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Design and Development of Smart Cooking Machine

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Abstract: ***The constant and continuous increase in our country's population causes lack of job opportunities and the struggle for survival come at a price of time and concentration. And a healthy diet and good rest is necessary after constant work. Even for children and teenagers nowadays have as much as work and problems as a grown man. As we chase for dreams and goals , we are and developing and improving every single day. But the only thing we cannot achieve or obtained is Time. Nobody can stop, reverse , control or buy Time. But one thing we can do is that we can save Time by stop wasting unnecessary time on simple things like watching smart phones for hours and sending more time in digital world than the real one. But necessary works like cooking also sucks a lot of Time in our life. If even developing a system that save and reduces the effort and Time that would be worth it. So that's why we going develop and construct a automated cooking machine or a "Smart cooking machine" which would be really helpful and useful for lots and lots people who are constantly running for their dreams and fulfilling their carrier and someone with less time in their hands. In my daily life I see parents who are going work struggle to manage their own and children's routine or time tables. As they need to cook their kids and themselves, for a fact humans need to eat live their life and we even consume food for three times a day. If look at a average person's life cooking drains most of time and energy than other daily based work or activity. As per Google a normal and average man spends over a hour for cooking only and didn't even include eating the food. Three times a day means three hours in a day which is gone and wasted to a citizen who is moving with no to less time in their regular life. This lack of time even to health issues such development of stresses, increase in blood pressure and heart problems. The main point of this Smart Cooking Machine reduces the time which they could do some useful work that will later helpful to future somehow. These automated cooking process are currently the one of major importance in this rapidly growing world. The project we are trying develop if ended at successful result, it would be helpful to this world and more development and improvement can be a glimpse of a future were there are with fully Automated cooking is available. As much as useful is there in this project which comes with some disadvantages. That's why we will going to rectify and find solutions to the problems in our Smarting Cooking Machines.***

I. INTRODUCTION

A smart cooking already been designed .This is to develop a environment for women who goes to works. Smart Cooking machine which use arduino as its control unit. This system consist of servo motor, stepper motor , temperature sensor, load sensor, position sensor, relay by solenoid ,belt drive, stirrer and induction stove. The input is given through arduino to following components. In this system we use Arduino Mega 2560. The command is given to the motors and other components by coding in Arduino Software

The uses of current are low in our machine. The salt level was put by our need which we want that is manual. In this machine, it has slight vessel washing. The cleaning process was not only for vessels it is also for the container of vegetables and ingredients. We have created it also for cutting the bigger size vegetables like drumstick, and it will also peel the vegetables. Thus the advantage and disadvantage. We use HMI and arduino software to provide instructions for preparing the dishes. We use motors, induction stove, containers for vegetables, oil and water, sensors and other electronic gadgets. The vegetables cut using electric cutter machine and put in their separate containers. When the command is given to the machine through HMI, the ingredients from their respect containers are pushed to the chamber. There two separate chamber, one for frying and other for boiling. Spices are added in correct in portions and time which is already included in the instruction through arduino. After the frying and boiling are complete, they are mixed together by a mixer Which powered by a motor. The pushing of ingredients are performed through small gear mechanisms and slide ways. The heating process is performed by induction stove.

In our project, we provide two or more dishes such as sambar, rasam and other similar recipes. Thus our automatic cooking machine increases the efficiency of cooking and reduces the effort of man power.

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II. OBJECTIVES

1) The traditional Indian way of cooking is more complicated .It takes concentration, effort and time of cooks until the point they get exhausted after cooking.
2) In this current era, everything moves forward and faster , but still cooking is the one of the thing that takes man power and done manually.
3) Useful for women's who going for daily work . Because , for preparing food it takes more time, it will make tired and chance to go late for work.
4) In our country cooking of certain dishes is more complex and harder as if it is only masters of cooking can achieve perfection in those dishes. Nowadays there are who cannot even for themselves. As they get older it gets harder to learn how to cook.
5) For Aged people and kids it is difficult cook food for them when they are alone in their home. Automated cooking process would be very helpful to these kind of people in our society .
6) Simple developments are done in cooking field with some working of the cooks.
7) Machine is full and full of automatic, so it is useful for many situations. And it is also used for food industries and hotels.
8) If we provide neat and hygienic food for our human generation, because nowadays the probability of hygienic in hotels and food industries is sure.
9) The making time of food is faster than human preparing, and time of washing the vessel is reduced, And this machine took low current for preparing food.
10) Automated process can easily reduce the time and energy of the people who spend most of their time in the kitchen. Our automated cooking machine is to lower the peoples effort and to decrease the time that spend in the kitchen.
11) These kinds of food based projects will be useful to further develop the food industries.

