IP Speaker with SIP and Smart Notification System

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ABSTRACT

An IP Speaker implies the ability to drive audio to an active loudspeaker device from a network connection, usually over the Internet. In many cases this type of speaker also contains Digital Signal Processing (DSP) to provide the audio crossover and other signal processing to provide frequency division and other tonal functions that exist in conventional speakers. The IP Speaker connects to Unicast or Multicast addresses to enable the delivery of streamed data from a source on the network, to arrive at a single speaker or many speakers respectively. Electronic Notice Board is a modern device that is used to display the information on digital devices. In these types of notice boards we can leave and erase the information for the people to read and view. The wireless technology has been making enormous advance over recent years. The use of wireless is increasing not only in industrial applications but also for domestic applications in day by day life. Now a day's, the notice boards which are using almost wireless electronic notice boards because they saves time and manpower. And we can write and delete the information to the people in time using the wireless technology through computers, GSM, mobile etc. Xampp an open-source cross platform web server platform is used.

Key words:IP Speakers, GSM, Notification System, Xampp

1. INTRODUCTION

A conventional speaker is an electromagnetic transducer that converts electrical signals to sound. An IP Speaker implies to the ability to drive power to an active loudspeaker from a network connection. The IP Speaker connects to unicast or multicast addresses to enable the delivery of streamed data. We also propose a Electronic Notification Board, which display the information on digital devices. We can write and delete information to people using computers .The Text messages are displayed in the Electronic Notice Board and audio messages are played in the IP Speaker. The notifications are queued in order to make sure that all messages are received and guarantees that the messages are received. We use priority scheduling in the system so that the messages are queued and received based on priority. Scheduling is one of the most important activity of the process manager which take decision to choose which of the process in the ready queue will be assigned .first. There are different types of scheduling algorithms available for taking decision. One of them is Priority Scheduling Algorithm, which is based on the priority assigned to each process.

In priority scheduling the Processes are executed on the basis of priority, the process having highest priority is executed first. In case of similar priority FCFS is used. In this project, the priority scheduling algorithm is used. The next main objective is to implement paging , Paging helps to group the speakers on the basis of department, batches, and in this make the system more user friendly as the system delivers message to the required group very efficiently. We use priority Scheduling algorithm for ordered arrival of messages, a priority is assigned to each senders, and priority is allowed to run. Each senders have their different priorities, according to the priority the messages are received. Higher priority process will arrive first and then the lower priority and so on. Generally, we use the lowest integer as highest priority. If the two or more sender has equal priorities then they executed in FCFS manner such that the process which enters first will be executed first. One of the main disadvantage of a class which have an IP Speaker system enabled is that, sometimes the students may not be present in the class, they may be in Laboratories or Libraries. So there occur a problem when messages are played in the speaker of their respective class but are not properly received. But in our proposed system, the messages are redirected to the Labs or Libraries where the students are present currently. This make sure that the students receive the notice. Our proposed system also contains a Notification Display Device which is placed in the common area of each Departments. This allows the Students or staffs to read the Notice without missing it.

2. SYSTEM STUDY

The proposed system have two phases, First phase is an IP Speaker with SIP (Session Initiation protocol) which draws power from Ethernet connection and SNMP(Simple Network Management Protocol)[1]. The IP Speaker plays such messages as audio, this proposed system is designed to be implemented in educational institutions. The principals, HOD's or the staffs can send the messages. IP Paging [2] is done, So that the sender can choose the destination of the message. It enables to group the speakers placed in different places (Department wise grouping, Batch wise grouping)etc. The messages are given priority in such a way that they are queued, if more than one user send message. The first priority is given to the Principal, HOD's, and then the other staffs If this users send messages they are queued according to the priority set by the administrator. The system also have a feature in which the staffs can play audio from their respective devices while taking tutorials in the IP Speaker enabled classes. But, there

is a case when the messages are sent at the same time when the teacher is playing tutorials, In this case the messages are given more priority, the tutorial is paused and the message is played and then the tutorial is paused. The Second phase of the system is a Smart Notification System which displays the text messages in the display device, the display device is placed in the department where the students, staffs can receive the messages played in the IP Speaker any time even if they miss the message they can look up to it. The system also have wireless connection [3] capabilities which will enable the tutor to connect their computer system wirelessly and conduct the tutorials.

Key Features of the System:

- Messages will be delivered to the students in the classes they are in.

- More efficient and guarantees messages are delivered.

3. SYSTEM DESIGN

The proposed system will be implemented using Raspberry Pi 3 [4] with HiFiBerry sound card and Adafruit I2S 3W Stereo Speaker Bonnet in combination with a notification system. The language used to implement the system is PHP and database management is handled by MySQL.
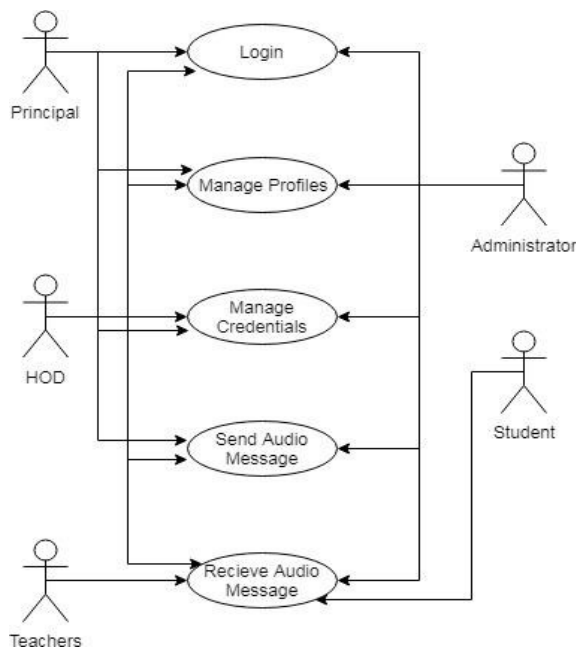
Figure 1: IP Speaker use case diagram

The system has 5 roles which interact with it in numerous ways:
- Administrator
- Principal

- HOD
- Teachers
- Students

The administrator will be responsible for all aspects of the proposed system such as handling credentials and profiles the administrator has the highest priority. The principal has the next highest priority. When messages are being transmitted, the higher priority message is transmitted. The HOD follows the principal in priority. Teachers and students do not have any privileges.

