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Survey On Smart Cooking Technologies

Sanjay Raj [1], Abhijith Jana [2], Amrutha PS [3], Sona Lazar [4], Ms.Vidya Hari [5]

[1],[2],[3],[4] UG Scholor,Dept.Of Computer Science and Engineering KMEA Engineering College, Kerala-India (of Aff.KTU) Ernakulam, India

[5] Asst.Prof,Dept.Of Computer Science and Engineering KMEA Engineering College, Kerala-India (of Aff.KTU) Ernakulam, India

ABSTRACT

The proliferation of Internet of Things (IoT) devices has revolutionized various aspects of our daily lives, including the way we cook and interact with our kitchens. By connecting everyday cooking appliances, utensils, and devices to the internet, smart cooking systems enable users to achieve greater convenience, efficiency, and control in their culinary endeavors. This survey presents an overview of the key technologies employed in smart cooking, focusing on IoT-enabled devices and their functionalities. We discuss the integration of sensors, actuators, and communication protocols that enable the exchange of data between various cooking appliances and a central control system. We also explore the advancements in voice recognition, natural language processing, and machine learning algorithms, which enhance the interactivity and automation of smart cooking environments.

Keywords: - Internet of Things, Wireless Network, Fire Detection, Smart Kitchen.

I. INTRODUCTION

The world's complexity and competitive nature have led people to consider cooking a very tiring and time-wasting activity. It is evident in society that, to survive with the current economic conditions, both parents have to engage in jobs. Thus, cooking has become a significant problem for women and men. As a solution to this problem, we propose a smart system that can reduce human interactions in the kitchen. The main goal is to build an automated cooking environment and reduces fuel wastage, ensuring security that concentrates on additional protection. This system makes users more comfortable, and safe in the kitchen environment. The proposed system is a hardware IoT system. With smartphones, we can adjust the flames and cooking time without even touching the stove. Like a micro-oven, a timer system is also available in this system. The system will auto-detect some common items for cooking and set timers for that item by itself, to some extent. Users can also set a timer or adjust the timer as well using an interface. Here also include a Bluetooth system for controlling the burner by voice. When smoke is detected, the temperature is high from its range while humans are not around, and if there is any unnecessary gas amount in the kitchen, a safety module will turn on automatically and an alert is produced. The main advantages of the system are time-saving and easy cooking. Our main focus has been to create a smart kitchen where the user is the central element of system design.

In particular, it was attempted to make them more comfortable, and safe in the kitchen environment through the inclusion of a series of technological interaction smart and high usability solutions. Technology becomes a support and a tool to ensure a better liability of the kitchen in terms of safety, comfort, and well-being, optimize energy consumption, increase energy efficiency, and improve the kitchen's usability. This system can be managed through an Android user interface, and by the human voice, which allows one to set and control almost the cooking activities in the kitchen and gives information and alerts in case of situations of warnings and reminders. Therefore, despite users' cooking skills, anyone can ensure that a delicious meal awaits them at home, through their mobile phone. Thus, the "smart-ignite", would be a solution for anyone who finds it difficult to prepare three meals a day, with other commitments. This survey paper comprehensively analyses IoT-based smart cooking technologies, focusing on their features, challenges, and future directions. With the increasing integration of the Internet of Things (IoT) in various domains, including the kitchen, smart cooking technologies offer innovative solutions to enhance the cooking experience. This paper aims to provide an in-depth understanding of IoT-enabled smart cooking devices, their functionalities, benefits, and potential limitations. It also explores the emerging trends and future research directions in this domain.

II. LITERATURE SURVEY

A. IOT-BASED SMART KITCHEN AUTOMATION ANDMONITORING SYSTEM

This methodology Implemented IoT based smart kitchen with an Automation Monitoring system using Node MCU [1]. The different technologies

such as RFID, WSN, Cloud Computing, Networking Technology, and Nanotechnology that support the IoT, and their applications in various fields i.e. Smart Home, Smart City, Smart Grid, Smart Health, and Smart Farming have been covered. In addition to this, special coverage has been made concerning Smart Kitchen. The description of various appliances and their application in the smart kitchen has been enumerated. In recent days kitchen-based accidents have increased in both commercial kitchens and domestic kitchens. People regularly go to the kitchen to cook the food. But it will become dangerous if there is leakage in a gas cylinder. It aims to reduce the risks in Kitchen using the Internet of Things. These accidents can be avoided using IoT technologies like monitoring the entire kitchen from remote are Tor to implement this research both hardware and software will be utilized. From the hardware side gas sensor, temperature sensor, humidity sensor, Servo motor, Arduino UNO, and load cell Node MCU has been used. From the software side integrated Node MCU and mobile application have been used. Our system provides results in the form of SMS.

