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# Smoke Detector with Auto Exhaust and Dialer

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**Abstract:** *In the current generation fire accidents and LPG leakages are increasing in many sectors due to several issues, It may cause lot of property damages and leads to death. This is happening because of improper guidance about the issue and for not recognising the issue earlierly and it takes few minutes to call fire department. In order to overcome all the issues mentioned above, here we are designed and implemented an intelligent "smoke detection system integrated with automatic exhauster and dialer". It helps us to intimate through ringing alarm and automatic call to fire, emergency department by sensing smoke. So that we can preplan and avoid the fire accidents without any loss.*

**Keywords:** Arduino UNO, GSM, Buzzer, Exhauster, MQ2 gas sensor, LCDI2C

## I. INTRODUCTION

Fire accidents and LPG gas leakages have emerged as critical safety concerns in today's fast-paced world, resulting in significant property losses and, tragically, loss of life. Such incidents are often attributed to a lack of awareness and delayed response times, which can escalate the severity of the situation. In light of these challenges, we have developed an innovative "Smoke Detection System Integrated with Automatic Exhauster and Dialer" to proactively tackle these risks. This intelligent system is designed to swiftly identify the presence of smoke and take immediate action to mitigate potential hazards.

The system operates by integrating multiple components, each playing a vital role in ensuring safety. At its core is an Arduino relay, which serves as the control hub for managing all connected components. A highly sensitive smoke sensor is employed to detect the presence of smoke, which triggers the system's response. The GSM module adds a layer of communication by automatically dialing emergency services, such as the fire department, ensuring a rapid response to the incident. Simultaneously, an exhauster is activated to ventilate the affected area by expelling harmful smoke, helping to minimize risks to both property and human life. Additionally, a buzzer provides an audible alert to inform occupants of the danger, allowing them to take precautionary actions.

By seamlessly integrating these components, the system not only provides early detection but also ensures a coordinated response to prevent fire accidents from escalating. This project exemplifies how technology can be harnessed to enhance safety and protect lives and assets. The "Smoke Detection System Integrated with Automatic Exhauster and Dialer" is a step forward in addressing fire-related emergencies, ensuring prompt action, and mitigating losses effectively

## II. LITERATURE SURVEY

Fire accidents and LPG leakages have been a persistent threat to human lives and property across various sectors. The rising number of such incidents is a result of insufficient preventive measures, lack of awareness, and delays in responding to emergencies. Numerous studies and systems have been designed to address these challenges, focusing on early detection and rapid response mechanisms.

Traditional fire safety systems rely on manual intervention, which can be time-consuming and ineffective during critical situations. Smoke sensors have been widely implemented as early warning devices, enabling the detection of smoke and the triggering of alarms. However, the integration of additional components, such as exhaust systems and automated communication devices, has gained attention in recent years for enhancing safety measures. Researchers have

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emphasized the importance of automation in fire safety to minimize human involvement during emergencies and reduce response time significantly.

The development of GSM-based communication systems marks a significant advancement in fire detection technology. These systems ensure that emergency services are notified promptly, even in the absence of manual intervention. Similarly, the use of automatic exhausters to remove harmful smoke has been recognized as an effective measure to mitigate the impact of fire incidents. Arduino-based control systems have emerged as a reliable platform for integrating various components in a smoke detection system, offering flexibility and efficiency.

This project builds upon the foundation of these advancements by combining a smoke sensor, Arduino relay, GSM module, exhauster, and buzzer into a single comprehensive system. By automating the processes of detection, alarm generation, ventilation, and communication, the system addresses the limitations of traditional fire safety mechanisms. The proposed solution not only enhances the effectiveness of fire detection but also facilitates proactive measures to prevent escalation, thereby contributing to the safety and well-being of individuals and their surroundings.

## III. ARDUINO NANO

Arduino serves as the core of this project, functioning as the microcontroller platform that processes data and controls the solar tracking system. Its affordability, open-source nature, and compatibility with a variety of sensors and actuators make it an excellent choice for developing automated systems like this one. The Arduino board receives input from light-dependent resistors (LDRs) that measure sunlight intensity. Based on this input, the Arduino processes the data and sends control signals to servo motors, which adjust the solar panel's orientation to align with the sun's position.

The Arduino Integrated Development Environment (IDE) is used to write, compile, and upload the code to the Arduino board. The IDE provides an intuitive interface and supports programming in C/C++. It includes a wide range of libraries that simplify tasks such as reading sensor data and controlling motors. Additionally, the IDE's debugging and testing features allow developers to refine and optimize the system's performance.

Together, Arduino and the Arduino IDE enable a highly efficient, customizable, and user-friendly approach to building the solar tracking system. Their accessibility makes the system suitable for a wide range of applications, promoting sustainable energy solutions through innovation and automation.

## IV. WORKING

The smoke detector project with auto exhaust and dialer functions operates as an intelligent system to ensure safety during fire-related incidents. It consists of a smoke sensor to monitor smoke levels in the air, an Arduino microcontroller that serves as the brain of the system, a buzzer for audio alerts, a relay module, an exhaust fan for smoke removal, and a GSM module for emergency notifications. When the smoke sensor detects smoke beyond a predefined threshold, it sends a signal to the Arduino. The Arduino then activates the buzzer to alert nearby individuals and powers the exhaust fan through the relay to clear the smoke. Simultaneously, the Arduino communicates with the GSM module to either send an SMS or make a call to preconfigured emergency contacts, such as homeowners or the fire department. This coordinated system ensures immediate smoke evacuation and swift emergency responses, making it a comprehensive safety mechanism for fire-prone environments. If you'd like, I can assist with further customization or implementation details.

