IoT-Based Intelligent Gas Detector and Fire Prevention System

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➢ **Abstract**

This paper represents a design of IoT-Based Intelligent Gas Detector and Fire Prevention System. In today's era Healthcare has been primarily concentrated in the hospital domain and each place of social stages. Some gases and Fires usually occur because of carelessness and changes in environmental conditions. They cause threats to the residential community and may result in human death and property damage. Consequently, these gases and fires must be detected early to prevent these types of threats. The immediate notification of a fire is the most critical issue in do fire detection systems. Fire detection systems using wireless sensor networks sometimes do not detect a fire as a consequence of sensor failure. Wireless sensor networks (WSN) consist of tiny, cheap, and low-power sensor devices that have the ability to sense the environment and can provide real-time fire detection with high accuracy. In addition, Global System for Mobile Communications (GSM) to avoid false alarms.

Keywords— Wireless Sensor, Embedded system, GSM

I. INTRODUCTION

This paper describes the implementation and design of IoT-Based Intelligent Gas Detector and Fire Prevention System. This system is embedded in social place and connected with network devices and healthcare peripherals through the SIP protocol. The healthcare system connects to the hospital in the external world over Ethernet. The. SIP is a signaling protocol used on top of UDP. This system is an embedded system that has operating system of embedded Linux.

Our paper discusses the design of the healthcare service that is one of the important services provided to the social environment.

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II. Definition of related concepts

[A] Raspberry pi board

The Model B+ is the higher-spec variant of the Raspberry Pi. It replaced the original Model B in July 2014. Compared to the Model B it has:

More GPIO. The GPIO header has grown to 40 pins, while retaining the same pinout for the first 26 pins as the Model B.

More USB. We now have 4 USB 2.0 ports, compared to 2 on the Model B, and better hotplug and overcurrent behaviour.

Micro SD. The old friction-fit SD card socket has been replaced with a much nicer push-push micro SD version.

Lower power consumption. By replacing linear regulators with switching ones we've reduced power consumption by between 0.5W and 1W.

Better audio. The audio circuit incorporates a dedicated low-noise power supply.

Neater form factor. We've aligned the USB connectors with the board edge, moved composite video onto the 3.5mm jack, and added four squarely-placed mounting holes.

The RASPBERRY-MODB+-512M is a credit card sized computer that plugs into your TV and a keyboard, its like a little PC which can be used for many of the things that your desktop PC does, like spreadsheets, word processing and games. It also plays high definition video

The design is based around a Broadcom BCM2835 SoC, which includes an ARM1176JZF-S 700MHz processor, VideoCore IV GPU, and 512Mbytes of RAM.

The design does not include a built in hard disk or solid state drive, instead relying on a microSD card for booting and long term storage. This board is intended to run Linux kernel based operating systems.

Free, versatile, and highly developer friendly Debian GNU/Linux operating system

[B] SIP Protocol

The Session Initiation Protocol (SIP) is a signaling communications protocol, widely used for controlling multimedia communication sessions such as voice and video calls over Internet Protocol (IP) networks.

The protocol defines the messages that are sent between endpoints, which govern establishment, termination and other essential elements of a call. SIP can be used for creating, modifying and terminating sessions consisting of one or several media streams. SIP can be used for two-party (unicast) or multiparty (multicast) sessions. Other SIP applications include video conferencing, streaming multimedia distribution, instant messaging, presence information, file transfer, fax over IP and online games.

Originally designed by Henning Schulzrinne and Mark Handley in 1996, SIP has been developed and standardized in RFC 3261 under the auspices of the Internet Engineering Task Force (IETF). It is an application layer protocol designed to be independent of the underlying transport layer; it can run on Transmission Control Protocol (TCP), User Datagram Protocol (UDP) or Stream Control Transmission Protocol (SCTP). It is a text-based protocol, incorporating many elements of the Hypertext Transfer Protocol (HTTP) and the Simple Mail Transfer Protocol (SMTP).