III. LITERATURE REVIEW

1) *Automatic Cooking Machine using Arduino*

(Amit Kumar, July 2019);

'Automatic cooking machine' as the name itself implies, cooking of food automatically without any human effort. 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. In present day scenario there is a rapid increase in inventions of machines which are based on automation process and they are used in every sector from home to industries.

2) *Fully Automatic Cooking System (M-cooker)*

(Rukshani Somarathna February 2014);

The complexity and the competitive nature of the world have led people to consider cooking as a very tiring and a time wasting activity. It is evident in the society that, in order to survive with the current economic conditions both parents in a family has to engage in jobs. Thus, cooking has become a significant problem to women and men, equally. As a solution to this problem, we proposed to introduce a fully automated cooking system, the "m-cooker", which can cook a simple curry with the user's command. The most significant feature of success, of this automatic cooker is that it could be controlled via the mobile input.

3) *Future Smart Cooking Machine System Design*

(Dewi Agushinta .R, December 2013);

There are many tools make human task get easier. Cooking has become a basic necessity for human beings, since food is one of basic human needs. Until now, the cooking equipment being used is still a hand tool. However everyone has slightly high activity. The presence of cooking tools that can do the cooking work by itself is now necessary. Future smart cooking machine is an artificial intelligence machine that can do cooking work automatically. With this system design, the time is minimized and the ease of work is expected to be achieved. The development of this system is carried out with system development life cycle (SDLC) methods. Prototyping method used in this system is a throw-away prototyping approach. At the end of this research there will be produced a cooking machine system design including physical design engine and interface design.

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4) Design and Development Automated Food Maker

(Mr. Madan .G, JUNE 2019);

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.

5) Performance Study of a Developed Automated Cooking System

(Kingsley Chilakpu, July 2020);

Food is an essential part of life. It gives the required energy and body nutrients to grow and develop, to be healthy and active to move, work, play, think and learn . It is a known fact that all animals eat, but only human beings cook their foods amongst all the animals. So cooking becomes more than necessary as it is the symbol of our humanity and what marks us off from the rest of nature . Cooking primarily means the addition of heat to soften food for human consumption. A lot of cooking methods are used and practiced by different races, tribes, cultures, in catering and hotel industries etc. Each has its peculiar merits and demerits, as a result of different people. Various recipes and techniques for all kinds of food substances have been developed at different times. Cooking food in a liquid (water, bouillon, stock, milk) is known as Boiling. Examples of food which might be cooked by boiling are; stocks (beef, mutton, chicken), sauces, glazes, soup, farinaceous, fish and vegetables. Poaching is a cooking technique that involves submerging of food in liquid such as water, milk, stock or wine. Stewing is a long, slow cooking method where food is cut into pieces and cooked in the minimum amount of liquid, water, stock or sauce. Braising is a method of cooking food in the oven by steam (moist heat) under varying degrees of pressure. Cooking food by dry heat in an oven is known as baking. Roasting is cooking in dry heat in an oven or on a spit with the aid of fat or oil. Frying is oil based cooking technique used to prepare portion sized cuts of meat, fish and fritters. Grilling is a fast method of cooking by radiant heat. These cooking methods are critical to the development of suitable cooking facilities. Over the years several heating devices have been employed in easing these methods of cooking.

IV. PROBLEM IDENTIFICATION

In our project, we have problems like infrastructure and arrangement of various electronics and component containers ,the complete procedure for a recipe or a dish ,timing of every vegetables and other ingredients to get fully cooked and the order of food materials to come after one and other. We can identify these problems by deeply analyzing problems using six sigma and similar management techniques.

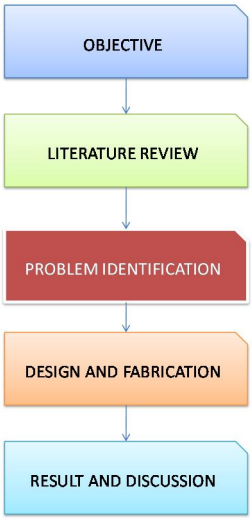
Cooking is regular and common practice around human kind, cooking based problems can easily solved by asking and gathering information skilled and more experienced persons in the cooking field itself. It would easy, efficient and not very time consuming if we just ask our parents who are cooking every day for us. Technical stuffs like electronics, layout of the machine, programming ,coding and mechanisms based problems are rectified by learning, taking information from staffs that are related to the respective topic from our project or collect notes and advice from the people who are already worked at these kinds of topics similar to the project.

