Automated and Concise Medicament System Based on SIP Protocol

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***Abstract* — This paper represents a design of Automated and Concise Medicament system based on SIP protocol. In today's era Healthcare has been primarily concentrated in the hospital domain and each place of social stages. With the current technology trends, some e-health care services have evolved. Here healthcare services available today focus on technology miracle. This paper illustrates the implementation of the healthcare or E-health using SIP protocol. The usage of internet for facilitating communication to the public places generates a new lease of life to the society. This Automated and Concise Medicament healthcare system uses the mobile connected to the public that connects to the hospital network over the Internet. The application connects to the hospital network using Session Initiation Protocol (SIP) to facilitate communication.**

Keywords— SIP protocol, Embedded system, Heathcare

I. INTRODUCTION

This paper describes the implementation and design of Automated and Concise Medicament system based on SIP protocol.. 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. The medicament system is an embedded system that has operating system of embedded Linux. This Automated and Concise Medicament system 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. 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

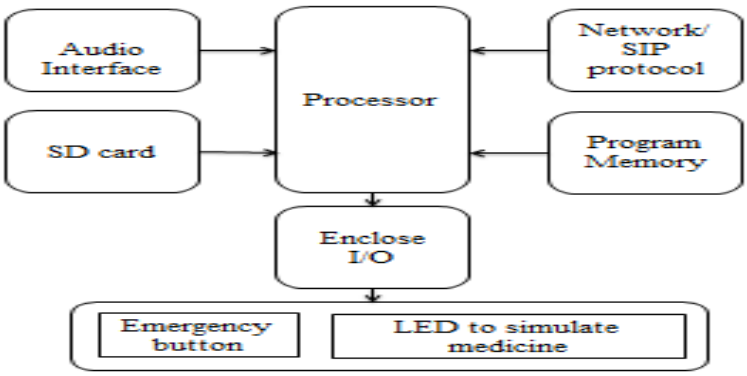

Fig 1. Block diagram of the hardware system design

Here block diagram for Automated and Concise 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. Here the emergency button and LED to simulate medicine is also shown in the figure. Now the session is established using SIP protocol which is also shown in the block diagram of this system.

IV. ADVANTAGES AND APPLICATION AREA FOR AUTOMATED AND CONCISE MEDICAMENT SYSTEM

SIP is part of the IETF standards process; it is similar in syntax to other Internet protocols such as SMTP (Simple Mail Transfer Protocol) used for e-mail and HTTP (Hypertext Transfer Protocol) used for the World Wide Web. It is a text based protocol that is used to manage sessions established on the Internet. These sessions can be simple two-way telephone calls or collaborative multi-media conference sessions. Once the session has been set up using SIP, the audio and video packets are transported using RTP (Real-time Transport Protocol). The underlying transport of SIP messages can either be in UDP, TCP or Stream Control Transmission Protocol (SCTP). Within a multimedia conference, the body of a SIP message often contains session description which enumerates the media streams to be used for the session. However, as we describe below, the message body can contain any other type. Application area for Automated and Concise Medicament System are school, college, hotel, restaurant etc.

PERFORMANCE EVALUATION

A. System setup

Automated and Concise Medicament 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.

V. CONCLUSION

This paper describes the implementation of Automated and Concise medicament system based SIP protocol on the Raspberry Pi board, an embedded board 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.

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