

IMPLEMENTATION OF FIRE ALARM SYSTEM USING RASPBERRY Pi AND ARDUINO MICROCONTROLLER

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Abstract-The suggested fire alarm system is a real-time monitoring system that, in the event of a fire, detects the presence of smoke in the air as a result of the fire and records photographs using a camera mounted within the room. The Raspberry Pi and Arduino Uno were the embedded systems utilised to create this fire alarm system. The system's capacity to remotely send an alert when a fire is discovered is its major feature. The device will show a picture of the room's condition on a webpage when smoke is detected. To use Short Message Service to report the event to the Firefighter, the system will require user confirmation (SMS). Utilizing this approach will decrease the likelihood of a false alarm, which is a benefit.

Keywords: Component, Raspberry pi, Arduino uno, fire, Alarm, buzzer, web server.

1. INTRODUCTION

A fire is an unfavourable occurrence that could result in a significant loss of social wealth and human lives. Different alarm systems, including smoke detectors and temperature sensor-based systems, have been created to stop these losses. Different automatic fire alarm systems are now accessible as a result of technological advancements and the lowering cost of instrumentation like temperature sensors and camera, buzzer, etc. Along with the more affordable instruments, internet-based and wireless broadband technologies have also advanced, and there are now numerous systems that enable low-cost, high-speed data transfer and wireless networking. Numerous automated and monitoring systems with low power consumption, quicker processing, and reduced costs have been made possible by the inexpensive, credit card-sized single board computers like the Raspberry Pi.

2. LITERATURE SURVEY

A variety of platforms have been used in the development of multiple automated security surveillance system prototypes. Different fire alarm systems have been developed as a result of recent advancements in GSM, web server, and microcontroller technologies. A fuzzy neural network was used, for instance, to suggest an intelligent fire alarm system. In order to have a self-learning and adaptive capability, it processes data from the sensors and calculates a model of fuzzy neural network based on the properties of the fire detection signal. However, it is only a study on proposing a new approach for fire detection.[1]

A wireless intelligent home alarm system with anti-theft, anti-fire, and anti-harmful gas leak features was created utilising a single chip microcomputer (SCM) AT89C51 and a voice chip ISD1420. The gas concentration and alarm host were shown using two SCMS as wireless transmission was employed to provide the alarm signals. A voice message will be delivered to the appropriate department when the sensor detects smoke. However, as this method did not contain any user confirmation, if a mistake is made during the detection, a false alarm will be

reported. A Zigbee- based intelligent home security system that uses a surveillance camera to monitor key areas inside a home . The user would be notified when the system was activated by any penetration.[2]

By utilising a Beagle board SBC, Zigbee, and FTP Webserver to monitor key areas within a home while also detecting smoke. Improved real-time surveillance for home security system. The system initiates real-time video recording for a set amount of time and activates the alarm when smoke or intruder movement is detected. It also delivers warning messages via SMS to mobile phones. But because it only records video, this technology can only send SMS warnings to users and cannot transmit live streaming video. Additionally, the single board computer used is more expensive and has less technological capability than the Raspberry Pi.[3]

