**DESIGN AND IMPLEMENTATION OF SPEECH RECOGNITION SYSTEM USING GENETIC ALGORITHM**

**(SOFTWARE ALSO AVAILABLE)**

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This is to certify that this project work, “**Design and Implementation of Speech Recognition System using Genetic Algorithm***”*, was written by ***Student’s Name***with Registration number ***Your Matric / Registration Number*** and has been read and approved for the award of **(Degree, ND, or HND)** in the department of ***(Your Department)****,* ***Your School (SIAS, SBMT, SHSS)****,* ***Institution Address.***

**………………………………… ………………………….**

***Project Supervisor’s Name* DATE**

**(Project Supervisor)**

**………………………………… ………………………….**

***Your HOD’s Name* DATE**

**(Head of Department)**

**DEDICATION**

This work is dedicated to God for his enabling grace, and to all computer enthusiasts who help to make life a pleasant experience.

**ACKNOWLEDGEMENT**

I owe my indebtedness to my Supervisor (Name of your Supervisor), the Head of Department (Name of your HOD) and the Lecturers in the department of (Your Department) for their moral support that facilitated the successful completion of my (Tertiary Institution level). I am grateful to God Almighty and my parent for their financial support in my career. I really appreciate you all for everything, Thank you very much.

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**ABSTRACT**

*Speech Recognition software can "read" text from a document, Web page or e-Book, and also listen to voices of the system user, thereby generating synthesized speech through a computer's speakers. The aim of the study is to Design and Implement a Speech Recognition System using Genetic Algorithm. In achieving this aim, the following specific objectives were laid out as follows to: understand the speech recognition and its fundamentals, design and implement a Speech synthesizer that will recognize voice sound, design and implement a System that can listen to speech in any frequency that user specifies, and develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice. The methodology adopted in this study is the structured system analysis and design methodology (SSADM) which is a technical approach for analyzing and designing an application or system by applying object throughout the software development process. The programming language used is HTML, CSS, JAVASCRIPT, PHP, SQL and JQUERY. The reason why web programming languages was used is because, it is platform independent and it is a web based application. The problem area in speech synthesis is very wide. There are several problems in text pre-processing, such as numerals, abbreviations, and acronyms. This system will help solve the problems by using well written synthesis algorithm for the conversion. The application will build a platform to aid people with disabilities especially on reading and also help get information easily without any stress. The project could also help children learn how to pronounce words and how to read. The study will serve as a foundation and guide to other research students interested in researching on Speech Recognition systems.*

**CHAPTER ONE**

**INTRODUCTION**

**1.1 Introduction**

Speech Recognition software can "read" text from a document, Web page or e-Book, and also listen to voices of the system user, thereby generating synthesized speech through a computer's speakers. Genetic algorithm based on natural genetics; therefore they share the same names. The genetic algorithms is a stochastic search technique (stochastic search use probability to help guide their search) inspired by the mechanics of natural selection and natural genetics (Goldberg et al., 1989). The basic idea behind the genetic algorithms is to maintain a population of strings or chromosome, which are encoding of a potential solution to the problem being investigated. Each chromosome is tested using a fitness function to know the good solution of the problem. The strings of artificial genetic system are analogous to chromosome in biological system. The chromosomes are composed of features, or detectors that are called genes. This may take on some number of values, called alleles.

As a prelude to other parts of this study, this chapter will discuss the background upon which this study was initiated, the statement of problems that led to this study, the Aim and Objectives of the study. Others are Significance of the study, Scope of work, Limitation of the study and Definition of technical terms.

**1.2 Background of Study**

In recent years, study on Genetic Algorithm can be found in many research papers (Chu, 2003a; Chen, 2003; Chu, 2003b). They demonstrated different characteristics in Genetic Algorithm than others. For example, parallel search based on random multi-points, instead of a single point, was adopted to avoid being limited to local optimum. In the operation of Genetic Algorithm, it only needs to establish the objective function without auxiliary operations, such as differential operation. Therefore, it can be used for the objective functions for all types of problems.

Speech signals are composed of a sequence of sound. These sound and the transitions between them serve as symbolic representation of information. The arrangement of these sounds (symbols) is governed by the rule of language. The study of these rules and their implications in human communication is the domain of linguistic. The study and classification of the sounds of speech is called phonetics. Speech can be represented in term of its message content or information. An alternative way of characterizing speech is in terms of the signal carrying the message information, i.e., the acoustic waveform (Holmes et al., 2001). Speech is one of the most important tools for communication between human and his environment, therefore manufacturing of Automatic System Recognition (ASR) is desire for him all the time (Rabiner et al., 1978).

Artificial neural network has better speech recognition speed and less calculation load than others, it is suitable for chips with lower computing capability. Therefore, artificial neural network was adopted in this study as speech recognition platform. Most artificial neural networks for speech recognition are back-propagation neural networks. The local optimum problem (Yeh, 1993) with Steepest Descent Method makes it fail to reach the highest recognition rate. In this study, Genetic Algorithm was used to improve the drawback.

Consequently, the mission of this chapter is the experiment of speech recognition under the recognition structure of Artificial Neural Network (ANN) which is trained by the Genetic Algorithm (GA). This chapter adopted Artificial Neural Network (ANN) to recognize Mandarin digit speech. Genetic algorithm (GA) was used to complement Steepest Descent Method (SDM) and make a global search of optimal weight in neural network. Thus, the performance of speech recognition was improved. The nonspecific speaker speech recognition was the target of this chapter. The experiment in this chapter would show that the GA can achieve near the global optimum search and a higher recognition rate would be obtained. Moreover, two method of the computation of the characteristic value were compared for the speech recognition.

However, the drawback of GA used to train the ANN is that it will waste many training time. This is becasue that the numbers of input layer and output layer is very large when the ANN is used in recognizing speech. Hence, the parameters in the ANN is emormously increasing. Consequently, the training rate of the ANN becomes very slow. It is then necessary that other improved methods must be investigated in the future research.

In natural systems, one or more chromosome combined to form the total genetic prescription for the construction and operation of some organism. The total genetic package (structure) is called the genotype. The organism formed by the interaction of the total genetic package with its environment is called the phenotype (Mitchell, 1996). Genetic algorithm based on natural genetics; therefore they share the same names. The genetic algorithms is a stochastic search technique (stochastic search use probability to help guide their search) inspired by the mechanics of natural selection and natural genetics (Goldberg et al., 1989). The basic idea behind the genetic algorithms is to maintain a population of strings or chromosome, which are encoding of a potential solution to the problem being investigated. Each chromosome is tested using a fitness function to know the good solution of the problem. The new population is created by selecting chromosome from the old population. The new population is re-evaluated and the processes continue until the solution is found (Mitchell et al., 1996). The strings of artificial genetic system are analogous to chromosome in biological system. The chromosomes are composed of features, or detectors that are called genes. This may take on some number of values, called alleles.

**1.3 Statement of the Problem**

The importance of texts cannot be overemphasized. Hardly can anyone pass a message without including one form of text or the other. This is a problem for the visually impaired. They find it hard to read through the texts especially when the font-size is small. This has led to the development of a Speech Recognition conversion system. For those with learning disabilities, some in literary levels, they often get frustrated trying to browse the internet because so much of it is in text form.

Also in some already developed speech synthesizers, the problem area in speech synthesis is very wide. There are several problems in speech pre-processing, such as numerals, abbreviations, and acronyms. This system will help solve the problems by using well written synthesis algorithm for the conversion.

**1.4 Aim and Objectives of Study**

The aim of the study is to Design and Implement a Speech Recognition System using Genetic Algorithm. In achieving this aim, the following specific objectives were laid out as follows:

1. To understand the speech recognition and its fundamentals.
2. To design and implement a Speech synthesizer that will recognize voice sound.
3. To design and implement a System that can listen to speech in any frequency that user specifies.
4. To develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice.

