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Research Article

IOT BASED AUDIO RECOGNITION IN SMART HOMES

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Abstract

Smart houses are necessary in today's environment. The days of only seeing smart homes in science fiction films are long gone, since they have made major strides in the last few decades. Home automation has completely altered the meaning of life in comparison to previous eras. Each of our household appliances, including the TV, air conditioner, lights, fans, and more, used to be controlled by a different remote control. Another issue is that balancing all those remote controls can occasionally be uncomfortable, particularly for the old and disabled. In the twenty-first century, everything is mechanized, even homes and factories. A home that has been outfitted with technology to provide services catered to the needs of its residents is known as a "smart home." The purpose of this article is to conduct a systematic review of the most recent smart home literature and to assess research and development in the field. In addition to providing a full review of the development and features of the current smart home system (SHS), this article provides a deep understanding of the latest hardware and trends. The report then delves deeply into a few of the important services and advantages that the SHS provides. Fans, screens, air conditioners, lamps, and other appliances are all controlled via home automation. In addition to saving time and energy, home automation decreases the need for human labor. It also serves as a protective measure. Elderly people and people with physical disabilities can easily transition from the centralized unit to household appliances. Voice-controlled home automation allows users to control their home's appliances with their voice. The control device receives voice commands via a smartphone. All of these systems and technologies are reviewed in this study..

Keywords: Voice recognition, smart homes, home automation, IoT, Arduino Uno, MCU node, GSM, security, energy

INTRODUCTION

The ability to connect with people at any time and from any location has revolutionized human life. Due to several technological advancements, sensors, CPUs, transmitters, receivers, and other devices are now reasonably priced. Therefore, we can apply all of these items in our daily lives [4]. The Internet of Things can be considered an extension of internet services if someone want to increase the availability of online services [1]. The internet of today is developing into the Internet of Things (IoT). A smart home is a residence or living space equipped with technology that enables remote and automated operation of all household equipment and devices [8]. Through the internet, users of smart homes can effortlessly monitor and manage all of their equipment and gadgets. Standard protocols and a predetermined, appropriate

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network architecture are used to link home appliances. Figure 2 [2] illustrates the fundamental concept of IoT-based smart homes.

The entire system may be split into two sections: the first section includes all of the household appliances, switch modules, and RF transmitter receivers; the second section includes all of the interface devices, processors, data collectors, and GPRS modules that will be used for internet communication.

The intricacy of mobile applications, reliance on dependable internet connections, and possible privacy issues are some of the issues that current home automation systems frequently encounter. The requirement for a reliable, stand-alone solution that enables users to safely and conveniently manage their home surroundings is addressed by this project. The solution guarantees reliable operation and more control over home automation by doing away with the requirement for internet access. The fascinating field of home automation systems is examined in this essay, with an emphasis on those that use GSM and Internet of Things technology. We explore the core ideas, elements, and functionalities of this cutting-edge technology, illuminating its revolutionary potential to change how we live in and maintain our houses. A notable degree of ease has been brought about by the development of GSM-based home automation systems, which allow remote supervision and control. Whether they live on the property or miles away, homeowners can now easily manage their houses with easy messages via text or specialized smartphone apps.

This experience is further improved by the incorporation of IoT devices, which gather data in real time from sensors placed thoughtfully throughout the house.Users of all technical backgrounds may now easily operate and access the system's functionalities thanks to the integration of voice assistants and intuitive mobile applications. A crucial component is customization, which enables homeowners to adapt their home automation experience to their particular tastes and way of life.

The different parts and features of GSM and IoT-based home automation systems will be discussed in this article, along with their uses in practical situations and the possibility of scalability and expansion. We will also go over how machine learning and data analytics may improve the system's usability and performance. We will explore a world where our homes are not just places of refuge but also intelligent, flexible, and responsive areas that meet all of our needs, improve our everyday lives, and safeguard our future as we set out on this adventure through the world of GSM and IoT-based home automation.

OBJECTIVE

1. Planning and simulating a single stage beat width adjusted inverter that fully converts dc power to ac power is the main goal of this.
2. The inverter's 12V DC source from the battery is meant to provide 150 watts.
3. Five 9-watt driven lights or a maximum of 100-watt bulbs can be controlled by the inverter's 1.2 Amp of substitute current.
4. An inverter converts DC electricity from sources such as energy units, solar chargers, or batteries to AC power.
5. Power can be supplied via an inverter at any anticipated voltage.

In particular, it can surely operate AC hardware meant for mains activity or be adjusted to produce DC at any desired voltage.

