DESIGN AND IMPLEMENTATION OF AN ONLINE RADIO S TREAMER APPLICATION

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CERTIFICATION

This is to certify that this project research was carried out by **KAZEEM, Ajia An as** with matriculation number **ND/23/COM/PT/0032**, has been read and approved as meeting part of the requirements for the award of Higher National Diploma (HND) in Computer Science.

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DEDICATION

This project is dedicated to the creator of the earth and universe, the Almighty God. It is also dedicated to my parents for their moral and financial support.

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First and foremost praises and thanks to God, for his infinite mercy and showe rs of blessings on me throughout my undergraduate level.

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ABSTRACT

Many users like to listen to radio program on a transistor radio, but the mobile gadget has many limitations. Currently, radio streaming systems are going through transition where more and more traditional analog solutions and systems are being replaced by newly available digital systems. The reason is that traditional systems are not easily expandable and have low voice interference with little or no signal processing. However, Internet Protocol (IP)-based digital systems having high speed dedicated processors not only offer fast processing but also provide ease in implementing advance features such as voice detection and cyber security. Radio streamer (e-radio, internet radio or online radio) is the digital distribution of radio content, such as radio programs, as streaming voice delivered over the Internet. Streaming radio online stands in contrast to dedicated terrestrial radio delivered by over-the-air aerial systems, traditional radio systems. In order to rationally use the network resources, and make the transmission of streaming media more fluent, this research proposes a design scheme of the streaming radio transmission system, and describes the design of the general structure. In this study, a concept of a radio station URL service is proposed. The aim is to create a solution where the qualities in traditional radio systems are preserved in an online environment. The decisions that were taken when shaping this project are based on a literature study and expert interviews. The proposed methodology was to design the application using Visual C# - Winforms. Visual C# is a high level programming language that was developed and implemented on the .Net framework (software framework developed by Microsoft that runs primarily on Microsoft windows) and MySQL as the database.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 INTRODUCTION

We are in a digital age where the technological change hugely impacts all forms of media. Radio is not an exception and is today facing a rapid transition toward Internet-based services. Radio was once as simple as TV-scheduled broadcasts received by the public with a device capable of changing the channel and adjusting the volume. Not only has technology brought new innovative features, but it has also challenged the notion of what the entire radio media really is (Jackie, 2011).

According to Waterman (2013) radio streamer or online radio is the "digital distribution of radio content such as radio programs, news and so on, as streaming voice delivered over the Internet. Streaming radio stands in contrast to dedicated terrestrial radio delivered by radio stations over-the-air aerial systems, FM and/or AM frequency transmission".

Currently, radio streaming systems are going through transition where more and more traditional analog solutions and systems are being replaced by newly available digital systems. The reason is that traditional systems are not easily expandable and have low voice transmission with little or no signal processing. However, Internet Protocol (IP)-based digital systems having high speed dedicated processors not only offer fast processing but al

so provide ease in implementing advance features such as voice detection, object tracking and cyber security (Wang, 2002).

Dave (2017) asserted that radio streamer is a software or system tha t collects (accepts) as input, a radio station streaming URL, checks the auth enticity of the URL and then connect to it through the internet; and this is d one with the aid of the computer. It offers a more computerized approach t o the way and manner we appreciate the use of technology by listening to r adio online in our day to day activities thereby reducing the massive limitati on that is associated with the limited system of listening through a radio pl ayer or a mobile phone.

It serves as an alternative medium to amplitude modulation (AM) / fr equency modulation (FM) when broadcasting a station. Some radio station s (within and outside the nation) broadcast online live on the internet and b ecause of the limitation of the FM Radio in accessing frequencies at a very far distance, the software ensures that there is a globalize access to such i nformation when needed (Franc, 2005). Some radio stations (within and ou tside the nation) broadcast online live on the internet and because of the li mitation of the FM Radio in accessing frequencies at a very far distance, th e software ensures that there is a globalize access to such information wh en needed.

Recently, radio streaming has been extensively used for information broadcasting. Availability of improved and enhanced transmission facilities

(i.e. high speed LAN, wireless Ethernet) make it further possible to use radi o streaming in fast real time applications. Before developing the software, t he perspective of a situation where radio listeners i.e. the users buys a FM/ AM radio device and start listening to his/her desired local station. This dev ice must have been preconfigured to have access to these local stations. B ut before the user will be able to listen to his/her desired station, it is assu med that the radio device must have met certain necessities. New services that attempt to define what radio should be are frequently being released o n the market: new devices, new applications and new models of content de livery. Although the options are many, it is difficult to recognize a solution th at covers both the need for usability and a comprehensive access to conte nt.