**1.5 Significance of Study**

The following are the relevance of this study, which are stated as follows:

1. The application will build a platform to aid people with disabilities especially on reading and also help get information easily without any stress.
2. The study will serve as a foundation and guide to other research students interested in researching on Speech Recognition systems.

**1.6 Scope of the Study**

The study focuses on the Design and Implementation of Speech Recognition System using Genetic Algorithm.

**1.7 Limitations of the study**

During the course of this study, many things militated against its completion, some of which are:

1. **Time Constraint:** The time frame given to accomplish this project was very short due to school academic calendar and it was carried out under pressure which made the researcher not to implement some necessary features.
2. **Research material:** availability of research material is a major setback to the scope of the study.
3. **Frequent power failure:** This made the researcher append more money on fuel to ensure sustainable power.
4. **Financial Constraint:** Insufficient fund tends to impede the efficiency of the researcher in sourcing for the relevant materials, literature or information and in the process of data collection (internet).

**1.8 Definition of Terms**

**Learning Objects:** In the context of this research, a learning-object-is-a-resource with a clear educational-application. It is in digital form − examples: a Microsoft Word Document or a PDF document.

**Catalog:** This research applies the word ‘catalog’ as a container that presents all the SICT projects logged/stored in an organized tabular format, showing relevant information about each project. It can be compared to a library catalog containing all the information about books − their titles, author, number of pages, published year, ISBN etc.

**Repository:** A repository (in this case; SICT repository) is an archive, storehouse or container that allows storage, cataloging, accessing all SICT undergraduate projects and thesis, and viewing each object’s content.

**Identifier:** An identifier is simply a unique identity attached to one object, it aids referencing such object directly when its identifier is requested. An identifier can be a serial number, identity number (also written as ‘ID’) or an index number.

**Object:** An object in the context of this research refers to a project record returned by a database − queried using an Object Oriented Programming (OOP) approach. An object (i.e. a project record) returns or contains the project topic, student name, abstract, year of project submission and the date and time the object record was created.

**Database:** A database is a repository that allows storage, retrieval and manipulation of data. A database can be used efficiently with the aid of a Database Management System (DBMS) − a set of tools that allow storage, access, retrieval and maintenance of data stored in a database, examples of DBMS include XAMPP, WAMP, LAMP and AppServ to mention a few.

**Web-Browser:** A web-browser, internet browser or browser is software program that interprets the codes written in markup languages in graphic and visual (like images, text, audio or animation) form. This allows users to easily request and access a website or to search for information through a search engine (either Google, Ask, Bing and AOL among others).

**Keyword:** A phrase or just one word that is used to search for a certain result or set of results.

**User:** A user is system, application, request or person that can use a computer or software to perform a specific task.

**Metadata:** A set of data that describes and gives information about other data.

**Dataset:** A collection of related game plans of information that is made out of disengaged segments however can be controlled as a unit by a PC.

**Relational Database:** A database composed to see association among relations of information delineates tables from which data can be gotten to or reassembled in different courses without rearranging the database tables.

**CHAPTER TWO**

**LITERATURE REVIEW**

**2.1 Introduction**

This chapter focuses on the review of related literature. A literature review includes the current knowledge as well as theoretical and methodological contributions to a particular topic. It documents the state of the art with respect to the topic you are writing. It surveys the literature in the topic selected. In this research work the literature review includes the Theoretical Review, Digitalized Teaching Materials, Application of Speech Recognition in Language Learning, Speech Synthesis Techniques, Development of Speech Recognition Synthesizer, Methods for Speech Recognition Synthesis, and Empirical Studies.

**2.2 Theoretical Review**

**2.2.1 Speech pre-processing**

The speech signal needs be pre-processed prior to entering the recognition platform. The speech pre-processing includes point detection, hamming windows, speech feature, etc. Each process is illustrated as follows.

**2.2.2 Fixed-size frame and Dynamic-size frame**

With fixed-size frame, the number of frame varies with speech speed due to different length of voice signal. This problem does not exist in DTW recognition system. However, this study with artificial neural network ANN has to use dynamic-size frame to obtain a fixed number of frames. There are two methods to get a fixed number of frames:

1. Dynamic numbers of sample points
2. Dynamic overlap rates (Chen, 2002).

Either of the two methods can lead to a fixed numbers of frames, meeting the requirement by ANN recognition system.

**2.2.2 Point Detection**

A voice signal can be divided into three parts: speech segment, silence segment and background noise. How to differentiate between speech segment and silence segment is called point detection. After removal of unnecessary segments, the time frame in comparison is narrowed and the response time is shortened.

There are a number of algorithms for speech end point detection. In general, there are three types based on parameters:

1. Time domain point detection method,
2. Frequency domain point detection method,
3. Hybrid parameters point detection method.

Among the three, the time domain point detection is the simplest and the most frequently used, but has the shortcoming of lower noise resistance. On the other hand, frequency domain point detection and hybrid parameters point detection have higher noise resistance and better accuracy, but is more complicated in calculation. In this chapter, we adopted the time domain point detection method for shortening the computation time.

**2.2.3 Hamming Window**

The purpose to fetch hamming window is to prevent discontinuity in every frame and both ends of every frame. When the voice signal is multiplied by hamming window, we can reduce the effect of discontinuity (Wang, 2004).

**2.2.4 Feature Capture**

In general, there are two types of features capturing of voice signal for speech recognition, time domain analysis and frequency domain analysis. Of the two, time domain analysis is more straightforward and involves less calculation, so it saves time. Frequency domain analysis needs to go through Fourier transform first, so it involves more calculation and complexity and takes more time. Common speech features capturing include Linear Predict Coding (LPC) (Chen, 1994), linear predict cepstrum coefficient (LPCC), Mel-frequency Cepstrum coefficient (MFCC) (Chu, 2003b) etc. With consideration of recognition accuracy, this study selected MFCC as the speech feature capturing method.

Using MFCC to obtain solutions involves three steps:

1. Using Fast Fourier Transform (FTT) to obtain power spectrum of the speech signal;

2. Applying a Mel-space filter-bank to the power spectrum to get logarithmic energy value;

3. We conduct the discrete cosine transform (DCT) of log filter-bank energies to obtain MFCC.

**2.2.5 Speech Recognition Platform**

BPNN is the most commonly used structure in ANN. Although ANN has fast recognition rate and fault tolerance, it is not perfect because its SDM has a problem with Local Optimum. To prevent this from happening, GA is adopted to assist in SDM for obtaining optimal weight and improved recognition performance.

**2.2.6 Back-propagation Neural Network**

In principle, back-propagation neural network uses Multiple-Layer Perception as system framework and SDM as training rule. Such a system is called back-propagation neural network. Multiple-layer in Multiple-Layer Perception model indicates it is composed of many layers of neurons. Besides, the signal transmittance mode between neurons in two layers is the same as that for a single layer. The study adopted three-layer structure (input layer, hidden layer, output layer) as the basic framework for speech recognition, which is depicted.

**2.2.7 Genetic Algorithm**

Genetic algorithm (Goldberg, 1989; Michalewicz, 1999) involves Selection, Reproduction and Mutation. The purpose of selection is to determine the genes to retain or delete for each generation based on their degree of adaptation. There are two types of determination:

(1) Roulette - Wheel Selection

(2) Tournament Selection.

The study adopted tournament selection. It is to follow their fitness function sequence for each gene set to determine whether they are retained. The fittest survives. Reproduction is a process to exchange chromosomes to create the next generation according to distribution rule. In general, there are one-point crossover, two-point crossover and uniform crossover, etc. The evolutionary process of GA is depicted.

**2.3 Digitalized Teaching Materials**

Asoodar et at. (2014), Ching (2009), & Yang et al. (2012) all suggest that instructors should make full use of information technology to aid the material designing process. Many teachers cannot attain perfection in teaching English because they graduated from non-English departments and are subject to the limitations of their professional abilities and cultural background. In this case digitalized teaching materials are definitely one of the most feasible resources. The characteristics of these particular materials are stated as follows:

**2.3.1 Multiplicity**

With the development of informational technology, digital textbooks shift the focus of learning towards the students' independent study. In order to foster learners’ independence and motivation towards learning, diverse teaching contents that exhibit vivid and interesting features and allow students to learn in accordance with their individual interests are extremely important.