B. GAS LEAKAGE WITH AUTO VENTILATION AND SMART MANAGEMENT SYSTEM USING IOT

In the proposed framework, gas sensors (MQ2 Sensor), and fire sensors are interfaced to the Arduino microcontroller. These sensors go about as a contribute to the framework. The reaction of every one of these sensors can be seen in the LCD display. GSM module utilizes AT orders for sending SMS. This item is an extraordinary development board for IoT-based applications (Blynk). Auto air ventilation and a water flow system are also present in the proposed system. The proposed framework includes the system's software, hardware, and framework activity. To comprehend the work, all aspects of the segment are clarified in detail in the accompanying subsection. This framework utilizes the gas sensor, fire sensor, bell, and transfers with appended water valve, air fan, and GSM module for correspondence dependent on the Arduino microcontroller. The framework can alarm clients about home fires, and gas spillage. It can play out some fitting activity as a reaction to undesirable circumstances to forestall the loss of human existence and assets. The proposed system has the facility for gas detection and fire. If a gas fire is detected by the system then it will notify the homeowner through SMS and also buzzer on. There are two important features auto ventilation and water flow via a solenoid valve in the proposed system. The proposed system is exceptionally valuable to forestall fire demise. In this manner, the harm is mainly caused due to gas spillage and it can be limited by utilization of IOT based smart gas management system.

C. SMART KITCHEN USING RASPBERRY PI

In the proposed framework, gas sensors (MQ2 Sensor), and fire sensors are interfaced with the Arduino microcontroller. These sensors go about as a contribute to the framework. The reaction of every one of these sensors can be seen in the LCD. GSM module utilizes AT orders for sending SMS. This item is an extraordinary development board for IoT-based applications (Blynk). Auto air ventilation and a water flow system are also present in the proposed system. The proposed framework includes the system's software, hardware, and framework activity. To comprehend the work, all aspects of the segment are clarified in detail in the accompanying subsection. This framework utilizes the gas sensor, fire sensor, bell, and transfers with appended water valve, air fan, and GSM module for correspondence dependent on the Arduino microcontroller. The framework can alarm clients about home fires, and gas spillage. It can play out some fitting activity as a reaction to undesirable circumstances to forestall the loss of human existence and assets. The proposed system has the facility for gas detection and fire. If the system detects a gas fire, it will notify the homeowner through SMS and a buzzer. There are two important features auto ventilation and water flow via a solenoid valve in the proposed system. The proposed system is exceptionally valuable to forestall fire demise. In this manner, the harms are mainly caused due to the gas spillage and it can be limited by the utilization of IOT based smart gas management system.

D. IOT BASED SYSTEM FOR SMART KITCHEN

This methodology provides insight into the dynamics that come with the emergence of IoT in the furniture and kitchen manufacturing industry. By implementing the concept of IoT companies are currently evaluating how internal knowledge and skillsets correspond to the new technical requirements that the emerging digital setting outlines and by directing internal research they are learning more about 10T and connected products as they proceed. One current major problem is that there are no open protocols that can connect all products regardless of supplier. Nevertheless, the implementation of IoT does not solely involve technical aspects and companies are also faced with the dilemma of how to design and develop corresponding commercial processes. To this point, early product implementations have arrived on the consumer markets and the future vision is to achieve full integration that embeds connectivity and interaction among all products in the home.

E. INTELLIGENT KITCHEN BASED ON STC89C52RC MI-CONTROL UNIT

A smart kitchen system taking STC89C52RC as the Micro Control Unit (MCU) and regarding Keil uVision 4, DXP2004, as the assistant design software is studied in this paper. This system is composed of a temperature and humidity sensor, flame sensor, buzzer, relay, combustible gas sensor, photosensitive sensor, NRF24L01 wireless communication module, and liquid crystal display module. This design can detect the illumination intensity, temperature and humidity, combustible gas concentration, and flame brightness of the kitchen in real-time and display its numerical value on the LCD screen. This system not only can be used for monitoring the environmental safety of the kitchen but can also be used for monitoring the environment of rental houses

F. SMART KITCHEN USING IOT

This project aims to detect gas leakage or sudden change in temperature in the kitchen and alert the user by using SMS, LCD, and buzzer. Also, used IOT for constant monitoring of LPG and temperature levels. Before implementing the hardware for this system, simulation of this system are done in proteus. Out of the required components of this project must add libraries for Arduino UNO, GSM module, and MQ 2 gas sensor because Proteus does not come with these libraries. Components that are required for our project include Arduino UNO, GSM GPRS SIM800C module, Node MCU ESP 8266, Mq2 gas sensor, LM 35 temperature sensor, Exhaust fan, 1channel 5v relay module, LC display, piezoelectric buzzer, jumper wires, power supply cables, etc. This project is very useful to prevent accidents due to gas leakage. Each flame and gas detection application has its unique safety hazards. The main advantage of this simple gas leak detector is its simplicity and ability to warn its stakeholders about Gas leakage.