The infrastructure and arrangement of various electronics and component containers can be solved by splitting then into sections, one is electrical components and food materials containing containers. All the food containers are at the top of the machine so that the raw vegetables would slide their way to the vessel. To hold the containers in the top, a skeletal form of the machine or like a frame of a automobile vehicle which could hold and carry the parts of the respective machine. The relay and all the sliding mechanisms will be sited on the middle rack. The stirrer and liquid containers will be seated directly above the vessel so it could fall into the vessel when needed. All the wiring of electrical gadgets will pass behind the machine because it will affected and melted by the heat produced while cooking of the dish. The HMI is fixed outside as the screen to the consumers, which are used show, the respective operations for each dishes.

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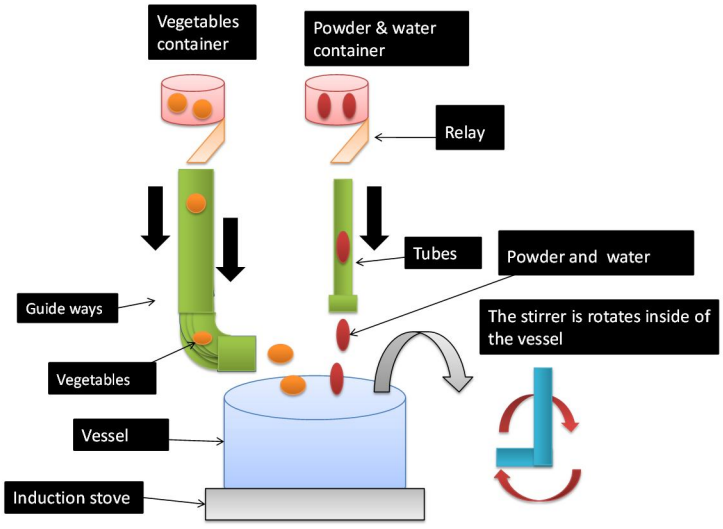
Hence the problem identification of our project 'Smart Cooking Machine' is successfully consider and rectified properly as per the taken management techniques. We may face problems when practically involved the project for every single part the machine. We solve additional problems by researching and receiving advices and recommendations from our respective faculties and project tutors.

V. METHODOLOGY

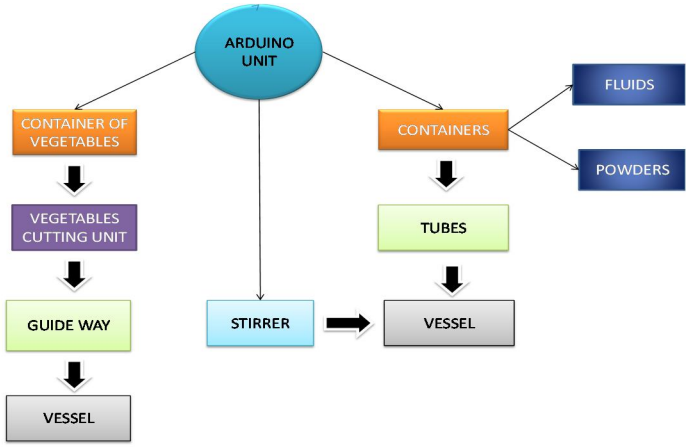


The manual way of cooking is more hard and complicating. The automated process may reduce the work load. We are going to take a specific recipe or a dish and develop the automated process particularly concerning that only. For a basic dish or recipe in Indian cooking have a seasoning, boiling, frying, mixing and addition of spices. In this project we have taken our primary dish vegetable stew. There are containers for every vegetable and ingredients such as onion, carrot, beans, lentil, chilli powder and pepper powder. The cooking vessel should be kept in the post of cooking manually. After the vessel is placed, a notification in the HMI board in appear asking permission to start cooking, once we click that cooking process will get started. At first the water is poured and filled in the vessel for boiling of lentil, beans and beans.