**2.3.2 Hypertext**

Teachers can systematically expand the teaching and learning database of materials and related supplementary information on teaching websites. By using network nodes, students can easily retrieve or download the course information. In addition, it will provide multiple sources of information by way of hyperlink, breaking through the traditional linear reading style (Chen et. al., 2013, & Pacheco, 2013).

**2.3.3 Authenticity**

Jonassen, Peck, and Wilson (1999) pointed out that computer technology can bring the real world into the language learning environment and allow students to break through the restriction of having only a limited number of books in the classrooms. Furthermore, it increases students' opportunities to learn with real corpora.

**2.3.4 Energy Saving and Environmental Protection**

Digital materials can be repetitively acquired, unlike printed ones, which can consequently help save paper and achieve environmental protection. According to the unique features of digital materials as described above, it is obvious that digital materials can be incorporated as one of many ways of English teaching.

**2.4 The Application of Speech Recognition in Language Learning**

In the recent years, computer assisted teaching and learning systems have been focusing on communication training, directly leading to an increase in the practice of people's communication skills as compared to previous years. This is made possible because computers are now capable of detecting, identifying, and processing spoken languages (Ehsani et al., 1998). This subsequently leads to Speech Recognition and Speech Recognition’s increasing popularity in language learning. Speech Recognition converts text information directly into a voice reading, and then uses natural semantic analysis techniques generated through artificial intelligence to make effective judgments on letters, words, the tone of numerals and special reading methods, and then employs speech synthesis patented technology to clearly read out the anthropomorphic sounds with adjusted speed and frequency. This allows each word to be pronounced correctly and naturally.

According to Dutoit (1997), the functioning of Speech Recognition (Figure 1) includes: (1) Natural Language Processing (NLP), a module that is able to produce voice recording of articles and combine the tone and rhyme and (2) Digital Signal Processing (DSP), a module which can convert the received symbol information into a voice. Zhu (2005) detailed the four major modules of Speech Recognition.

1. **Textual Analysis:** Analyzes the syntax and semantics of the text and converts it into language characteristic parameters. In other words, the computer can identify words, sentences, and pronunciations, and knows how to pronounce and when and how long to pause.
2. **Rhythm Generator:** Sends language characteristic parameters into the rhythm generator to produce the corresponding rhythm message of each syllable in the text, including the baseband track, volume, and duration, and converts the tone, voice, pause mode, and length of pronunciation into rhythmic parameters.
3. **Synthesis Unit Generator:** Outputs synthesis unit by following monosyllabic phonemes speech waveform samples in the speech database.
4. **Speech Recognition Synthesizer:** Selects acoustic parameters from the sound database to match the sounds needed to be pronounced.

**2.5 Speech Synthesis Techniques**

Symbolic prosody data is used by the synthesizer to generate speech using a specific method. There are three main categories of speech synthesis techniques.

1. Articulator synthesis
2. Formant synthesis
3. Concatenative synthesis

**Articulator Synthesis:** Articulator synthesis aims to simulate computationally the neurophysiology and biometrics of speech production. Articulator synthesis uses mechanical and acoustic model of speech production to synthesize speech. This synthesis produce intelligible synthetic speech, but its output is still far from natural sound (Mark et al. 2005).

**Formant Synthesis:** In this system representation of individual speech segments are stored on a parametric basis. The parametric are those of low level Holmes formant synthesizer for each segment. There is a single value for each parameter. This means single acoustic segment speech (Archana, 2021).

**Concatenative Synthesis:** Concatenative synthesis is a technique for synthesizing sound by Concatenative samples of recorded sound called units. The duration of units is not strictly defined and may vary according to the implementation, roughly in the range of 10 ms up to 10 seconds. It is used in speech synthesis to generate user specific sequence of sound from a database built from recording of other sequences (Mark et al., 2005).

**Units for Concatenative Synthesis**

1. Phone: Phone is single unit of sound. The speech is a sequence of such sounds.
2. Diphone: A diphone is defined as the signal from either midpoint of a phone or point of least change within the phone to the similar point in the next phone.
3. Triphone: A Triphone is a section of the signal taking in a sequence going from middle of a phone completely through the next one to the middle of a third (Mark et al., 2005).

**2.6 Development of Speech Recognition Synthesizer**

Artificial speech has been a dream of the humankind for centuries. To understand how they represent systems and how the development has taken shape in the present form. This review may provide new researchers with insights for further processing. In this paper, the history of synthesized speech from the first mechanical efforts to systems that form the basis for today's high-quality synthesizers is discussed.

Generating synthetic speech has been a curiosity for the past 100 years. Around those years Gerbert of Aurillac created the first known mechanical talking machine. For the next two centuries, inventors like Albertus Magnus and Roger Bacon created machines know as “talking heads” (Mattingly, 1974). However, the first known machine that tried to mimic real human speech was developed by Christian Kratzenstein of St. Petersburg in 1779. This machine could produce five long vowel sounds. Twelve years later, Wolfgang Von Kempelen developed a machine that could produce vowels and some consonants (Schroeder et al. 1993).

The first full Speech Recognition system was developed in the late 1960’s. Since then, there have been many advances in the accuracy and the quality of Speech Recognition systems. Companies like IBM, Microsoft, and Bell Labs have developed both free and commercially available systems. Following are the some products of Speech Recognition synthesizer.

1. **MITalk:** In 1976, Allen, Hunnicutt, and Klatt developed the MITalk at MIT available in English language. This Speech Recognition used different levels to convert text to synthesized speech. In the first level, abbreviations, numbers, and symbols were transformed into words. Then, using a 12,000 morph (prefixes, roots, and suffixes) lexicon, words were converted to their phonetic equivalent. Words not in the lexicon were converted to phonemes by using rules (Allen et al., 1987).
2. **DEC Talk:** Digital Equipment Corporation DEC Talk was based on Klattalk system it is available in American English, German and Spanish. The DEC Talk system later became commercially available in 1983. The system is capable to say most proper names, e-mail and URL addresses and supports a customized pronunciation dictionary. It has also punctuation control for pauses, pitch, and stress and the voice control commands are inserted in a text file which is used by DEC talk software applications. The speaking rate is adjustable between 75 to 650 words per minute (Sami, 1999).
3. **Festival:** The Festival is multi-lingual Speech Recognition currently available in English British and American, Welsh and Spanish. This system is developed by Alan Black and Paul Taylor. The system is written in C++ and supports residual excited LPC and PSOLA methods and MBROLA database. With LPC method, the residuals and LPC coefficients are used as control parameters. It uses letter-to-sound rules and a large lexicon for Speech Recognition conversion. Speech synthesis is accomplished using unit-selection concatenation of diphones. Festival offers a general framework for building speech synthesis systems (Black et al., 1997).
4. **AT&T VOICEBUILDER:** The AT&T VOICEBUILDER supports only English language. It provides a new tool to researchers and practitioners who want to have their own voices synthesized by a high-quality commercial-grade text-to- speech system without the need to install, configure, or manage speech processing software and equipment. It is implemented as a web service on the AT&T Speech Mash up Portal. The system records and validates users’ utterances, processes them to build a synthetic voice and provides a web service API to make the voice available to real-time applications through a scalable cloud-based processing platform. All the procedures are automated to avoid human intervention (Alistair, 2021).
5. **Speech Recognition System in Indian Languages:** IIIT Hyderabad has build a generic framework for Hindi and Telugu languages for generating text processing modules and linguistic resources which could be extended to all of the Indian languages with minimal efforts and time. Anand Arokia et al. approach is to make use of minimal language information, acoustic data and machine learning techniques. Their efforts in this direction support mainly for font identification, Font-to-Akshara conversion, and pronunciation rules for Aksharas and text normalization (Anand et al. 2007).
6. **WHISTLER:** Whistler is a trainable Speech Recognition (Speech Recognition) system available in English language that automatically learns the model parameters from a corpus. The speech engine is based on Concatenative synthesis and the training procedure on Hidden Markov Models. The speech synthesis unit inventory for each individual voice is constructed automatically from unlabeled speech database using the Whisper speech recognition system. The speech recognition unit recognizes the speech and automatically labels the speech segments. This method not only improved naturalness but also decreased the time required to create a new voice and made the synthetic speech similar to the original speech donor (Xuedong et al. 2021).
7. **Mobile phone based Speech Recognition:** Now a day’s many mobile phone manufacturer companies provide Speech Recognition facility. It is very useful for visually disabled person; they can hear the text that appears on a mobile phone screen even for reading e-books. The Google have introduced Speech Recognition for Android based mobile phone available in English, Spanish, French and Italian etc. (Greenbolt, 2015). SVOX Corporation introduced its Android phone based Speech Recognition. It can read a English text, e-book and can translate a speech to another language speech (Svoxbilevoices, 2021). C-DAC Mumbai has developed Android phone based Speech Recognition for Marathi and Oriya language (Cdac, 2015).
8. **Speech Recognition conversion using OCR:** This system is consisting of a portable camera, a computing device and speaker. First it reads image document, recognize the characters, numerals and symbols. A reconstructed text is converted into speech (Jisha et al., 2015).