G. CUEING KITCHEN: A SMART COOKING ASSISTANT

Due to problems with attention, cognition, memory, and executive functions people with Cognitive Impairments face difficulties in independently completing certain instrumental activities of daily living such as meal preparation. The purpose of this research study was to understand specific problems people with cognitive impairments face in their activities around their kitchen, specifically focusing on meal preparation tasks. Ethnographic interviews were conducted with people with Traumatic Brain Injury and specific unmet needs were identified. The Smart Cueing Kitchen, a cognitive orthosis with advanced sensing and prompting tools was designed to satisfy some of these unmet needs. This paper reports the design rationale for deploying different system technologies in the kitchen and discusses proposed future developments

H. SMART KITCHEN: REAL-TIME MONITORING OF THE KITCHEN THROUGH IOT

The goal of this study is to show that a Smart Kitchen may be created using Ambient Assisted Living (AAL). At present, it is only limited to smart TV, smartphone, tablet, laptop, and desktop computers in our room. In the future, when it would be shifting towards smart cities then at that time smart kitchens will play an important role, and they will contribute a lot to making the smart city possible. Digital technologies such as the Internet of Things (IoT), artificial intelligence (AI), and cloud computing will be used to implement this system. It also deals with the use of a renewable source of energy to power up in case of commercial power failure or shutdown. This system also presents the solution to various kinds of kitchen problems like gas leakage, sudden fire, excessive smoke, and sudden temperature rise. The status of these parameters will be displayed to the user on a real-time basis. It can be generalized by interfacing the various kind of sensors with Node MCU which will monitor the entire parameter of the kitchen and the status will be displayed in organic led using the graphical user interface (GUI) and it can be controlled using a wireless sensor network (WSN); as Node MCU has in-built Wi-Fi technology that can be connected to a mobile application like Blynk and the user can visualize every bit of information with the current status. It's based on the Open Services Gateway initiative, which allows you to build a complicated system out of simple modules that deliver services ranging from wide-area networks to local area networks

I. Smart Kitchen with New Measurement, Web and Application Based with Affordable Design

This project provides a certain automatic process for a user of the kitchen. The basic concept behind the project, connect the entire kitchen and present it on an Android application or website. Users should be aware of the number of items and how much quantity of the item is required in cooking a meal for an individual or number of people in an accurate manner. Our project aims to develop a new smart kitchen that will operate by Android application as well as through a website. The whole kitchen will operate by an Android application. This project will measure the number of ingredients as well as it will send all material in the container for cooking with the help of an Android application. Light sensors will be used instead of a weight machine to measure the number of ingredients. This project will help make easy cooking in the kitchen with the accurate amount of ingredients and this project will also help in saving electricity with safety tools.

J. IoT-based system for detection of gas leakage and house fire in smart kitchen environments

In this proposed methodology, the design of a system enables early detection of house fire and gas leaks. Additionally, as the size of industrial kitchens increases, It covers the possibility for dangerous gas incidents, caused by gases such as liquefied petroleum gas (LPG) and carbon monoxide (CO). The system is implemented using cheap state-of-the-art off the-shelf IoT components. This system logic relies on a few rules that define fire/hazard and the communication between the dedicated devices. Furthermore, It creates a higher level of connectivity between the system and the end user, which will provide instantaneous notification to the user's mobile communication device. Nonetheless, the data gathered by the measuring devices provide exciting opportunities for statistical analysis of the environmental conditions and trends. Moreover, It explained the decision for combining this system with the Moving Average 3 algorithm to provide better energy efficiency. This approach provides useful information when trying to develop a fully distributed system based on real models that can operate in slightly extreme conditions and communicate between themselves with a low energy consumption protocol. This paper described the system for early detection of gas leaks and possible risks for a house fire. Moreover, it explained our decision for combining our system with the Moving Average 3 algorithm to provide better energy efficiency. This approach provides useful information when trying to develop a fully distributed system based on real models that can operate in slightly extreme conditions and communicate between themselves with a low-energy consumption protocol. That is why it took into consideration the energy efficiency part and used the Moving Average 3 algorithm. It simulated the work of our system in an industrial smart kitchen environment

III. CONCLUSION

This survey investigates the range of applications and benefits offered by IoT technologies in smart cooking. We examine the impact of connected kitchen appliances on cooking efficiency, recipe assistance, personalized nutrition, and energy management. We also explore the potential for remote monitoring and control, ensuring users' convenience and peace of mind.

The survey also addresses the challenges and considerations associated with IoT technologies in smart cooking, such as privacy and security concerns, interoperability, and user acceptance. We analyze the existing research, standards, and regulatory frameworks that aim to address these issues and promote the safe and seamless integration of IoT in the kitchen.

By comprehensively reviewing the current landscape of IoT technologies in smart cooking, this survey provides valuable insights into the advancements, potential applications, and challenges in this emerging field. The findings from this survey can serve as a foundation for future research, development, and adoption of innovative smart cooking solutions, ultimately enhancing the overall cooking experience and transforming our kitchens into intelligent and interconnected spaces. Based on the survey on smart cooking systems, it is evident that significant research has been conducted in this field. The integration of advanced technologies such as IoT, AI, and robotics into kitchen appliances and cooking processes has led to the development of intelligent cooking systems. These systems offer a range of benefits, including enhanced efficiency, convenience, and personalized user experiences.

The surveyed literature emphasizes the key components and functionalities of smart cooking systems. It discusses the use of AI techniques for recipe recognition, ingredient substitution, and meal planning. Additionally, the integration of sensors, actuators, and cloud computing enables automation, food condition monitoring, and real-time notifications to users.

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