A Modern Automatic Cooking Machine Using Arduino Mega and IOT

Z. Mary Livinsa, G. Mary Valantina, M. S. Godwin Premi, G. Merlin Sheeba

School of EEE, Sathyabama Institute of Science and Technology, Chennai, India

*Corresponding Author E-mail: livinsa@gmail.com

Abstract. In day to day life, still the majority of the household having an extremely hectic schedule for cooking. The time taken to cook food in kitchen is very huge, which formulate them exhausted. Currently the technology has grown and automation process was introduced to society for human welfare. The proposed model of a new automatic cooking machine which is fully automated totally based on Arduino Mega. The fundamental inspiration behind this is to create a modernization in kitchen. Such innovation in kitchen will help reducing human efforts which is extraordinarily favorable to every person. This machine having following functions: pumping raw ingredients into pan, stirring then cooking. Also this machine maintains the quality with quantity of cooking food. The main aim of this model is to create the cooking very simple, trouble-free and a lesser amount of time consuming.

1. Introduction

Food is the most essential necessity of individuals. So cooking has turn into a fundamental requirement for human beings. In modern world, a diversity of cookware has been used by human and a tool used for cooking utensils is human hand. Nowadays everybody commerce is elevated and a smart kitchen system has been deliberated, still the cooking domestic device that can cook itself is indispensable. Nowadays food making equipment is the very fashionable and nearly everyone need. Automation process was introduced to society for human welfare. Food automation is the most fast-growing mechanism. The Automated food maker mechanism is an innovative perception in food industrialized where it is designed to cook surplus variety of dishes [1].

The quality and taste of food may be varied in person to person while preparing. Sometimes the food may be wasted due to unawareness of the quantity prepared by human. But all these inaccuracies have been overcome by automatic machine. This automatic machine produces the same quality of food all time. We can minimize errors and wastage of food in case of a automatic machine. The machine provides quality food, reduction in cooking time and less supervision is required by the user. An industry uses automation process in case of production of food products over a large scale. Automation greatly reduces the need for human physical and mental requirements. Presently, the intention of automation in manufacturing companies is to enlarge the productivity and reducing expenses. Mostly, automation is regularly applied to boost the quality to a large extent in the manufacturing process. The most important solution of Automation in food manufacturing has been in enhancing the stability, security and convenience of food in foremost consumer advertise [2].
If it is used on small scale then we can reduce the supervision time which we give in normal cooking of our food and we can reduce the chances of any errors which may change the quality of food which we are preparing. If it is used on large scale it will reduce the production time of food products, quality is not compromised, labor cost is decreased since there will be need of less supervision, so ultimately industries can gain huge profits by the help of automation process. We can store vast number of food products in the memory of machine for the production and a proper hygiene is maintained throughout the process [3].

2. Literature Survey
V.B.Kumbhar et.al proposed Implementation of HMI Based Automatic Cooking Machine Such innovation in kitchen will help reducing human efforts. HMI Based is a well-groomed cooking mechanism with the purpose of cooking food without human intervention by clicking only some buttons. In this machine, based on the human need the user can choose the recipe and alter the inbuilt timers and the amount of ingredients. HMI Based machine consists of reed and limit input switches, Delta Made DVP14SS11R2 Program Logic Controller, Human Machine Interface (HMI) for selecting the recipe, and Outputs from PLC are various motors. The application of these systems is mass quantity cooking, maintains quality and taste of food and helpful in hotel industry and food chain [4].

Amit Kumar et.al proposed Implementation of PLC Based Automatic Cooking Machine that Main aim is to make cooking easier, simple and less time consuming. The machine will have pre-loaded recipes of your choice and the amount of ingredients will be specified in a C language program, so you just have to choose the recipe you want to eat and the machine will start to prepare your food and notify you when the food is ready. This machine can prepare food as close as food which can be prepared by a human hand. For communicating with the machine, we have installed a HMI interface through which we give command to the machine and every working process of the machine is controlled by Arduino2560 kit. This machine can be used in our day to day life and even in industries for mass production of certain food products [5].

Reema Patel et.al proposed automated cooking machine using programmable logic controller (plc) and HMI based automated cooking machine which is used in industrial level in food industry. Fundamentally, this machine dependent on mechanical and electrical parts with programming of PLC This machine will maintain a strategic distance from material wastage and work cost will likewise decreased by utilizing the automated cooking machine[6].

Alif Ahmad Syamsudduha et.al proposed future smart cooking machine system design which is based on an artificial intelligence mechanism. A future smart cooking machine that can limit cooking time and makes it simpler for people to do the cooking task is planned. This instrument is huge square size measurement and has numerous openings to put the food fixings. In that device a robotic arm will be there that will be valuable for preparing food fixings lies in accessible openings into wanted dishes. The progress of robot arm used by the Artificial Intelligence mechanism is LeJOS. To display the result a touch screen is utilized [7].