**2.7 Methods for Speech Recognition Synthesis**

In unit selection based Concatenative speech synthesis, joint cost also known as Concatenative cost, which measures how well two units can be joined together. After units are concatenated, most system attempts three join cost function and three smoothing methods such as No smoothing, linear smoothing and Kalman filter based smoothing (Jithendra et al., 2006). T. Dutoit showed that Line Spectral Frequencies (LSF) have good interpolation properties and produce smoother transition than LPC parameters (Dutoit, 1997).

The speech can be enhanced by using Kalman filter a perceptual post filter concatenated with a standard Kalman filter; it gives the best performance (Ning et al., 2006). A Speech Recognition system produces neutral speech; it can be converted into emotional speech by modifying the pitch counter (F0) of stressed words by using Gaussian normalization technique (Rohit et al., 2014).

**2.8 Empirical Studies**

Many studies have pointed out that phonetics is the combination of phonemic awareness and phonological awareness (Drezek, 2007; Anthony & Lonigan, 2004). Drezek (2007) interpreted phonemic awareness as cognition of a smaller phonemic stage. By way of moving, deleting and combining phonemes, phonological awareness (PA) displays the ability to manipulate sound and distinguish the difference between writing and speaking (Kamii & Manning 2002). For instance, phonological awareness appears when the teacher asks students to read the word "pat" and then changes the letter p to c and re-reads the word "cat". Performing phonological awareness requires the identification of the difference between phonetics. Davidson and Strucker (2002) believe that both English native speakers and non-English native ones can improve their English fluency by learning phonetic symbols, syllable changes, and reading aloud. Phonological awareness scholars, Kirby et al. (2003), Anthony & Lonigan (2004), and Ivey & Baker (2004), also emphasize the fact that phonological awareness at the kindergarten stage has great correlation with reading competitiveness. On the other hand, the lack of phonological awareness impacts dyslexia considerably. In other words, those who have good reading abilities read more extensively and people with dyslexia exclude reading, often times developing into the Matthew Effect (Stanovich, 1986). Accordingly, Drezek (2007) proposed that the bimodal input can help learners improve reading comprehension through phonological awareness. The first one is reading while listening (RwL). Learners read the article and listen to previously recorded audio CDs or cassettes, or listen to what the teacher is reading. The second is Speech Recognition, and Speech Recognition features convert text information into voice files, which makes the information in the computer more prominent. Bimodal input possesses three characteristics:

* RwL and Speech Recognition both trigger phonological awareness.
* Readers with severe dyslexia, including literacy difficulties and dyslexics, benefit more from RwL and Speech Recognition than learners with good reading skills.
* RwL and Speech Recognition reduce fatigue in reading and increase more interest as well as reading amount.

Elbro, Rasmussen & Spelling (1996), Dolan et al. (2005), and Garg (2011) all pointed out that Speech Recognition has a strong positive impact on learning languages. When conducting online reading tests, Olsen and Wise (1992) found that students employing Speech Recognition obtain higher literacy scores and acquire a larger vocabulary than those students who just use traditional computer programs. Davidson et al. (1991), Hebert & Murdock (1994), and Damper & Eastmond (1997) also indicated the fact that students' vocabulary significantly increases while using Speech Recognition to read articles. In addition, Davidson et al. (1991), Dawson et al. (2000), and Shany & Biemiller, (1995), van der Leij, (1981), and Yamagishi et al. (2009) all believe reading with the help of Speech Recognition greatly enhances students' accuracy and fluency of vocabulary. Furthermore, Elbro et al. (1996) argue that through syllables or letters coupled with Speech Recognition, language learners show significant improvement in vocabulary, comprehension, and fluency, compared with users following general curriculum.

The above-mentioned literature review addresses the effect of the Speech Recognition learning system on the students' reading achievement and vocabulary enhancement. Most of these studies, however, are quantitative-based and focus on the application of Speech Recognition with native English- speaking learners, not with students who are learning English as a foreign language. Since English plays an important role in the language education of Taiwan, the question of how to improve the four skills: listening, speaking, reading, and writing, becomes a crucial issue.

Many students often feel troubled while memorizing words because of not knowing how to pronounce them, but, at the same time, they are unable to keep up with the CD, due to failure to understand the content that the speaker is saying. Some students even become frustrated with learning English because they have no idea of how to speak with beautiful cadence. For this reason, research on developing teaching methods to improve these specific problems of learning English becomes a necessity. With substantial and rapid progress in Speech Recognition development, the most natural pronunciation and intonation generated through this technology has replaced the mechanized synthetic speech that was popular early before. This technology can provide learners not only with the best demonstration of the analog tone pronunciation, but also adds the flexibility and efficiency which cannot be achieved with pre- recorded files. Therefore, exploring the correlation between Speech Recognition and students’ learning English proves to be necessary. In addition, related research on Speech Recognition has been not very common in Taiwan. This research will employ Speech Recognition to produce digital material to further study the students' learning English at an elementary school.

**CHAPTER THREE**

**SYSTEM ANALYSIS AND DESIGN**

**3.1 Methodology Adopted**

The structured system analysis and design methodology (SSADM) was adopted for the analysis, design and implementation of this system. Structured systems analysis and design methodology (SSADM) is a set of standards for systems analysis and application design. It uses a formal methodical approach to the analysis and design of information systems.

SSADM follows the waterfall life cycle model starting from the feasibility study to the physical design stage of development. One of the main features of SSADM is the intensive user involvement in the requirements analysis stage. The users are made to sign off each stage as they are completed assuring that requirements are met. The users are provided with clear, easily understandable documentation consisting of various diagrammatic representations of the system. SSADM breaks up a development project into stages, modules, steps and tasks. The first and foremost model developed in SSADM is the data model. It is a part of requirements gathering and consists of well defined stages, steps and products. The techniques used in SSADM are logical data modeling, data flow modeling and entity behavior modeling.

1. **Logical Data Modeling:** This involves the process of identifying, modeling and documenting data as a part of system requirements gathering. The data are classified further into entities and relationships.
2. **Data Flow Modeling:** This involves tracking the data flow in an information system. It clearly analyzes the processes, data stores, external entities and data movement.
3. **Entity Behavior Modeling:** This involves identifying and documenting the events influencing each entity and the sequence in which these events happen.