## V. EXISTING SYSTEM

Existing smoke detection methods without advanced features like exhaust fans, LCD displays, and GSM modules primarily rely on basic components to detect smoke and alert occupants. Traditional smoke detectors, for instance, utilize ionization or photoelectric sensors to identify the presence of smoke. Upon detection, these detectors trigger an audible alarm, typically a buzzer, to warn individuals in the vicinity.

Similarly, heat detectors sense the rise in temperature associated with a fire and activate an alarm when a predefined threshold is exceeded. In some cases, manual call points, commonly known as break glass stations, are installed, allowing individuals to manually trigger the alarm by breaking the glass and pressing a button. These systems are

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designed to provide immediate alerts to ensure occupant safety, but they lack the capability to automatically exhaust smoke, display real-time information, or send emergency messages.

As a result, while these methods are effective in alerting occupants, they do not offer the additional functionalities that enhance safety and response times in modern smoke detection systems

## VI. PROPOSED METHOD

The proposed method enhances traditional smoke detection systems by incorporating additional features such as an exhaust fan, LCD display, and GSM module to improve safety and response mechanisms. In this advanced system, the smoke sensor continuously monitors the air for the presence of smoke or harmful gases. Upon detection, the system activates a buzzer to provide an audible alarm, alerting occupants immediately. Simultaneously, the exhaust fan is triggered to expel the smoke from the area, thereby improving air quality and reducing the risk of fire spread. The LCD display provides real-time information about the system's status and smoke levels, offering a visual alert to occupants.

Additionally, the GSM module sends SMS alerts to predefined contacts, such as homeowners, security personnel, or emergency services, ensuring a quick response and enhancing overall safety. This proposed method leverages the integration of multiple components to provide a comprehensive solution that not only detects smoke but also actively manages it and communicates emergencies effectively, offering significant improvements over traditional smoke detection systems.

## VII. SOFTWARE EMPLOYED

The Arduino Integrated Development Environment (IDE) plays a crucial role in the development of the solar tracking system. It is used to write, compile, and upload the control program to the Arduino microcontroller. The IDE provides an intuitive, user-friendly interface that simplifies coding in C/C++ for the microcontroller, allowing developers to focus on system functionality rather than complex software setup.

In this project, the Arduino IDE is used to write the code that reads input from the light-dependent resistors (LDRs) and processes the sunlight intensity data. Based on this input, the microcontroller then sends commands to the servo motors to adjust the solar panel's orientation for optimal sunlight exposure. The IDE includes a range of libraries that simplify the coding process, such as those for reading sensor data and controlling motors, ensuring rapid development. Additionally, the IDE's

debugging and data visualization, helping developers troubleshoot and refine the system's performance.

The open-source nature of the Arduino IDE ensures that the project is easily adaptable and can be modified or expanded by others. Overall, the Arduino IDE's simplicity, flexibility, and extensive support for various hardware components make it an ideal tool for implementing and refining the solar tracking system.

## VIII. RESULTS & DISCUSSION

The smoke detector with auto exhaust and dialer is an advanced safety system designed to provide rapid detection and response during smoke or fire incidents. It is equipped with a smoke sensor that identifies smoke levels in the air, and upon detection, the system sounds a local alarm through a buzzer to alert individuals in the vicinity. At the same time, it activates peripheral equipment such as an exhaust fan to remove smoke from the affected area, improving visibility and air quality. A critical feature of this system is its integration with a GSM module, which functions as an auto dialer to notify emergency services or designated contacts via SMS or calls. This ensures that help is summoned immediately, even if no one is present to respond manually.

More advanced models of such systems come with additional safety features to enhance protection. For instance, some include an auto flooding system, which discharges fire-suppressing agents like water or foam to control the fire before it spreads further. Others feature power-off mechanisms to cut electricity, reducing the risk of electrical short circuits and subsequent fire escalation. These systems are highly versatile and can be customized to suit the needs of homes, offices, and industrial facilities. Their capability to combine early detection, automated response, and swift notification makes them indispensable for safeguarding lives and property against fire hazards. This comprehensive approach to fire safety significantly minimizes potential damage and ensures prompt action in emergency scenarios.

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## IX. CONCLUSION

Smoke detectors with auto exhaust and dialer systems represent a leap forward in fire safety technology. By integrating early detection, automatic notification, and exhaust management, these systems ensure a rapid and comprehensive response to fire emergencies. Their ability to alert both occupants and emergency services drastically reduces response times, potentially saving lives and mitigating property damage. These systems are particularly valuable in environments where immediate action is critical, such as residential buildings, commercial properties, and industrial settings.

## X. FUTURE SCOPE

The project, "Smoke Detector with Automatic Exhauster and Dialer," is an enhanced version of a conventional smoke detection system. Previously, the system was limited to detecting smoke and triggering an alarm, alerting nearby individuals of potential fire hazards. However, this modified version integrates advanced features to improve safety and response efficiency. A GSM module has been incorporated to automatically send alerts via calls or SMS to pre-programmed contacts, ensuring immediate notification even if no one is present on-site. Additionally, an automatic exhaust system is included to help dissipate smoke, reducing the risk of suffocation and fire escalation. An LCD display has also been added to provide real-time updates on the system's status, including smoke levels and notification confirmations. These upgrades make the system more robust and reliable, enhancing its utility in residential, commercial, and industrial environments.

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