SMART COOKING MONITORING SYSTEM

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ABSTRACT

This research proposal aims to make a new invasion in a cooking system. A smart cooker controls the whole system of cooking with the help of a sensor with an IoT (Internet of things) by the instruction of a user. Also, the cooking will be done automatically by taking ingredients in the pot through itself for the particular food recipes. It can set or control temperature depends upon state of cooking as well as mixing task also done by itself. In addition, the smart stove will have the feature of measuring the amount of gas, leakage of the gas with the pressure sensor. This system will have the extra feature if any kind of accident occurs like as burning some things the system gets the notification with the help of a buzzer (alert) system and stops the system. Moreover, the application of smart device can be controlled the smart stove with the help of wireless communication. The device helps to monitor the whole cooking system and find out all the sensors working properly or not like the user can check the stove is running or not when the stove is starting to running. The smart cooking system provides a feasible method for intelligence in the cooking environment. The research aims towards full implementation of an IoT based cooking automation system through as the user instruction as a data processing so that the system can take suitable action based on the circumstances without human supervision.

INTRODUCTION

The cooking system has its own automated working features as well as has its other very unique smart features as well which makes the system intelligent and the main thing is that system can cook food by itself like automated cooking pot will take ingredients in it from ingredients pots then will set temperature, mixing ingredients. Also, smart stove can be controlled through mobile application through wireless communication. An additional knob attached with the stove which helps to turn off the stove automatically when cooking has been completely done and additional knob will also work when something is happening wrong like gas leakage or food is burning and even if the uncertain fire occurred. The system contains a timer device along with which fixes the cooking time as per particular recipes. From the social point of view, this system can reduce/save the time of cooking and make cooking easier, which are important and user-friendly for us.

1. Objective

To propose this system is an automatic stove that ensures the cooking in automated way, safety of the kitchen and the house. It is also taken care of by the user robotically the device of the user. This gives maximum facilities to the user to cook every item. It's a kitchen for the upcoming generation with the power of advanced AI & IoT Technology. However, major objectives in our research and that is as the system mainly will work automatically like each particular food will cook by itself as per recipe without direct involvement of the user in cooking and it will also notify the user in every single work to secure every work automated. Its essential goal to make the food in the time without having a few sorts of mishap and ensure the kitchen system safety without having any kind of accident. The association of this kitchen is inviting to the shrewd gadget with a Wi-Fi association and also with an electronic ventilator

to absorb steam. In addition, there is also remembrance storage space which stores the request of the user and works as their command. This system is extra and friendlier with the user and has the higher technology to do the work without the command of the user in case of any type of accident. This system is vastly supportive of the chief, householder inside the period of food preparation their meals without having any kind of problems.

2. State of Art

Cooking are the general way of making food. There are available many ways and tools to make easier the human task. Nowadays, Internet of things (IoT) going to make all the home appliances useful, easy, intelligent, and smart as well. So, cooking stuff is also included with this. People make food by following the process of mannered like analog cooking stove. Therefore, IoT added with induction stove and make that stove as a smart induction stove so it makes the cooking process pretty much easy. In an invented system by D. Paul Chacón-Troya et al., a smart induction stove is nothing but a Wi-Fi controlled stove along with IoT features. A stove is heated through an electromagnetic power transfer from alternative current (AC) at the wall outlet into a metal item. AC currents electronically conducted into a coil. Then the coil heated the cooking pot. It's an in general way to make food. Another paper work by A. Yalma et al. identify that microcontroller based embedded application which refers that to turning off any stove. This microcontroller turning off the stove represented by in three modes: detection mode, timer mode and remote access mode. In a paper (S. Reichel et al, 2011) an intelligent cooking agent called MAMPF (The Multifunctional and Adaptive Meal Preparation Facility) was introduced for zone-less stoves. The proposed system has two different domain- the hardware with induction hot plates and a user interaction system. MAMPF is equipped with intelligent agent and is the result of analysing the process of a meal preparation and identifying steps, tasks and action which can be supported by computer interaction. In [11], M. Y. Yuan et al. developed an automated oven monitoring system which is based on thermal cameras to detect hazard situations and to alert the user before a fire occurs. The main purpose of this work was to detect four types of alert situations. In another paper, they have presented KogniChef, an intellectual cooking assistive framework that gives clients with intelligent, multi-modular, and natural help while setting up a supper. Their framework expands normal kitchen apparatuses with a wide assortment of sensors and UIs, interconnected inside to deduce the present status in the cooking system and to give smart direction [14]. In an another research paper researcher proposed a smart cooking stove which is basically for Havesting Energy from the heat, Gas Leakage detection and IoT based notification System [15].