**3.1.1 Problem Identification Using SSADM**

The SSADM was used to discover some problems;

1. **Feasibility Study:** This assumes that the proposed project has been identified as a result of an exercise such as strategic planning and sets out to evaluate the various technical, organizational, financial and business options available. The aim is to establish the whether the direction and requirements of the project are feasible. The aim is to evaluate the feasibility of the proposal, involving an analysis of the problem and determination of the best solution; usually a range of potential solutions are presented.
2. **Investigation of the Environment:** The process of identifying, modeling and documenting the data requirements of the system being designed. The result is a data model containing entities (things about which a business needs to record information), attributes (facts about the entities) and relationships (associations between the entities).
3. **Business System Option (BSO):** A BSO defines the functional scope of a proposed solution. At its most basic level it consists of textual descriptions of those requirements satisfied by the solution. All BSOs must satisfy the minimum requirement as identified by user representatives.
4. **Requirement Certification:** Requirement Certificate aims to equip the learner or end user (client) with the advanced knowledge of project management and will enable the learner to understand the system requirement to uphold the project management required parameters.
5. **Technical System Option (Implementation):** There is availability of software, hardware and technical man power for the development and running of the new system. Hence the system is technically feasible as the requirement can be met without stress and much financial input. The software and hardware requirements include an Integrated Development Environment for web based applications, a standard PC for running this application, a local server and an up to date web browser for testing. As a programmer, the researcher can provide these requirements with ease and as such, this project is technically feasible.
6. **Logical Design:** Technical system options are production and logical design updates and query processing and system dialogue.
7. **Physical Design:** physical database design and a set of program specifications Program specifications are using the logical system specification and the technical system specification.

**3.2 Analysis of the Existing System**

The operations of the Design and Implementation of Speech Recognition System using Genetic Algorithm were analyzed, and some drawbacks were detected which led to the initiation of the new Speech Recognition. In the old system, it hard to read through the texts especially when the font-size is small. For those with learning disabilities, some in literary levels, they often get frustrated trying to browse the internet because so much of it is in text form. Also in some already developed speech synthesizers, the problem area in speech synthesis is very wide. There are several problems in speech pre-processing, such as numerals, abbreviations, and acronyms. This system will help solve the problems by using well written synthesis algorithm for the conversion.

**3.2.1 Dataflow of the Existing System**

**SPEECH RECOGNITION SYSTEM**

Input Analysis

Output Analysis

Process Analysis

Input Speech

Opening Account

Login to System

Process Request

Process New Account

Validate Login Details

Produce Result

Generate Report

**Figure 3.2.1: Dataflow of the Existing System**

**3.3.2 Disadvantages of the Existing System**

Some of the problems identified in the present system include:

1. The speed of processing data manually is low and prone to errors.
2. The current process is stressful to end-users
3. Things done manually were very uncomfortable.

**3.2.3 Weakness of the Existing System**

The weakness in speech synthesis is very wide. There are several problems in text pre-processing, such as numerals, abbreviations, and acronyms. This system will help solve the problems by using well written synthesis algorithm for the conversion. Even for people with the visual capability to read, the process can often cause too much strain to be of any use or enjoyment. With Speech Recognition, people with visual impairment can take in all manner of content in comfort instead of strain.

**3.3 Analysis of the Proposed System**

An overview of the proposed system flow chat has a relationship between an object to another just like the entity. Relationship diagram, the object relationship pair can be graphically represented by a diagram called entity relationship diagram (Entity Relationship Diagram). It is mainly used in database applications but now it is more commonly used in data design. The primary purpose of ERD is to represent the relationship between data object.

**3.3.1 Data Flow Diagram of the Proposed System**

This is a data flowchart of the proposed system as shown in figure 3.2.

Registration Details

ADMIN TABLE

USER TABLE

ADMIN

SPEECH RECOGNITION

LOGIN ACCOUNT

REGISTER

Success / Failure

Success / Failure

Login Details

Success / Failure

Login Details

Sends Details

Sends Details

Found / Not Found

Found / Not Found

**Figure 3.2:** Data Flow Diagram of the Proposed System

**3.3.2 Advantages of the Proposed System**

The following are the advantages of the proposed Speech Recognition;

1. To understand the speech recognition and its fundamentals.
2. To design and implement a Speech synthesizer that will recognize voice sound.
3. To design and implement a System that can listen to speech in any frequency that user specifies.
4. To develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice.

**3.3.3 Justification of the Proposed System**

The application will build a platform to aid people with disabilities especially on reading and also help get information easily without any stress. The project could also help children learn how to pronounce words. The study will serve as a foundation and guide to other research students interested in researching on Speech Recognition systems.

**3.4 Functional Requirements**

The following figure 3.4 shows the various modules involved in the system and available to users and to the Admin who have access to the system.

**3.4.1 Use Case Diagram of the Admin / User Privileges**

**ADMIN**

**END-USER**

**Figure 3.3: Use Case diagram of the Admin**

**Figure 3.4: Use Case diagram of the User (Client)**

**3.5 Data Requirements**

The following are the data requirements of new and existing users in the system. New users are required to create an account by providing some necessary information such as:

1. **Email Address:** The user's email address is required during registration and subsequent login on the system.
2. **Password:** The user is required to enter a secured password or pin during registration and subsequent login on the system
3. **User Name:** The user is required to enter a nickname which he/she will be addressed as subsequently for security reasons.

**CHAPTER FOUR**

**SYSTEM DESIGN AND IMPLEMENTATION**

**4.1 Objectives of the Design**

The following are the objectives of the proposed Speech Recognition design;

1. To understand the speech recognition and its fundamentals.
2. To design and implement a Speech synthesizer that will recognize voice sound.
3. To design and implement a System that can listen to speech in any frequency that user specifies.
4. To develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice.

**4.2 Cohesion and Decomposition High level Model**

**Description:** This is a cohesion and Decomposition High level Model

Admin

Admin

Client (Admin/User)

Open Account

Speak in Microphone

Trigger Audio System

Input Password

Give Feedback

**Figure 4.2:** Client (User) Privilegez

**4.3 Control Center / Overall Dataflow Diagram**

**Description:** This is a control center / overall dataflow diagram

SPEECH RECOGNITION SYSTEM

Input from Keyboard

Process

Report (Output)

Disk Storage

Result to Screen

**Figure 4.3:** Control Center / Overall Dataflow Diagram

**4.3.1 Proposed System Operation Flowchart**

**Description:** The diagram below entails the proposed system operation flowchart

Input Username and Password

Is username and password valid?

Display “Invalid Username/password”

No

Yes

**Figure A:** Login flowchart

INPUT REGISTRATION DETAILS

CONTINUE?

NO

YES

SAVE TO DATABASE

**Figure B:** Registration Flowchart

**4.4 System Specification and Design**

**4.4.1 Input and Output Specification**

**Description:** The diagram below entails the Input and Output Specification of the proposed system.

***SPEECH RECOGNITION SYSTEM***

Enter Username

Enter Password

Sign In

Register Here

User ID:

Password:

**Figure 4.5:** Input Specification for Login System

**Login Successful**

**Or**

**Login Unsuccessful**

**Figure 4.6:** Output Specification for Speech Recognition

**4.5 Choice and Justification of Programming Language**

To ensure a standardized object oriented program in its entire ramification, HTML, CSS, JAVASCRIPT, DJANGO and SQLITE Database was used in the development of Speech Recognition. These entire programs are used to ensure effective program. The motive behind the use of the language is its compatibility with several Operating Systems. It is object oriented and combines the feature of django and JavaScript platform thereby making it to run on any Operating System. It is secured in that it does not cause harm to user’s system and access to information is restricted. The language is simple and easy to learn.