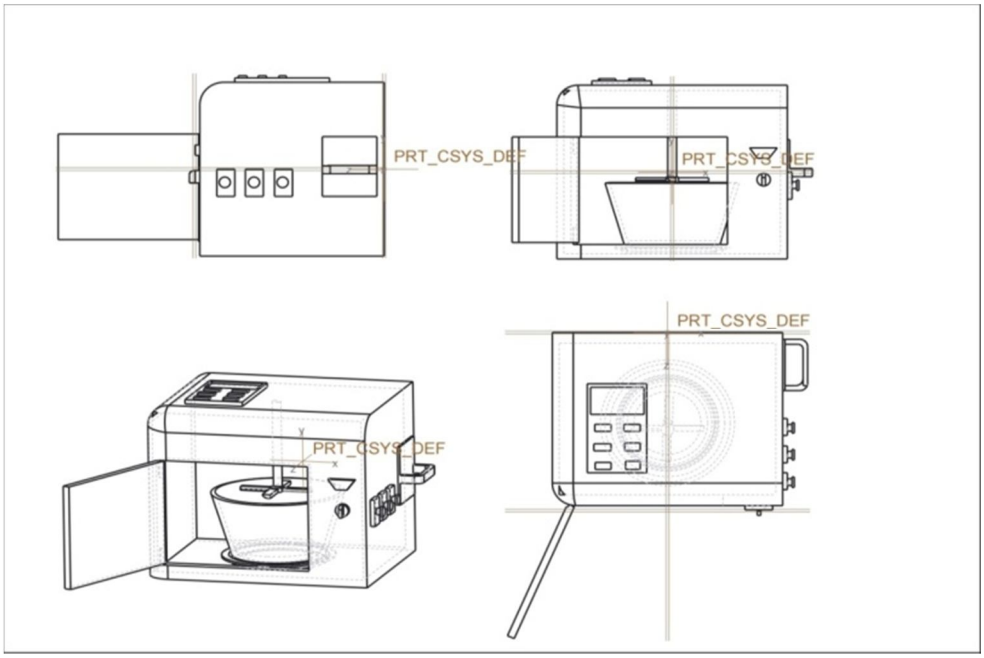
A. Design And Fabrication



1) Figure: Smart cooking machine process diagram



2) In our system, there has a 2 container, in first there will be filled of vegetables and ingredients.
3) The entire container was kept in top, and below there will be a relay, with the help of Arduino relay will be open, and the oil will be split into the vessel.
4) Load sensors will be fitted below the induction stove. While we keep the vessel, the load sensors will be detect and gives a signal to the Arduino. The Arduino helps to maintain on boiling temperature.
5) Below the container we have fixed a relay, which we steed by Arduino, it helps the relay to open and close.
6) While opening the relay, with the help of guide way the vegetables will be passes into vessels.
7) The stirrer will helps to mix it. It will run as per required speed.
8) The timing of making food will be set in Ardiuno. When it completed the food ,it will gives a buzzer sound.
9) Then it will automatically washes the vessels and container.
10) Sheet metal are used to cover the internal parts as the body of the cooking machine.
11) HMI helps the user to easily select the dish or recipe by just selecting that in the screen display before them.
12) Position sensors detect whether the vegetables cross in the right amount and close relay so that an unwanted amount would not go into the vessel.



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B. Design Circuit

Black Diagram

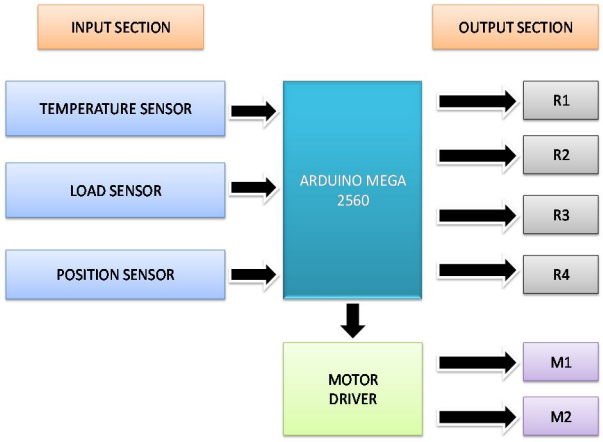


Fig 2: Block Diagram Of Design Circuit

The components of the proposed system are:

1) R1 - It will helps to open the relay, container for which cutter goes in to cutting the vegetables.
2) R2 - This relay will open as per guide way to vessel.
3) R3 - Powder or oil container will open and it will fell into the vessel.
4) R4 - Its helps to controls an induction stove.
5) M1-Motor driving the stirrer to rotate.
6) M2- Motor driving the cutter blades to cut the vegetables.

A single input is enough for the Arduino for controlling the whole parts. Arduino's input signal wire will be connected through the output. The relay's input will connect to Ardiuno and another output is connected to closing and opening the container. Stepped motor, servo motor will be work as per Arduino comments, it was connected by the induction stove output wires and arduino motor's output wire. While the process of cooking is completed, the components and circuits connected by Arduino will be automatically disconnects and finally the machine will be shutdown.

VI. ACKNOWLEDGEMENT

First and foremost, I would like to thank the Almighty God for giving us the strength knowledge, ability and opportunity to undertake this project study and to persevere and complete it with satisfaction.

We would like to express our special gratitude and thanks to special al machines laboratory and technicians for giving us such attention time.