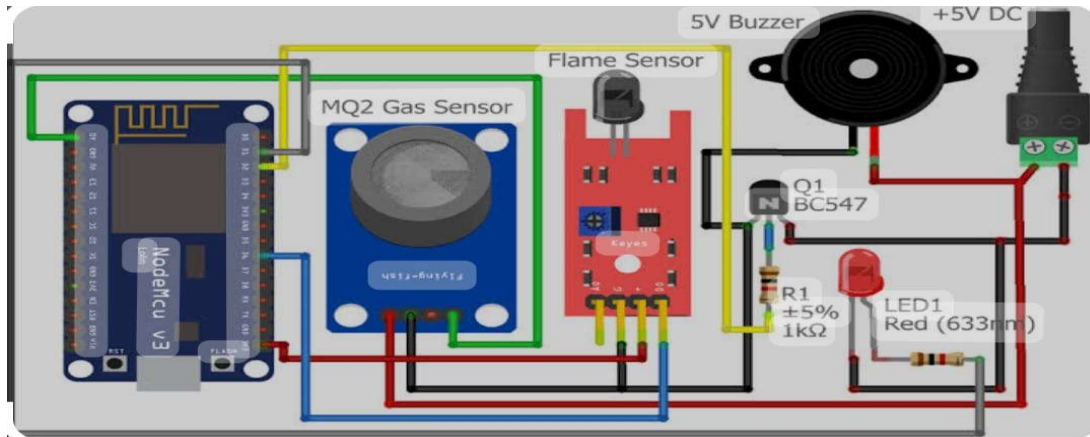
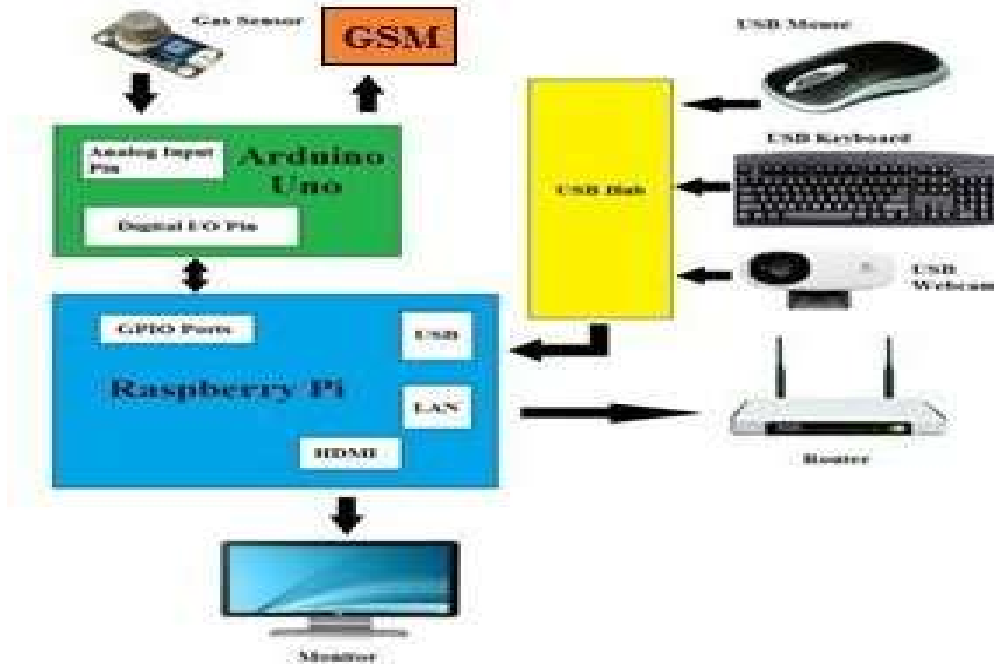
The solution for the problems from the previous research as stated above is to the power supply for the Arduino Uno can be either from a USB connection, DC power supply, or both. It is a high performance device which has low power AVR 8-bit Microcontroller with 32K bytes in-system and advanced reduced instruction set computing.[4].

It can be used to send and receive SMS, voice calling and receive data packet. The AT commands is used to enable the GSM shield to send the SMS to the recipient. Develop a new fire alarm system that alerts the user instantly when any events occur and asks for permission from the user to report to the Firefighter. The purpose of this study is to implement a fire alarm system using a cheaper single-board computer, the Raspberry Pi, combined with a microcontroller board, the Arduino Uno and the use of mid-level and high level programming languages to write the program. The project is a Bachelor degree final semester. project that has the objective to enable the student to apply knowledge gained from the previous semesters.[5]

The Raspberry Pi Model-B single-board computer, the Arduino Uno single-board microcontroller, the gas sensor, the GSM shield, and the webcam make up the construction of this fire alarm system. The Raspberry Pi was chosen above other single board computers because of its excellent technological specs, high data processing performance, and affordability. By processing the analogue signal from a sensor and sending SMS using the GSM shield, the Arduino Uno is used to lessen the workload on the Raspberry Pi. When the sensor picks up any anomaly in the air, the camera is used to take a picture of the surrounding area.[6]