Below is a brief explanation of the programming languages used;

**HTML:** HTML is a **markup** language for **describing** web documents (web pages).

1. HTML stands for **H**yper **T**ext **M**arkup **L**anguage
2. A markup language is a set of **markup tags**
3. HTML documents are described by **HTML tags**
4. Each HTML tag **describes** different document content

**CSS:** stands for Cascading Style Sheet, it describes how HTML elements are to be displayed on screen, paper, or in other media. CSS saves a lot of work. It can control the layout of multiple web pages all at once and External style sheets are stored in CSS files

**JAVASCRIPT:** JavaScript is the programming language of HTML and the Web. Programming makes computers do what you want them to do. JavaScript is easy to learn.

**Django framework (PYTHON):** Django is a server scripting language, and a powerful tool for making dynamic and interactive Web pages. PHP is a widely-used, free, and efficient alternative to competitors such as Microsoft's ASP.

**SQLITE:** SQL is a standard language for accessing and manipulating databases. SQL stands for Structured Query Language, SQL lets you access and manipulate databases, and SQL is an ANSI (American National Standards Institute) standard. SQL can perform the following task;

1. SQL can execute queries against a database
2. SQL can retrieve data from a database
3. SQL can insert records in a database
4. SQL can update records in a database
5. SQL can delete records from a database
6. SQL can create new databases
7. SQL can create new tables in a database
8. SQL can create stored procedures in a database
9. SQL can create views in a database
10. SQL can set permissions on tables, procedures, and views

**4.6 Program Documentation**

The main purpose of program documentation is to describe the design of your program. The documentation also provides the framework in which to place the code. As coding progresses, the code is inserted into the framework already created by the program documentation. The following was documented for the successful implementation of the software;

1. README file which contains a brief description of the project, installation instructions, a short example/tutorial,
2. Document your code which comprises application of coding conventions, such as file organization, comments, naming conventions, programming practices, etc.
3. Version of the files along with the major edits you did in each version

**4.7 Implementation Techniques**

The software Implementation is a process carried out to make changes on the tested programs developed in the system. The software will be installed successfully if the hardware requirement and the software requirement are available. The following phase contains how the software was implemented successfully;

**1) Coding:** The coding system has been developed to meet the following main objectives;

* To understand the speech recognition and its fundamentals.
* To design and implement a Speech synthesizer that will recognize voice sound.
* To design and implement a System that can listen to speech in any frequency that user specifies.
* To develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice.

**2) File conversion:** During file setup it is necessary to convert the existing master file to a new page. This new form is the responsibility of the newly designed, which undergoes the process of converting the old system master file to a new one.

System Conversion is a transformation process stage in system implementation at which the newly designed system is put in place of the old system by the organization after been tested and documented to prove that it is working. It is a significant milestone after which the ownership of the system if been officially transferred from the researcher (analyst) and the programmer to the end user.

The under listed are various system conversion briefly described to enable the implementation process.

1. **Parallel System of Conversion:** This takes place simultaneously at the same time, runs between the old and new system until probably the new system is completely put in place and the old system discarded.
2. **Direct System of Conversion:** This takes place automatically at a time over a short period of time. It saves cost, manages time and enhances fast operation but finds to a high risk of failure without new system comparability.

**3) Changeover Procedure:**

This is the process of changing from the former or previous system to the new system. In a changeover procedure, the organization change from the existing system to new system. This can be done in one of the following ways:

1. **Parallel Changeover:** This is the process of running the two systems simultaneously and comparing their results until the new system proves satisfactory; after which the use of the new system would be commenced.
2. **Direct Changeover:** This is the case whereby the new system replaced the old system immediately after development and when it must have proved successful. This procedure may be drastic if the new system fails.
3. **Phased Changeover:** In phased changeover method, the system usually starts with one unit or department of the organization. The advantage is that the organization would avoid losses in case it (the new system) fails.

**4) Commissioning:** This is the process of ensuring that installed systems are functionally tested and capable of being operated and conform to the design intention.

**4.8 Programming Module Specification**

Programming module specification follows successful implementation and incorporates also evaluation of the system in order to give the desired or necessary improvement. It includes monitoring the process of the other stages of system development to ensure that the development plan and objective are being accomplished. There are three types of system maintenance which include;

1. **Corrective Maintenance:** This covers maintenance, which is needed to put right coding errors and other faults, which may be introduced into the software. It include, the routine “debugging” of newly produced or recently amended code and emergency error correction in response to report faults.
2. **Adaptive Maintenance:** This covers the changes which are made to the software to meet new or changed circumstances, such as restructuring of a database, alternatives in operating procedures and changes to hardware or software versions.
3. **Preventive Maintenance:** This covers attempts to make the software perform more effectively. It includes user requests for enhancement, improvement due to experience, changes to make the software more easy to use and rewrite the code to make the maintenance that is specifically used for the new system to reduce its chances of breakages.

**Installation Instructions (Version 4.8.1):**

**Installing Software from the CD Drive or Flash Drive**

Step 1: Insert and open your Compact Disk (CD) or Flash Drive.

Step 2: Copy the "Speech-recognition-system" folder.

Step 3: Paste the folder in your Django project directory.

Step 4: Activate your virtual environment (if you are using one).

Step 5: Navigate to the directory where your Django project is located.

Step 6: Install the required dependencies (assuming you have a requirements.txt file):

bash

pip install -r requirements.txt

Step 7: Apply migrations to set up the database:

bash

python manage.py migrate

Step 8: Start the Django development server:

bash

python manage.py runserver

Step 9: Open your preferred web browser.

Step 10: Type the following URL in the address bar:

plaintext

http://127.0.0.1:8000/

Step 11: You're done with the installation!

Re-Executing the Software after Installation

Step 1: Start your Django development server (if not already running).

Step 2: Open your web browser and type the following URL, then press 'Enter':

plaintext

<http://127.0.0.1:8000/>

Step 3: You have successfully re-executed the software.

**4.9 Computer Hardware Minimum Requirement**

The software designed needed the following hardware for an effective operation of the newly designed system.

1. A system running on AMD, Pentium 2 or higher processor
2. The random access memory (ram) should be at least 512mb.
3. Enhanced keyboard.
4. At least 20 GB hard disk.
5. V.G.A or a colored monitor.

**4.10 Software Requirement**

The software requirements include:

1. A Windows XP operating system or higher version for faster processing
2. SQLITE database
3. Localhost
4. Python runtime environment

**4.11 Personnel / User Training**

Before the user can use the software, it is necessary to give a thorough training on how to use the software. It is also important to note that the users of the software are the operators. Training involves the tutorials, lectures or other methods used to make the users to understand how to use and maintain the software program. The following steps would help train and guide the users on how to use the program effectively:

1. Follow the instruction as in the software installation above
2. Right click on the Speech Recognition Software and run the localserver

If successful, click on your browser and type in <http://127.0.0.1:8000/>

1. Enter the username and password and click on login
2. Enter the main menu, select any of the submenus you want and continue
3. After performing necessary actions on the submenu, logout the program from the browser close button.

**CHAPTER FIVE**

**SUMMARY, CONCLUSION AND RECOMMENDATION**

**5.1 Introduction**

It is important to ascertain that the objective of this study was on the Design and Implementation of Speech Recognition System using Genetic Algorithm. In the preceding chapter, the relevant data collected for this study were presented, critically analyzed and appropriate interpretation given. In this chapter, certain recommendations made which in the opinion of the researcher will be of benefits in addressing the Design and Implementation of Speech Recognition System using Genetic Algorithm.

**5.2 Summary**

Genetic algorithm based on natural genetics; therefore they share the same names. The genetic algorithms are a stochastic search technique. Speech Recognition software can "read" text from a document, Web page or e-Book, generating synthesized speech through a computer's speakers. The problem area in speech synthesis is very wide. There are several problems in text pre-processing, such as numerals, abbreviations, and acronyms. This system will help solve the problems by using well written synthesis algorithm for the conversion.

The aim of the study is to Design and Implement a Speech Recognition System using Genetic Algorithm. In achieving this aim, the following specific objectives were laid out as follows to: understand the speech recognition and its fundamentals, design and implement a Speech synthesizer that will recognize voice sound, design and implement a System that can listen to speech in any frequency that user specifies, and develop an application software that can mainly be used for: Speech Recognition, Speech Generation, Text Editing and Tool for operating Machine through voice.

