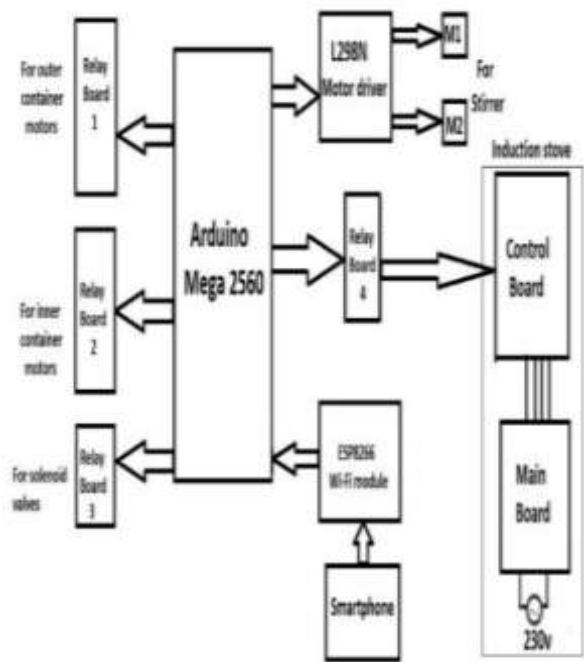


Figure.5. Block diagram of Automated food maker

IV. SOFTWARE IMPLEMENTATION

1. Arduino Software

The program for the microcontroller is written in embedded C language using Arduino IDE.

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards.

2. Android studio

In order to select the dish and to enter the number of serves, an android application called as "FooM" is developed using android studio. To code the app java language is used. To develop android application for android devices, android studio is the official integrated development environment from Google. To create an app Arduino studio consists of all the API. On Windows, macOS and Linux based operating systems Android studio is available for download.

The flow chart for automated food maker is as shown in Fig 6.

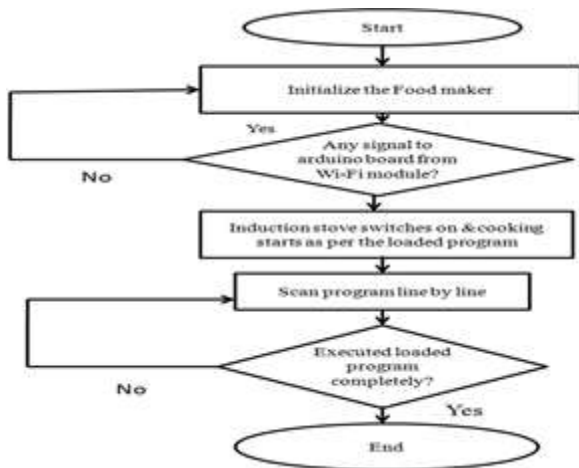


Figure.6. Flow diagram of Automated food maker



Figure 8: Various circuits of Automated food maker

V.RESULTS

An Automated food maker for was fabricated successfully. The complete machine process control was done using microcontroller with embedded language as it is easier for individual to understand and operate. The necessary heater control and actuator control are done through power supply and relay board circuit as shown in Figure 8. Few trails were conducted on the developed equipment to prepare Upma for 2 serves (that is for two people) during the trails we observed that proper amount of ingredients are been put into the vessel and is linked to selection of serves done by the operator. The trails show that apart from main ingredients, Water, Oil and other ingredients which are used are made to flow to meet the requirement. This is handled in the program part and it is functioning smoothly. To show the process of preparation and to evaluate the function of each elements the paper as included Figures 7-11 which shows the machine parts and mechanism.

Once the user opens the FooM app the default screen is shown in figure 4.4, at the same time the system will initialize all ports and will checks the motor drives and stirrer assembly position.