Before the advent of computer technology (internet to be precise), th e traditional means that has been the way people listen to radio has a lot of limitations in terms of assessing or listening to radio across the nation or ev en beyond the vicinities of a local station area. It was because of this reaso n that radio stations started broadcasting their programs online. The invent ion and application of computer and internet now brought succour to the w ay and manner radio stations broadcast their programs (Anjola, 2013).

The rapid development and popularity of Internet provides the strong market momentum for the development of the streaming media business, the streaming media business is becoming increasingly popular. Streaming

media technology is widely used in multimedia news publishing, live broadc ast online, advertising online, e-commerce, video on demand, remote educ ation, telemedicine, Internet radio, real-time video conference and other as pects of the Internet Information Services. The application of the streaming media technology will bring great changes on the network information exch ange and have a profound impact on the people's work and life (Liu, 2010).

The streaming media technology is not a single technology, it is the o rganic combination of network technology and video / audio technology. Th e implementation of streaming media technology on the network, needs to solve the problems on the streaming media production, publishing, transmi ssion and playing, and so on. The transmission platform which the streami ng media is dependent on is IP network, because the connectionless packe t forwarding mechanism of IP network is designed for the sudden data tran smission, it does not apply to the transmission of continuous media stream (Deering, 2010).

1.2 STATEMENT OF THE PROBLEM

Listening to radio programs traditionally in our midst especially amon g the youths usually undergo tedious and delayed process, and even when the stations are ready, users encounter many ups and downs on trying to a ccess the frequency of the broadcasting station. Some of the problems pos ed by this system include: Limited access to radio stations, unable to acces s radio stations outside the nation or outside certain vicinity, time wasted in

getting the frequency of radio stations. All these shortcomings led to the im plementation of this research.

1.3 AIM AND OBJECTIVES OF THE STUDY

The aim of this research work is to design and implement an Online R adio Streamer Application that would upon successful completion be able t o achieve the following objectives:

i. Provide ease of access to online radio broadcast.

ii. To design an easy documentation of the uniform resource locator (U RLs) of different radio stations.

iii. Allow users to listen to live radio stations from around the world, cate gorized by genre, language, or location.

iv. Ensure high-quality, uninterrupted audio streaming with adaptive bitrate support.

1.4 SIGNIFICANCE OF THE STUDY

The significance of this study is based on the fact that online radio str eamer application offers a more computerized approach to the way and m anner we appreciate the use of technology by listening to radio online in ou r day to day activities thereby reducing the massive limitation that is associ ated with the limited system of listening through a radio player or a mobile phone. The system ensure unlimited access to radio broadcast within and

outside Nigeria, it increase the level of accuracy and create an online radio streamer application that handles and manages radio stations broadcast U RLs.

1.5 SCOPE OF THE STUDY

This project will produce an online radio streamer that would handle and allow users to listen to live radio broadcast over the internet and have the URL stored in the application database for easy access and refere nce sake. It considered the different URL of the broadcast station as the in put, connects through this URL and then transfers the live broadcast back t o the application on the system.

This system is ideal for its purpose and may be used for other similar usage like listening to local music on the system.

1.6 ORGANIZATION OF THE REPORT

The project write-up is organized into five chapters. Chapter one is an introduction to the project which describe what the project entails. It discus ses the problems in the existing system. Also described in chapter one are the aim, the objectives, the significance and the limitation of the study. Cha pter two is the literature review of the project which contains diverse resear ch and scholarly articles written of this project while chapter three describe s the method of data collection, system analysis and design and improvem ent on the proposed system. Chapter four describes the implementation an

d result of the project and lastly, chapter five gives the summary, conclusio n and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 REVIEW OF RELATED WORKS

Xiaoyu and Rui (2011) proposed a design scheme of the streaming m edia transmission system, and described the design of the general structur e, the buffer and the scheduling algorithm, last, described the RTP transmis sion of the streaming media and the implementation of the buffer in detail. The new designed streaming media transmission system can improve the transmission efficiency, and reduce the waste of the network resources. In the proposed system, streaming media transmission system, when the nod e broadcast a program, it first connect the node of which tracker can get av ailable services at random, when the streaming media system begins to pl ay, or reconnect the node for failure, there is a buffer delay, and the effectiv e organizational strategy of data transmission ensure that the buffer delay i s small as much as possible.

Ever since the first terrestrial radio broadcast in December of 1906, n

ew technologies have continually emerged that have tried and tested the d urability of radio. Radio experienced a period of extreme growth and prospe rity in the 1930s and 1940s, with 95% of homes equipped with a radio by 19 50. As the world's most widely available and most listened to form of mass media out there, the notion that it may be fading is a difficult concept to rea lize. However, radio itself is not really in the decline – it is simply just evolvi ng with new changes in technology. The new millennium brought on the e mergence of satellite radio in 2001, which relays digital signal through the u se of satellites that can transmit to a much wider geographical area than te rrestrial radio, which transmits sound over the air via electromagnetic wave s. But even more advanced than satellite is the notion of Internet Radio – b eing able to stream radio over the web from virtually anywhere in the world, from a multitude of internet-connected devices (Dominick et. al, 2012).