Rakshitha M J, et.al proposed design and development automated food maker which makes a new food that one can snatch and go. The requirement of automated food maker is to include the fundamental fixings and afterward choosing the preset menu of different dishes. They have used solid and liquid ingredients containers for implementation of the device. Electronic Modules such as microcontroller based on Arduino Mega 2560 also used to control all the activities of the automated food maker [8].

3. System Development
The proposed model of a new automatic cooking machine which is fully automated totally based on mechanical and electrical parts with Arduino Mega 2560 microcontroller.
3.1 Block diagram

![Block diagram of a new automatic cooking machine](image)

Fig 3.1 represents the block diagram of the proposed a new automatic cooking machine which uses Arduino Mega 2560 microcontroller board based on the ATmega2560. Servo Motors is an electrical device which can push or rotate an object with great precision. It consist of controlled device, output sensor and feedback system to manage the movement and the finishing arrangement of the shaft. To open and close the system electromechanically Relay Switch has been used. Solenoid Valve opens or shuts the valve precisely. Solenoid valves may make use of metal seals or elastic seals and for controlling solenoid valves may likewise have electrical interfaces. A spring might be utilized to hold the valve opened or shut while the valve isn't actuated. The menu selection can be done with web app/Android app using IOT.

3.2 Proposed method

Currently the technology has grown and automation process was introduced to society for human welfare. The proposed model of a new automatic cooking machine which is fully automated totally based on Arduino Mega. The fundamental inspiration behind this is to create a modernization in kitchen. Such innovation in kitchen will help reducing human efforts which is extraordinarily favorable to every person.

3.3 Algorithm

1. The initial part of the program focuses on the amount of oil to be pumped into the pan that is put on the induction. We put a volume of 5 to 10ml for our test run. The oil is pumped into the pan slowly through the valve pipe. The flow is controlled and the time is already pretested with test runs of the model.
2. This is carried out by the solenoid valve built on the sides of the model. The mixture of raw spices and purees drops down into the pan through a funnel to mix with the oil.
3. The funnel is a prototype made by using a plastic bottle with a narrow cap, the narrow cap acts as a control for the flow of the puree mixture that drops down.
4. The timing is adjusted to allow for the oil to heat up and cook the spices partially. The timings are adjusted according to the recipe being used. The puree mixture is premade using the basic spices and seasoning.
5. The spatula then drops down to a level just above the pan, in order to stir the basic mixture of oil and spices. The spatula works using an oscillation movement that is carried out using the servo motor. The servo motor timings are also adjusted in the source code according to the requirement.

6. After stirring for some time, the spatula is pulled back up and the raw vegetables or ingredients are dropped down through the funnel into the spices and oil mix. In this case the raw ingredients are paneer, the paneer is fresh and not pre cooked or pre fried.

7. The induction heats up in intervals, thus the gravy can tend to stick to the bottom of the pan. To ensure we get even cooking consistency we put water at a considerable amount. The heat is thus evened out throughout the gravy.

8. Then water is pumped into the gravy through another solenoid pump also attached on the side. The valve pump has a constant flow rate. The time and volume of water passing per second has been tested and the required timing is adjusted to pump the optimal volume of water into the pan.

9. The spatula once again drops down and mixes the total gravy, to provide a nice consistency and to enable equal mixing. The servo motor has a much longer stirring time as the ingredients are all in the pan. They need to be mixed properly thus the spatula needs to stir it for a longer time.

10. After the gravy is properly stirred, the spatula is pulled up and the lid of the pan automatically drops down and closes the pan to amplify heat. It remains closed for sometime as per requirement, and finally it opens. The lid is closed to provide for amplified heat to allow for cooking of the paneer with the gravy combined. This ensures that there is no under or overcooking of the gravy.

11. The timing of the lid to be closed is tested out and the results were noted. The timings can also be adjusted in the source code depending on the ingredients being used.

12. As soon as it opens up, the Arduino shuts down the entire system as well as the induction. The food is now prepared.

4. Results and Discussion

Figure 4.1 represents the proposed new cooking machine and Figure 4.2 represents the typical Indian cuisine Paneer butter masala which is prepared by the proposed new cooking machine and. The raw ingredients are put one by one into the utensil as per the requirement and simultaneously the mixture was continuously stirred. Firstly, the oil is poured into the utensil and then heated for a certain time. The mixture of raw ingredients are then dropped into the utensil and mixed using spatula. It’s cooked
for some time and then the required amount of water is poured into the mixture. Once the gravy is prepared cottage cheese is automatically dropped down and the spatula is mixed once again. Finally, the lid is automatically put on the top of the utensil and then it is pulled up by the motor once the food is ready.

5. Conclusion
This model presents Arduino Mega and IOT based automatic cooking machine. The result of this machine can be used for domestic cooking purpose. The advantage of the proposed cooking machine is more efficient use of materials and we can maintain the hygiene by this way. Also this machine maintains the quality with quantity of cooking food. This machine will avoid material wastage and labor cost by using the automation technology.

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