Figure 7: Complete Machine in ideal condition



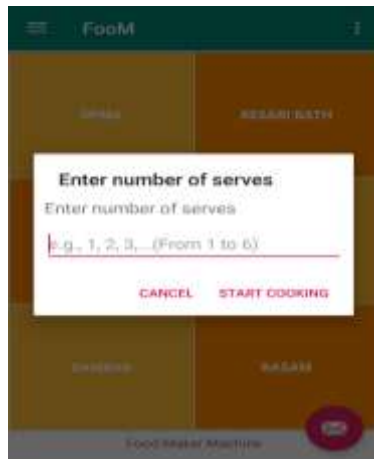
Figure 9: Opening screen of the FooM app

Next automatically screen changes to selection menu and Display the selection options where as this is loop screen will keep on displaying until unless user selects the dish to be cooked.



Figure 10: selection screen along with dish name with options

After the dish selection the user has to select the number of serves need to be cooked and click the start cooking option. Until and unless the serves are selected the actual cooking work will not get started.



**Figure 11: display of Serves selection**

Once all inputs given to the system the cooking process will get started. Depending on which dish is selected and number of serves the cooking time varies and ingredients flow will also controlled. According to the pre-set time the cooking process will complete and one can enjoy the dish.

## V.CONCLUSION

This paper mainly concentrates on concept development and trials to ensure electronic control parts operation. Hence the design is considered mainly for easy prototyping, keeping this the containers and other parts such as motors, vessel and induction stove are directly brought and integrated into the system to conclude the prototyping build provides all operation and functionality of the Automated food maker. However the design part can be reviewed to make more aesthetic and rugged to fit into kitchen environment.

This concept proved that the new and innovative idea of Automated food maker can cook dishes, like Upma, Kesari bath, Pongal by using microcontroller. In addition to this we are experimenting the same machine to cook gravy dishes like sambar, rasam and familiar other dishes. Combination of above mentioned dishes can be done by change in Microcontroller program.

## REFERENCES

[1] Nizam Uddin Ahamed; Zahari Bin Taha; Ismail B. Mohd Khairuddin; Tasriva Sikandar; Md. Asraf Ali; "Development Of Fuzzy Inference System For Automatic Tea Making" 2016 IEEE International Conference On Automatic Control And Intelligent Systems (I2CACIS) Pages: 196 – 201.

- [2] Kaviraj. N "Automatic Vegetable Curry Maker (AVC - Maker)" International Journal of Engineering Sciences & Research Technology (IJESRT) (Vol.6, No. 2) 2017-03-02, Page: 53-55, ISSN:2277-9655 6(2): February, 2017.
- [3] Praise Sabu, Sreerag M P, Sukesh P P, "Design and Development of Automated Appam Maker" IJRST – Volume 3 | Issue 11 | April 2017 ISSN (online): 2349-6010.
- [4] Siraj M Tamboli, "Smart Dough Making Machine" Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-4, 2017 ISSN: 2454-1362.
- [5] "Best bits: Applications of microprocessors: Chip makes drip coffee" IEEE Spectrum Year: 1981, Volume: 18, Issue: 9, Pages: 19 – 19.
- [6] Amit B Solanki, V R Solanki and D N Shah "Design & Development of Automatic Fast food Machine" International Journal of Mechanical Engineering and Robotics Research Vol. 3, No. 3, July, 2014 ISSN 2278– 0149.
- [7] Alhade A. Algitta , Mustafa S , Ibrahim F , Abdalruof N. and Yousef M "Automated Packaging Machine Using PLC" IJSET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 5, May 2015. ISSN 2348 – 7968.
- [8] D Kanimozhi, B Nantheni Devi & T Manochandar "PLC Controlled Automatic Food Packaging Machine" International Journal of Engineering Trends and Technology (IJETT) – Volume 30 Number 1 - December 2015.
- [9] K. S. Shaji, H. S. Lohit, Chiranjith Barui, "Design and Development of an Automatic Dosa Maker for Indian Households" MSRUAS-SASTech Journal 29 Vol. 15, Issue, 2014.