Dominick et. al., (2008) in their work, asserted that there are a wide v ariety of Internet Radio stations available with different features that users can choose from. One of the most popular Internet radio stations is called P andora, which uses a technology, it calls the Music Genome Project, a musi c information system that classifies songs based on a multitude of distinct characteristics to deliver music based on individuals' tastes and interests (Pandora Media, Inc.). Another station is called Live 365, which allows user s to create their own Internet radio station to reach a global audience. The site has thousands of stations created by the public that cover over 260 ge

nres of music (Live365). A different type of program is Blog Talk Radio, whi ch lets anybody with a telephone and computer host a live Internet talk sho w and it integrates with social networks to go even deeper into the web rad io experience (Blog Talk Radio). There is also Last.fm, a service that lets list eners subscribe to stations and then access them from any Internet-conne cted device (Last.fm). Aside from these programs, there are countless othe r stations with similar features such as Slacker, SHOUTcast, Jango, AOL, Ra dio Tower, Last.fm, Reciva, NPR, Sangean, CBS Radio, and Absolute Radio – the list goes on and on.

The rapid development and popularity of Internet provides the strong market momentum for the development of the streaming media business, the streaming media business is becoming increasingly popular. Streaming media technology is widely used in multimedia news publishing, live broadc ast online, advertising online, e-commerce, video on demand, remote educ ation, telemedicine, Internet radio, real-time video conference and other as pects of the Internet Information Services (Xinyan Zhang, *et al*, 2010).

The application of the streaming media technology will bring great ch anges on the network information exchange and have a profound impact o n the people's work and life. The streaming media technology is not a singl e technology; it is the organic combination of network technology and video / audio technology. The implementation of streaming media technology on the network needs to solve the problems on the streaming media productio

n, publishing, transmission and playing, and so on. The transmission platfor m which the streaming media is dependent on is IP network, because the c onnectionless packet forwarding mechanism of IP network is designed for t he sudden data transmission, it does not apply to the transmission of conti nuous media stream. In order to transmit the effective and high quality vide o streams in Internet, we need to solve many problems; this paper mainly s olves the problem of the streaming media transmission (Xiaoyu *et al*, 201 2).

The Internet Radio model is very effective for many reasons. First of all, the re are no boundaries as to how far it can transmit audio because it isn't run ning through the airwaves – terrestrial radio can only travel about 30-40 mil es and satellite can travel over 20,000 miles, but the distance of the Interne t is unlimited. There are also much fewer, if any, interruptions to programmi ng by DJs or commercial advertising. The majority of Internet Radio sites m ake money by sporadic 15-30 second commercials after a few songs have been played, and much of the advertising is displayed via banner ads and mobile ads that don't take away from listening time. Terrestrial radio often has several minutes of commercials in between songs. Internet Radio is als o free, pending the availability of an Internet connection – no costly subscri ption fees like those necessary for satellite. Additionally, Internet Radio pro vides the highest possible sound quality, and there is not the hassle of deali ng with radio static or frequency loss. Finally, and perhaps most importantl

y, Internet Radio can travel wherever there is an Internet connection. Users can listen from home, in the car through a mobile device, or on a computer from anywhere in the world – the programming is not limited to a specific g eographical area (Cridland, James 2010).

Radio users can also purchase Wi-Fi Internet radio players that strea m music through aggregators of Internet radio sites. Many of these have a social networking aspect as well that lets users share recommendations an d see what their friends are listening to at the same time. These devices ar e turning radio into more of a social experience (Hardware Zone). Another up and coming technology is in-dashboard car radio systems now available by most automobile manufacturers that use Smartphone and Bluetooth co nnections to stream online radio. Many of these are partnered with brands such as Pandora and are hands-free and voice controlled to allow for a safe and enjoyable driving and listening experience (Kerry). According to an Arbi ton in-car study done in 2009, 38% of drivers are interested in listening to In ternet radio in the car (RAB).

One of the reasons that Internet radio is so successful is because it is contr olled by the listener, meaning that users of these sites get to decide exactly what they want to listen to. However, this is not as easy as it appears and it can fact be very costly. The Digital Millenium Copyright Act of 1998 has pla yed a major role in regulating Internet Radio and making sure that proper ro yalties are paid off. While terrestrial radio stations only have to pay publishi