RESEARCH DESIGN AND METHODS

1. Hypothesis

The current cooking system which are used now are still missing some important features and functions which can be really important and helpful for people. The autonomous cooking system can be a great revolution. It can save time and effort of the user and that's how this can be efficient. Also this autonomous cooking system can have made food by recipe which will be generated in the database of the system. There will be ingredient pot for ingredients which user will add and then the system will auto cook the food by the particular recipe by user command. And in this cooking system the temperature will be handled by the system as per cooking type. Also if any occurrence happened like gas leakage, the system will automatically detect the incident and take necessary measures like stop the operation and give signal to user. User command will be generated by user with a smart device. And the system will do the work automatically. These are the unique features of this autonomous cooking system which are missing in the cooking system now. So implementation of these features to make an autonomous cooking system can be an efficient system and can save time and effort both. A user will not have to make so much effort to make food in normal cooking system. An autonomous cooking system can solve the problem and can be a revolution to cooking system.

2. Requirement

Here in this autonomous cooking system, a user will be required to make the decision. And user will be connected to autonomous cooking system by a smart device like smartphone or laptop with internet connection. User will set command for the system by smart device. Then the user will add ingredients to the Ingredient pot and make command for particular recipe and cooking operation will start by the system. The system will control the temperature and also any kind of incident and take necessary measures. After making the food system will automatically stop operation and give signal to user. So We will use the recipe data and algorithm in the system to make it. That's all the main requirements and functionalities of the system we proposed.

CHALLENGES

1. Technical Challenges

There are few technical challenges and also some social challenges in this research for practical implementation.

1.1 Accuracy of the machine

The main system of this research proposal is to make a smart cooking system. The system will be completely autonomous and can make decision by own. The user just has to add the ingredients in the system and the system will automatically prepare food by the recipes. User just need to make the instruction of food name and add ingredients. The system will work according to the recipes which will be programmed in the database of the system like a coffee machine. So here the main challenge is to ensure the accuracy of the cooking that how efficiently the system can cook food according to the recipes with given ingredients.

1.2 Accuracy of the result

The accurate result means the exact food by the user's choice with the given ingredients in proper time. The machine must have to maintain the temperature properly. And also any kind of disaster like gas leakage will be detected my machine. Whenever the food is ready the user will get update automatically. For every kind of food recipes there will be a particular time to make the food by system. So the accuracy of the result refers to the fact that each food should be cooked as per recipe in proper time. So here efficiency of cooking and timing are most important factors for accurate result.

2. Social Challenges

1.1 Acceptance

Acceptance can be a big challenge in social aspect. Because this system will be an autonomous cooking system with lots of features like programmed recipes so obviously it will be expensive and not everyone can afford this easily for personal use. But this system can be easily affordable by big hotels, restaurants and food shops for an easy and comfortable cooking system.

1.2 Environment friendly

There is an another challenge to ensure the system will be environment friendly totally. The system should be accurate in terms of safety measures and ensure that any kind of disaster must not happened. Even if there is any problem the system will alert user by sending signal and stop the operation immediately.

1.3 Service providing

The system should be proper in terms of service like timing, particular recipe, control temperature and detect any kind of problem or disaster.

EVALUATION

Impacts and Benefits of the Project

Automated cooking system will help to add additional features to the existing cooking system. Adding automated cooking pot, ingredients pot, smart device and gas leakage detector device are the new invention to the cooking system. The pot and cooking system has its own capability to take decision in particular actions. So from the scientific point of view the impact of the project is it make the cooking features/systems more advanced and intelligent.