SIP works in conjunction with several other application layer protocols that identify and carry the session media. Media identification and negotiation is achieved with the Session Description Protocol (SDP). For the transmission of media streams (voice, video) SIP typically employs the Real-time Transport Protocol (RTP) or Secure Real-time Transport Protocol (SRTP). For secure transmissions of SIP messages, the protocol may be encrypted with Transport Layer Security (TLS).

SIP request:

For SIP requests, RFC 3261 defines the following methods:

Main article: List of SIP request methods

REGISTER: Used by a UA to register to the registrar.

INVITE: Used to establish a media session between user agents.

ACK: Confirms reliable message exchanges.

CANCEL: Terminates a pending request.

BYE: Terminates an existing session.

OPTIONS: Requests information about the capabilities of a caller without the need to set up a session. Often used as keepalive messages.

A new method has been introduced in SIP in RFC 3262:

PRACK (Provisional Response Acknowledgement): PRACK improves network reliability by adding an acknowledgement system to the provisional Responses (1xx). PRACK is sent in response to provisional response (1xx).

SIP response:

The SIP response types defined in RFC 3261 fall in one of the following categories:

Main article: List of SIP response codes

Provisional (1xx): Request received and being processed.

Success (2xx): The action was successfully received, understood, and accepted.

Redirection (3xx): Further action needs to be taken (typically by sender) to complete the request.

Client Error (4xx): The request contains bad syntax or cannot be fulfilled at the server.

Server Error (5xx): The server failed to fulfill an apparently valid request.

Global Failure (6xx): The request cannot be fulfilled at any server.

III. Hardware design

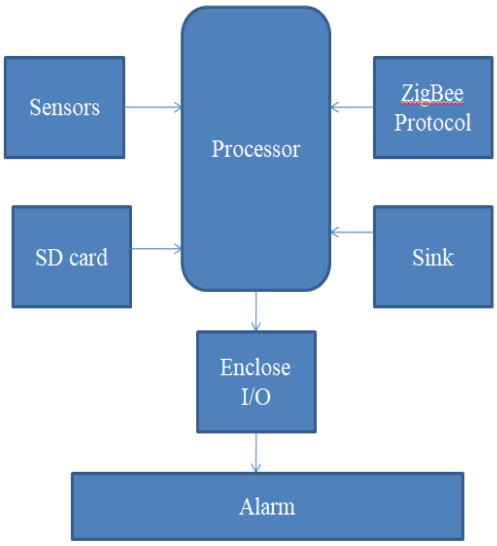

Fig 1. Block diagram of the System

Here block diagram for IoT-Based Intelligent Gas Detector and Fire Prevention System is shown in the above figure. In the figure the Processor is shown in the figure and Raspberry pi B+ model is used as a processor in this system.Now the session is established using SIP protocol which is also shown in the block diagram of this system.

System setup

IoT-Based Intelligent Gas Detector and Fire Prevention System System can be install where there is a large concentration of people are usually come The target groups can be restaurant, hotel , colleges, universities and large day care centers.

When an emergency happens at one of these locations, one Button should be place by any person who is in emergency or would like to help someone in emergency and it will automatically connect to a network physician via audio. The doctor will talk to the patient, do his diagnosis and prescribe the medicines..

IV. CONCLUSION

This paper describes the implementation of IoT-Based Intelligent Gas Detector and Fire Prevention System based on ARM11 processor running on Linux operating system. This paper also presents the feature of the Healthcare System that enables a remote used doctor to activate and monitor the elderly person and facilitate e Healthcare into every social place. This presented the evolution of E-health services in areas from telemedicine using wireless network and Ethernet network along with the proposed solution using the SIP Protocol.

This will allow public access of rare medicine in places where there is a large concentration of people, kids and adults alike, like colleges & universities, hotels, restaurants, large day care facilities, theme parks, airports, shopping malls etc

- The Two major flaws of the currently proposed project is to design an intelligent analysis of smart system to detect harmful gases and for fire prevention.
- The system is able to detect multiple gases at the same time it also prevent the fire damage. If there is any major deviation , then the system alerts the user depending on the levels of hazard gases and fire.

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