The methodology adopted in this study is the structured system analysis and design methodology (SSADM) which is a technical approach for analyzing and designing an application or system by applying object throughout the software development process. The programming language used is HTML, CSS, JAVASCRIPT, PHP, SQL and JQUERY. The reason why web programming languages was used is because, it is platform independent and it is a web based application. The application will build a platform to aid people with disabilities especially on reading and also help get information easily without any stress. The project could also help children learn how to pronounce words and how to read. The study will serve as a foundation and guide to other research students interested in researching on Speech Recognition systems.

**5.3 Conclusion**

In essence, the research work was successfully researched to meet the objectives set at the beginning of the project work. While one cannot completely rule out one form of limitation or the other, it was a success to a greater extent. On the whole, the research has been a worthwhile exercise. It has afforded the researcher the opportunity to really appraise the situation on the ground and allow one to bring out areas that might need attention for the improvement of the research work.

**5.4 Recommendation**

Based on the findings, the following recommendations are hereby suggested that only few across the counter information were provided for in the research work, it is strongly recommended for subsequent researcher to expand the scope of the research work.

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**APPENDIX A**

**“SOURCE CODE”**

<?php

session\_start();

#Speech Recognition Audio System

$db['db\_host'] = 'localhost';

$db['db\_user'] = 'root';

$db['db\_pass'] = '';

$db['db\_name'] = 'stdreg';

foreach($db as $key => $value){

define(strtoupper($key), $value);

}

$conn = mysqli\_connect(DB\_HOST,DB\_USER,DB\_PASS,DB\_NAME);

if (isset($\_POST['register1'])) {

$name = $\_POST['name'];

$email = $\_POST['email'];

$dob = $\_POST['dob'];

$address = $\_POST['address'];

$department = $\_POST['department'];

$sex = $\_POST['sex'];

$level = $\_POST['level'];

$session = $\_POST['session'];

$sql = "INSERT INTO `student` (`id`, `regno`, `name`, `email`, `sex`, `dob`, `department`, `level`, `session`, `waec`, `nd`, `birth`, `attestation`, `fees`, `date`, `status`) VALUES (NULL, '', '$name', '$email', '$sex', '$dob', '$department', '$level', '$session', '', '', '', '', '', '', '');";

if(mysqli\_query($conn,$sql)){

$message = "Bio Data Uploaded Successfully, Proceed to Upload Your Credentials!";

}else{

$error = "Bio Data was not Uploaded Successfully, try again later!";

}

if (isset($message)) {

$sql = "SELECT \* FROM `student` WHERE `email` = '$email' AND `name` = '$name';";

$query=mysqli\_query($conn,$sql);

$numrow=mysqli\_num\_rows($query);

if($numrow>0){

$result=mysqli\_fetch\_array($query,MYSQLI\_ASSOC);

$\_SESSION['uid']=$result['id'];

}

echo "<script>alert('".$message."');</script>";

echo "<script>window.location='register2.html';</script>";

}elseif (isset($error)) {

echo "<script>alert('".$error."');</script>";

}

}

if (isset($\_POST['register2'])) {

// Count # of uploaded files in array

$total = count($\_FILES['waec']['name']);

// Loop through each file

for( $i=0 ; $i< $total ; $i++ ) {

$name = $\_FILES['waec']['name'][$i];

$ext = end((explode('.', $name)));

$ext1= ".".$ext;

//Get the temp file path

$tmpFilePath = $\_FILES['waec']['tmp\_name'][$i];

//Make sure we have a file path

if ($tmpFilePath != ""){

//Setup our new file path

$newFilePath = "images/" . $newname = date('YmdHis',time()).mt\_rand().$ext1;

//Upload the file into the temp dir

if(move\_uploaded\_file($tmpFilePath, $newFilePath)) {

$waec = $newname;

}

}

}

// Count # of uploaded files in array

$total = count($\_FILES['nd']['name']);

// Loop through each file

for( $i=0 ; $i< $total ; $i++ ) {

$name = $\_FILES['nd']['name'][$i];

$ext = end((explode('.', $name)));

$ext1= ".".$ext;

//Get the temp file path

$tmpFilePath = $\_FILES['nd']['tmp\_name'][$i];

//Make sure we have a file path

if ($tmpFilePath != ""){

//Setup our new file path

$newFilePath = "images/" . $newname = date('YmdHis',time()).mt\_rand().$ext1;

//Upload the file into the temp dir

if(move\_uploaded\_file($tmpFilePath, $newFilePath)) {

$nd = $newname;

}

}

}

// Count # of uploaded files in array

$total = count($\_FILES['birth']['name']);

// Loop through each file

for( $i=0 ; $i< $total ; $i++ ) {

$name = $\_FILES['birth']['name'][$i];

$ext = end((explode('.', $name)));

$ext1= ".".$ext;

//Get the temp file path

$tmpFilePath = $\_FILES['birth']['tmp\_name'][$i];

//Make sure we have a file path

if ($tmpFilePath != ""){

//Setup our new file path

$newFilePath = "images/" . $newname = date('YmdHis',time()).mt\_rand().$ext1;

//Upload the file into the temp dir

if(move\_uploaded\_file($tmpFilePath, $newFilePath)) {

$birth = $newname;

}

}

}

// Count # of uploaded files in array

$total = count($\_FILES['attestation']['name']);

// Loop through each file

for( $i=0 ; $i< $total ; $i++ ) {

$name = $\_FILES['attestation']['name'][$i];

$ext = end((explode('.', $name)));

$ext1= ".".$ext;

//Get the temp file path

$tmpFilePath = $\_FILES['attestation']['tmp\_name'][$i];

//Make sure we have a file path

if ($tmpFilePath != ""){

//Setup our new file path

$newFilePath = "images/" . $newname = date('YmdHis',time()).mt\_rand().$ext1;

//Upload the file into the temp dir

if(move\_uploaded\_file($tmpFilePath, $newFilePath)) {

$attestation = $newname;

}

}

}

// Count # of uploaded files in array

$total = count($\_FILES['fees']['name']);

// Loop through each file

for( $i=0 ; $i< $total ; $i++ ) {

$name = $\_FILES['fees']['name'][$i];

$ext = end((explode('.', $name)));

$ext1= ".".$ext;

//Get the temp file path

$tmpFilePath = $\_FILES['fees']['tmp\_name'][$i];

//Make sure we have a file path

if ($tmpFilePath != ""){

//Setup our new file path

$newFilePath = "images/" . $newname = date('YmdHis',time()).mt\_rand().$ext1;

//Upload the file into the temp dir

if(move\_uploaded\_file($tmpFilePath, $newFilePath)) {

$fees = $newname;

}

}

}

$date = date('U');

$uid = $\_SESSION['uid'];

$sql = "UPDATE `student` SET `status` = 'Pending', `waec` = '$waec', `nd` = '$nd', `birth` = '$birth', `attestation` = '$attestation', `fees` = '$fees', `date` = '$date' WHERE `id` = '$uid';";

if(mysqli\_query($conn,$sql)){

$message = "Credentials Uploaded Successfully, a confirmation email will be sent to you shortly!";

}else{

$error = "Credentials were not Uploaded Successfully, try again later!";

}

if (isset($message)) {

echo "<script>alert('".$message."');</script>";

echo "<script>window.location='index.html';</script>";

}elseif (isset($error)) {

echo "<script>alert('".$error."');</script>";

}

}

?>

<!DOCTYPE html>

<html>

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<meta http-equiv="X-UA-Compatible" content="ie=edge">