There are multiple benefits to this project. Firstly, users/chief don't need to directly involved to the cooking. Because user will just set the command for particular food recipe & will give ingredients then the whole cooking will be done by itself in the system. Therefore, cooking makes more easy. Then smart device will provide notification in every particular actions. Risk of burning, accident even if any uncertain condition problems will have been reduced.

REFERENCES

1. V. Govindraj, M. Sathiyanarayanan and B. Abubakar, “Customary Homes to Smart Homes using Internet of Things (IoT) and Mobile Application,” 2017 International Conference On Smart Thechnologies For Smart Nation, Aug. 2017.

2. C. Zhang, M. Zhang, Y. Su and W. Wang, “Smart home design based on ZigBee wireless sensor network,” 7th International Conference on Communications and Networking in China, Aug. 2012.

3. S. Dey, A. Roy and S. Das, “Home automation using Internet of Thing,” 2016 IEEE 7th Annual Ubiquitous.

4. M. Tamaki., Y. Yamazaki., C. Premachandra., “A basic study on Intelligent Reminder System for unextinguished Gas Stoves,” 2019 IEE 1st Global Conference on Life Sciences and Technology’s, Japan.

5. A. Yalmar., M. Parihar., V. Kadam., K. Kharat., “Implementation of Automatic Safety Gas Stove,” 2015 Annual IEEE India Conference, India.

6. D.Paul Chacón-Troya1., J. Quezada., C. Espinoza., “Development and implementation of a smart induction stove” Published on 2017 Brazillian Power Electronics Conference, Brazil.

7. Loic, M., 2015. iKT universal electronic monitoring device and method of use for saet cooking. U.S. Patent 9,060,212.

8. G. V. da Silva Medeiros. M. Ricardo dos Santos. A. Sandyra Bezerra Lopes., E.C.Barbalho Neto., “Smartgas: a smart platform for cooking gas monitoring system.”2017 IEEE First Summer School on Smart Cities, Natal, Brazil, August 6-11, 2017.

9. A. Ahmed Syamsuddha., D. Pratiwi., A. Reswari Yudistari., J. Hindharta., D. Agushinta R., “Future Smart Cooking Machine System Design,” Vol.11, No.4 December 2013,pp.827~834.

10. S.Reichel., T. Muller., O. Stamm., F. Groh., B. Wiedersheim., and M. Weber,“MAMPF: An intelligent Cooking Agent for Zone less Stoves,” Intelligent Environment (IE), 2011 7th International Conference, DOI:10.1109/IE.2011.18

11. M.Y. Yuan., J. R. Goubran, “Thermal Imaging for Assisted at Home: Improving Kitchen Safety,” Journal of Medical and Biological Engineering, 33(4): 380-387.2012.

12. Nandan Rai, S., Kumar, K., Mishra, A. and Mittal, V. k.,"Multi-stage Face Recognition for Biometric Access", in Proc. IEEE 12th International INDICON 2015 Conference (E3-C3), Jamia Millia Islamia, New Delhi, 17-20 Dec 2015.

13. Kumar, K., Kumar, K., Nandan Rai, S., Mishra, A. and Mittal, V. k.," Biometric Access for a Secure Smart Robot", in Proc. IEEE 3rd International Conference on Signal Processing, Computing and Control 2015 (ISPCC 2015), JUIT, Waknaghat, India, 24-26 Sep 2015.

14. Neumann, Alexander; Elbrechter, Christof; Pfeiffer-Leßmann, Nadine; Kõiva, Risto; Carlmeyer, Birte; Rüther, Stefan; Schade, Michael; Ückermann, André; Wachsmuth, Sven; Ritter, Helge J. (2017). "KogniChef": A Cognitive Cooking Assistant. KI - Künstliche Intelligenz, (), –. doi:10.1007/s13218-017-0488-6

15. Jahan, S., Talukdar, S., Islam, M. M., Azmir, M. M., & Saleque, A. M. (2019, January). Development of Smart Cooking Stove: Harvesting Energy from the Heat, Gas Leakage Detection and IoT Based Notification System. In 2019 International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST) (pp. 117-120). IEEE.