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BLOCK DAIGRAM

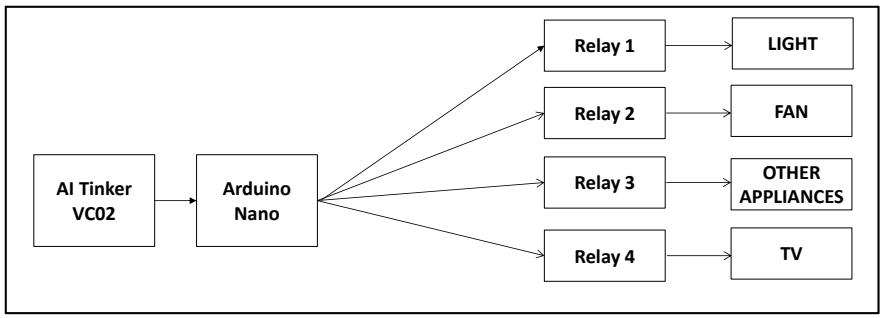

Fig. 2 :- Block Diagram

FUNCTION

- Power Supply: The system is powered by an SMPS AC to DC converter, providing necessary voltage to all components.
- Voice Command Input: The user issues a voice command, which is captured by the AI Tinker VC02 module.
- Voice Processing: The AI Tinker VC02 processes the audio input, converting it into a digital signal.
- Command Transmission: The digital signal is sent to the Arduino Nano for interpretation.
- Command Interpretation: The Arduino Nano compares the received command with its pre-programmed set of commands to determine the action.
- Relay Activation: The Arduino activates a 5V DC SPDT relay, which controls the power supply to the specified appliance.
- Transistor and Diode Protection: A BC547 transistor may amplify the signal, while a 1N4007 diode protects the circuit from back EMF generated by the relay.
- Appliance Control and Feedback: The relay powers the connected appliance, and optional feedback (via LEDs or speakers) confirms the action to the user.

APPLICATIONS

- The Offline Home Automation System's Use The project
- Lighting manager: Users may simply manage interior and outdoor lighting, altering brightness or turning lights on and off using voice commands.
- Heating and Cooling Control: The system has the ability to control heaters, fans, and air conditioners, enabling temperature changes according to user preferences.
- Home Security: Without relying on the internet, home security can be improved by controlling appliances like motion sensors, cameras, and alarms.
- Entertainment Systems: Users may conveniently control audio and visual entertainment by controlling TVs, speakers, and other multimedia devices.

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- Home Appliances: By controlling a variety of home appliances, like toasters, humidifiers, and coffee makers, the system can simplify daily chores.
- Smart Gardens: By automating garden lights or irrigation systems, users may guarantee that plants and landscape receive the best possible care.
- Accessibility Solutions: By using voice commands to control their surroundings, the technology offers a practical option for people with mobility issues.
- Energy Management: Users can monitor and lower energy consumption by regulating different appliances, which promotes more environmentally friendly living habits.

ADVANTAGES

Benefits of the Project for an Offline Home Automation System

Enhanced Protection Operating without internet access reduces the likelihood of hackers and data breaches, safeguarding user security and privacy. The system reliably manages household appliances and keeps running even when the internet is interrupted. Voice recognition makes it simple and easy for all users, including those who are not as tech-savvy, to use. Users can add new appliances and modify voice commands to easily customize the system to meet their specific needs and preferences. By using common components like relays and the Arduino Nano, the system is kept affordable while retaining dependable functionality. Because of the straightforward wiring and component integration, anyone with little technical experience may manage installation and setup.

The architecture of the system enables efficient energy use, which lowers home power usage. Feedback Mechanisms: Visual and auditory feedback enhances the user experience by confirming that commands have been executed appropriately.

CONCLUSION

The use of remote-controlled equipment at home has become essential in the current technological era. The controllers' rapid mobility and ease of use make them suitable for everyday use. Instead of using several controllers for each device, you can use a single controller to control them all. It can also be controlled using a smartphone, adding another useful feature to one of the most widely used portable gadgets. Home appliances are replaced by smartphones that can recognize voice commands and control the devices accordingly. Smartphones send spoken commands to an Arduino device via the Bluetooth channel, and the Arduino gadget reacts to the commands. These spoken instructions are intended to be easy to understand and remember. The simple commands in this project make it easy to utilize. To effectively test the concept, a fan, LED, and smartphone are connected to a circuit. The development of this project can significantly enhance the lives of the elderly and disabled for a range of electrical and electronic devices. Our lives will be considerably more convenient and glamorous for both young and old. The large community can benefit from the universal controller that has speech recognition capabilities.

AUTHOR(S) CONTRIBUTION

The writers affirm that they have no connections to, or engagement with, any group or body that provides financial or non-financial assistance for the topics or resources covered in this manuscript.

CONFLICTS OF INTEREST

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