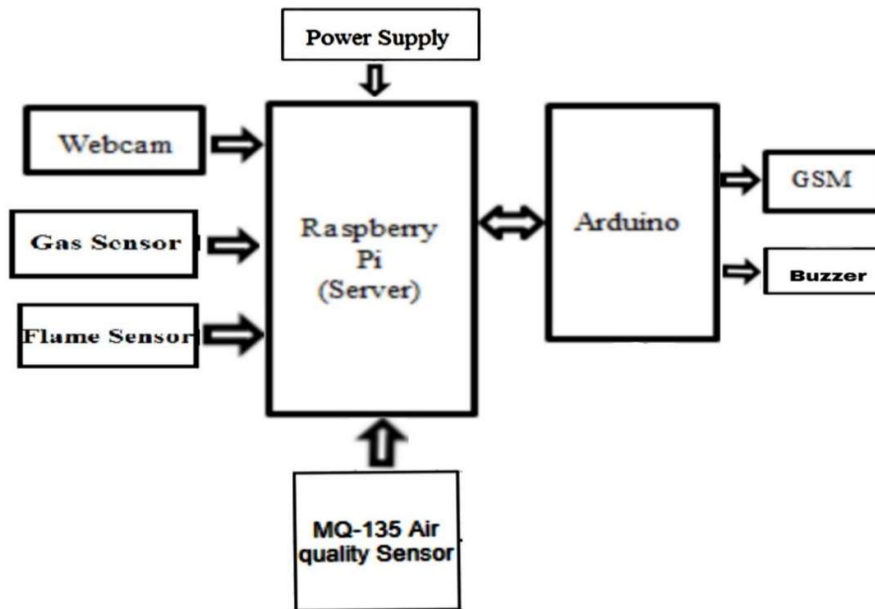
Webcam, a gas sensor, an Arduino, a raspberry pi (server), GSM, and a buzzer. The selection of programming languages and the installation of potential software. By putting Apache HTTP Webserver on it, it can serve webpages. GSM Shield and Arduino Uno.[7]

3. PROPOSED SYSTEM



The GSM shield controller used is SIM900 and it was attached to the Arduino Uno. Its function is to send SMS to the Firefighter. The SIM900 GSM shield has low power consumption. It has its own GSM communication module and processor which is programmed using JAVA.

4. BLOCK DIAGRAM



5. SYSTEM ARCHITECTURE

-Composed of the components:

-Raspberry Pi Model-B single-board computer - Arduino Uno single-board microcontroller

-Gas Sensor

HARD WARE

A 700 MHz ARM-architecture CPU is included in the low-cost Raspberry Pi computer, which runs a Linux-based operating system.

ARDUINO UNO

The installation of software that might be used and the choice of programming languages are also flexible. This system's primary objective is to foresee false fire alerts.

This system makes use of affordable, dependable tools that were appropriate for creating a fire alarm.

It is cost-effective as a final-year project that allowed students to use knowledge they had learned. The Arduino Uno was connected to the SIM900 GSM shield controller.

GSM SHIELD CONTROLLER

Sending an SMS to the firefighter is its purpose. 900 for SIM

GSM shield uses little power.

The GSM shield is made available via the AT commands. send the recipient an SMS. using the engineering curriculum

GAS SENSOR

To detect the presence of smoke, the gas sensor QM-NG1 is employed in this system. It can be positioned anywhere in the room, but the middle is the optimum placement. The sensor was chosen because of its excellent sensitivity to dangerous gases, length. To detect the presence of smoke, the gas sensor QM-NG1 is employed in this system.

6. CONCLUSION

The major objective of this technology is to anticipate false fire alerts. This system makes use of affordable, dependable tools that were appropriate for creating a fire alarm. It's an economical final-year project that allowed students to put their engineering curriculum skills to use. Python has been chosen as the high level programming language for creating the system's OS application program. Raspbian Wheezy is a forked version of the Debian Wheezy operating system.

7. REFERENCES

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