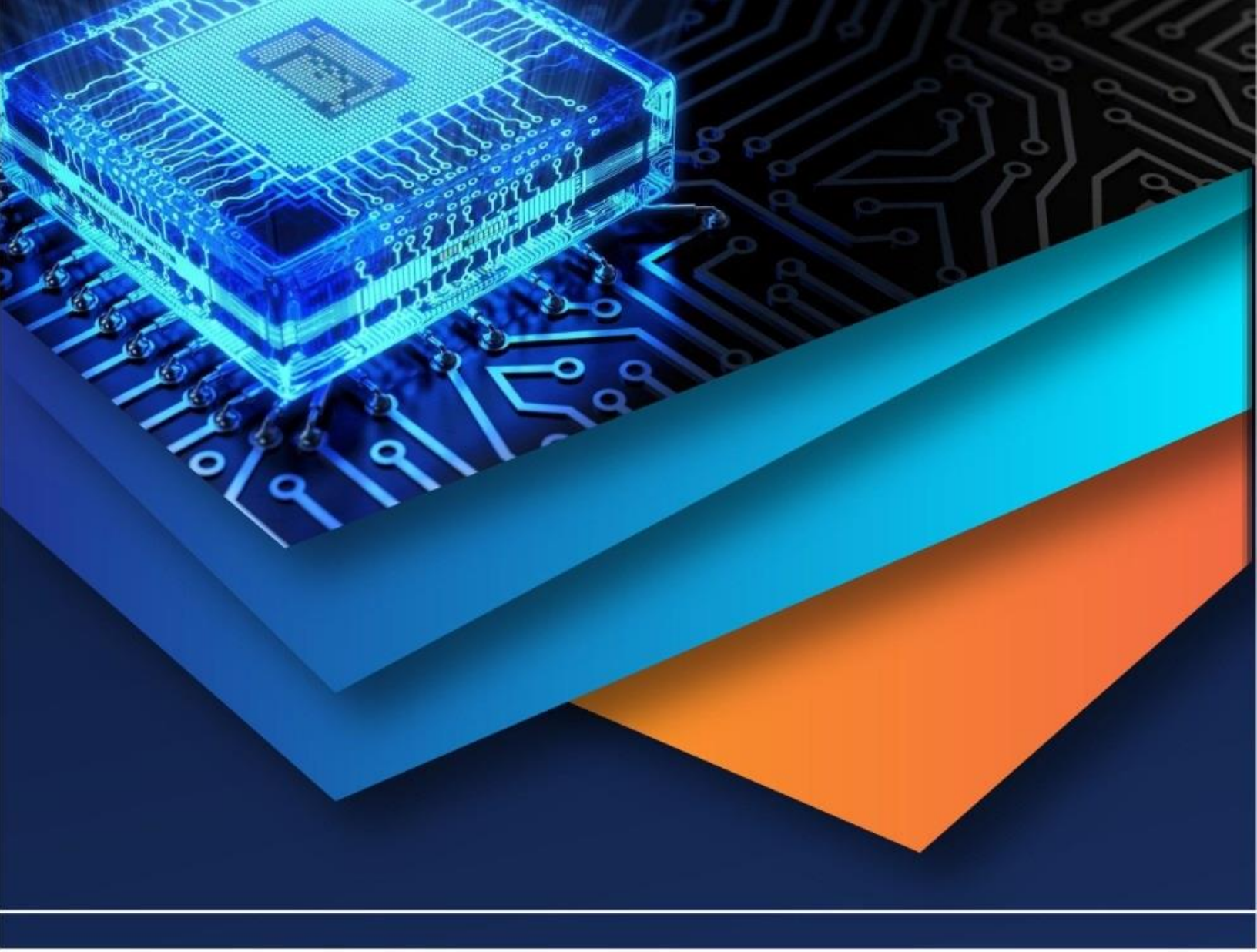
We would like to express our gratitude towards our parents for their tremendous contribution in helping us reach this stage in our life. This would not have been possible without their unwavering and unselfish love, cooperation and encouragement given to us at all times.

CONCLUSION

A. In this report , we have seen about the Introduction , literature survey, electronics, motors, mechanisms, materials and the working of this smart cooking machine project.
B. With this deep analysis for this project we have learnt how to develop and construct the product of the same kind.
C. If we successfully complete this project ,it would easy for kids and elderly aged people to cook food on their home.
D. And the time around kitchen will also be reduced which would be really beneficial for people who goes to work and woman who send most their time in kitchen.
E. With the help of team work we will able to complete this project .
F. With this information we will this report. Thank you.

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