<title>Student's Portal</title>

<link href="css/index.css" type="text/css" rel="stylesheet">

</head>

<body>

<div class="container">

<header>

<nav>

<ul>

<li><a href="index.html">Home</a></li>

<li><a href="register.html">Portal</a></li>

<li><a href="login.html">Login</a></li>

</ul>

</nav>

</header>

<h1> Certificate Verification System</h1>

<div class="slideshow-container">

<div class="mySlides fade">

<div class="numbertext">1 / 3</div>

<imgsrc="img/museum.jpg" style="width:100%">

<div class="text">Art & Design</div>

</div>

<div class="mySlides fade">

<div class="numbertext">2 / 3</div>

<imgsrc="img/paper.jpg" style="width:100%">

<div class="text">Research</div>

</div>

<div class="mySlides fade">

<div class="numbertext">3 / 3</div>

<imgsrc="img/student.jpg" style="width:100%">

<div class="text">Tech</div>

</div>

</div>

<br>

<div style="text-align:center">

<span class="dot"></span>

<span class="dot"></span>

<span class="dot"></span>

</div>

<script>

varslideIndex = 0;

showSlides();

function showSlides() {

vari;

var slides = document.getElementsByClassName("mySlides");

var dots = document.getElementsByClassName("dot");

for (i = 0; i<slides.length; i++) {

slides[i].style.display = "none";

}

slideIndex++;

if (slideIndex>slides.length) {

slideIndex = 1

}

for (i = 0; i<dots.length; i++) {

dots[i].className = dots[i].className.replace(" active", "");

}

slides[slideIndex-1].style.display = "block";

dots[slideIndex-1].className += " active";

setTimeout(showSlides, 3000); // Change image every 3 seconds

}

</script>

</div>

</body>

</html>

<?php

$allow = "no";

ob\_start();

session\_start();

require\_once('db.php');

include('mail.php');

if(isset($\_POST['checkbox'])){

foreach($\_POST['checkbox'] as $user\_id){

$regno = "15H/000".$user\_id."/CS";

$sql = "SELECT \* FROM `student` WHERE `id` = '$user\_id';";

$query=mysqli\_query($conn,$sql);

$numrow=mysqli\_num\_rows($query);

if($numrow>0){

$result=mysqli\_fetch\_array($query,MYSQLI\_ASSOC);

$email=$result['email'];

$name=$result['name'];

$department=$result['department'];

$bd = urlencode('Congratulations '.$name.', your registration in the '.$department.' department is completed. Your Registration Number is '.$regno);

file\_get\_contents("https://www.bulksmsnigeria.com/api/v1/sms/create?api\_token=0NHYGfiCNxlbb6rP00bTtKoGd3KZ8vckE28f0ansI7Dvzvx8ZYgYSm8SpS3r&from=StdRegPortl&to=".$email."&body=".$bd);

$bulk\_option = "delete";

if($bulk\_option == 'delete'){

$bulk\_del\_query = "UPDATE `student` SET `status` = 'Approved', `regno` = '$regno' WHERE `id` = '$user\_id';";

mysqli\_query($conn, $bulk\_del\_query);

echo "<script>alert('Approval Successful!');</script>";

echo "<script>window.location='index.php';</script>";

}

}

}

}

?>

<!DOCTYPE html>

<html lang="en">

<?php

include\_once('head.php');

$x = "";

$sql = "SELECT \* FROM `student` WHERE `status` = 'Pending';";

$query=mysqli\_query($conn,$sql);

$numrow=mysqli\_num\_rows($query);

if($numrow>0){

$result=mysqli\_fetch\_array($query,MYSQLI\_ASSOC);

$id=$result['id'];

$name=$result['name'];

$email=$result['email'];

$sex=$result['sex'];

$dob=$result['dob'];

$department=$result['department'];

$level=$result['level'];

$session=$result['session'];

while ($result=mysqli\_fetch\_array($query)) {

$id=$id."||".$result['id'];

$name=$name."||".$result['name'];

$email=$email."||".$result['email'];

$sex=$sex."||".$result['sex'];

$dob=$dob."||".$result['dob'];

$department=$department."||".$result['department'];

$level=$level."||".$result['level'];

$session=$session."||".$result['session'];

}

$id2=explode("||", $id);

$name2=explode("||", $name);

$email2=explode("||", $email);

$sex2=explode("||", $sex);

$dob2=explode("||", $dob);

$department2=explode("||", $department);

$level2=explode("||", $level);

$session2=explode("||", $session);

$allow = "yes";

$px=count($id2);

}

?>

<div class="content-wrapper">

<div class="container-fluid">

<!-- Breadcrumbs-->

<ol class="breadcrumb">

<li class="breadcrumb-item">

<a href="#">Dashboard</a>

</li>

<li class="breadcrumb-item active">View All Students</li>

</ol>

<!-- Example DataTables Card-->

<div class="card mb-3">

<div class="card-header">

View All Students</div>

<div class="card-body">

<div class="table-responsive">

<form method="POST" action="">

<table class="table table-bordered" id="dataTable" width="100%" cellspacing="0">

<thead>

<tr>

<th style="width: 60px"><button type="submit" class="btnbtn-primary btn-block" name="del" >Approve (\*)</button></th>

<th>Name</th>

<th>Email</th>

<th>Sex</th>

<th>DOB</th>

<th>Department</th>

<th>Level</th>

<th>Session</th>

<th>View</th>

</tr>

</thead>

<tfoot>

<tr>

<th><button type="submit" class="btnbtn-primary btn-block" name="del" >Approve (\*)</button></th>

<th>Name</th>

<th>Email</th>

<th>Sex</th>

<th>DOB</th>

<th>Department</th>

<th>Level</th>

<th>Session</th>

<th>View</th>

</tr>

</tfoot>

<tbody>

<?php

if($allow === "yes"){

for ($i=0; $i< $px; $i++) {

?>

<tr>

<td><input type="checkbox" name="checkbox[]" value="<?php echo $id2[$i]; ?>"></td>

<td><?php echo $name2[$i]; ?></td>

<td><?php echo $email2[$i]; ?></td>

<td><?php echo $sex2[$i]; ?></td>

<td><?php echo $dob2[$i]; ?></td>

<td><?php echo $department2[$i]; ?></td>

<td><?php echo $level2[$i]; ?></td>

<td><?php echo $session2[$i]; ?></td>

<td><a target="\_blank" href="<?php echo 'view.php?id='.$id2[$i] ?>" ><i class="fa fa-eye"></i></a></td>

</tr>

<?php

}}

?>

</tbody>

</table>

</form>

</div>

</div>

<div class="card-footer small text-muted">Student Registration Portal</div>

</div>

</div>

<!-- /.container-fluid-->

<!-- /.content-wrapper-->

<footer class="sticky-footer">

<div class="container">

<div class="text-center">

<small>Copyright © Priceless Stores 2018</small>

</div>

</div>

</footer>

<!-- Scroll to Top Button-->

<a class="scroll-to-top rounded" href="#page-top">

<i class="fa fa-angle-up"></i>

</a>

<!-- Logout Modal-->

<div class="modal fade" id="exampleModal" tabindex="-1" role="dialog" aria-labelledby="exampleModalLabel" aria-hidden="true">

<div class="modal-dialog" role="document">

<div class="modal-content">

<div class="modal-header">

<h5 class="modal-title" id="exampleModalLabel">Ready to Leave?</h5>

<button class="close" type="button" data-dismiss="modal" aria-label="Close">

<span aria-hidden="true">×</span>

</button>

</div>

<div class="modal-body">Select "Logout" below if you are ready to end your current session.</div>

<div class="modal-footer">

<button class="btnbtn-secondary" type="button" data-dismiss="modal">Cancel</button>

<a class="btnbtn-primary" href="logout.php">Logout</a>

</div>

</div>

</div>

<!-- Custom scripts for all pages-->

<script src="js/sb-admin.min.js"></script>

<!-- Custom scripts for this page-->

<script src="js/sb-admin-datatables.min.js"></script>

</div>

</body>

</html>

**APPENDIX B**

**“OBJECT PROGRAM”**

**THE SOFTWARE (OBJECT PROGRAM) IS AVAILABLE ON REQUEST**