The proposed system allows the principal, HODs and administrator have the authority to create and manage groups. Groups are subsets of the students based on certain attributes such as year, department, class, etc. Use case diagram shown in figure 1.

The notifications are based on the timetable of the students regardless of the classroom. As such, if the students have a lab or a library, the notification will be redirected to their respective classroom. The message will also be displayed on the screen. Use case diagram shown in figure 2.

If an acknowledgement is not received after message is sent, the packet may be lost and the message is sent again. The packet loss cannot be handled when using UDP therefore we use TCP. The message system must be secure and infallible. To ensure the security of the system, encryption protocols are put in place.
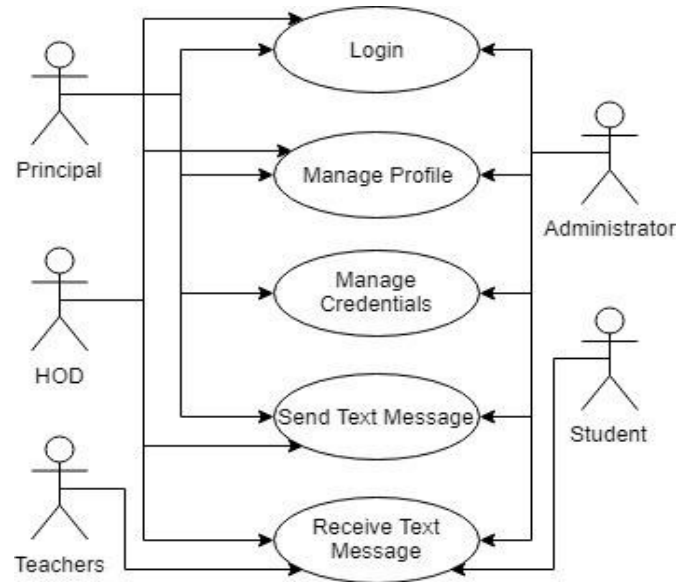
Figure 2: Notification system use case diagram

4. SYSTEM REQUIREMENTS:

For the proposed system the following requirements are necessary. Whenever you purchase software or hardware for your computer, you should first

make sure your computer supports the system requirements. In this section we tell about the hardware and software requirements needed for our proposed system. In our proposed system we are using PHP as our programming language. These program is more efficient while executing and make it feel good.

Software Requirements:

A software requirements specification (SRS) is a description of a software system to be developed, used appropriately, software requirements specifications can help prevent software project failure. The software requirements specification document lists sufficient and necessary requirements for the project development. For the proposed system we use PHP as our programming language. PHP provides a lot of predefined functions to secure your data. It is also compatible with many third-party applications, and PHP can easily integrate with other.

The main software requirements for our proposed systems are Xampp and Sublime.

Xampp[5] is a free and open source cross platform web server solution stack package developed by Apache which allow a web application to be easily tested on local web server.

Sublime[6] Text is a proprietary cross-platform source code editor with a Python application programming interface. It natively supports many programming languages and markup languages, and functions can be added by users with plugins, typically community-built and maintained under free-software licenses. Text editor used for PHP was sublime text.

Hardware Requirements:

For our proposed system the following requirements are necessary. Operating systems like Windows 7, Windows 8,Windows 10 and Linux are compatible for our proposed system. For these operating systems the proposed system will work ideally.

Our proposed system will contain hardware components like Raspberry Pi 3, HiFiBerry sound card, Adafruit I2S 3W Stereo Speaker Bonnet, Notification System, Bluetooth Module, etc

5. CONCLUSION

The IP Speaker connects to Unicast or Multicast addresses to enable the delivery of streamed data from a source on the network, to arrive at a single speaker or many speakers respectively. Notice Board is essential thing in any organization or public places to provide the information. Our proposed project will solve the potential problems that may arise when implementing an IP speaker based notification system.

Electronic Notice Board is a modern device that is used to display the information on digital devices.

In these types of notice boards we can leave and erase the information for the people to read and see. The wireless technology has been making enormous advance over the recent years. The use of wireless is increasing not only in industrial applications but also for domestic applications in day by day life.

The IP speaker with notification board will revolutionize the notification systems implemented within many institutions such as colleges, banks and government offices.

REFERENCES

1. W. Stallings, SNMP SNMPv2 and RMON: **Practical Network Management**, MA, Reading:Addison-Wesley, 1996.
2. J. Kempf, "**Dormant Mode Host Alerting ("IP Paging") Problem Statement**", IETF RFC 3132.
3. Nakar, P. S. (2004) **Design of a Compact Microstrip Patch Antenna for use in Wireless/Cellular Device**s, The Florida State University, Tallahassee.
4.https://www.raspberrypi.org/products/raspberry-pi-3-model-b-plus/
5.http://www.tutorialspoint.com/articles/run-a-php-program-in-xampp-server
6.https://en.wikipedia.org/wiki/Sublime_Text