HARDWARE PROTOTYPING OF A YORUBA LANGUAGE TUTOR FOR KIDS

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DEDICATION

I dedicate this project to Almighty Allah who has made it possible through His might. My dedication also goes to my parents Mr and Mrs Isiaq, always supportive.

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ABSTRACT

Yoruba is a dialect continuum of West Africa with over 50 million speakers. The indigenous is less spoken in our society because of the various trans-national structural revolutions going on in the world today in the name of globalization. Parents want their children to speak and learn English right from infancy and as a result, many aspects of the Yoruba language have been watered down. Many Yoruba words have virtually disappeared, and taken over by English loan words. Given to the globalization of our society, it is becoming increasingly important for people to speak indigenous languages. The aim of this project work is to develop Yoruba language tutor for kids which can aid their speaking and learning of the language.

The design of the project is divided into four modules which are the power supply, control, display and audio output. In this system, the 220-240V AC supply was stepped down and converted to DC (5V) by the power supply unit for use by all other units. Control unit coordinates of what the display unit will show based on the input of the user and then gives necessary audio signal. The system is designed by categorizing the basics of Yoruba language into different levels as lesson. Lessons levels are converted into audio waveform using FL studio. A questionnaire was design to evaluate the system performance and given to thirty one (31) users.

Hardware implementation was carried by coupling the power unit, the control unit, the display unit, and a full wave rectifier circuit was design using four diodes (IN4001), Micro controller (ATMega328) was connected with 28pins IC socket to avoid direct soldering of IC on the board. The buttons was connected to the analogue pin of the microcontroller from A0-A5. Power indicator LEDs was connected to 5V from the voltage regulator with 220ohms resistor to reduce current flowing into the LED, The implementation of the system was carried out using C- programming language to program the micro controller. Based on the questionnaire 48% users rate the system functionality very good while 44% rate the device good based on reliability, while 34% user rated the device excellent based on ease of use, while 49% rated it fair based on audio clarity.

The project work has developed a prototype for kids to learn Yoruba language. The prototype can be redesigned into a robotic toy, with moving parts to encourage and attracts the kids.

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CHAPTER ONE

INTRODUCTION

1.1 PREAMBLE

Language is a system that consists of the development, acquisition, maintenance and use of complex systems of communication, particularly the human ability to do so (William, Casterline, & Croneberg, 1965) Estimates of the number of human languages in the world vary between 5,000 and 7,000. However, any precise estimate depends on a partly arbitrary distinction between languages and dialects. Natural languages are spoken or signed, but any language can be encoded into secondary media using auditory, visual, or tactile stimuli – for example, in whistling, signed, or braille (Skwwarecki, Babies Learn to Recognize Words in the Womb, 2013). This is because human language is modality-independent. Depending on philosophical perspectives regarding the definition of language and meaning, when used as a general concept, "language" may refer to the cognitive ability to learn and use systems of complex communication, or to describe the set of rules that makes up these systems, or the set of utterances that can be produced from those rules. All languages rely on the process of semiosis to relate signs to particular meanings.

Oral, manual and tactile languages contain a phonological system that governs how symbols are used to form sequences known as words or morphemes, and a syntactic system that governs how words and morphemes are combined to form phrases and utterances. Human language has the properties of productivity and displacement, and relies entirely on social convention and learning. Its complex structure affords a much wider range of expressions than any known system of animal communication. Language is thought to have originated when early hominines started gradually to change their primate communication systems, acquiring the ability to form a theory of other minds and a shared intentionality (Skwwarecki, Babies Learn to Recognize Words in the Womb, 2013).

The most commonly spoken language of Nigeria is English which was the former colonial language, was chosen due to the contrast of cultural and linguistic forced through drawn borders facilitated under the Berlin Conference (William,

Casterline, & Croneberg, 1965) Communication in the English language is much more popular in the country's urban communities than it is in the rural areas due to colonization. The other major languages are Hausa, Igbo and Yoruba. The languages spoken in Nigeria are not evenly distributed, for instance in the South-West part of Nigeria speaks Yoruba; Igbo is largely spoken in the South-East part of Nigeria; while in the North-West part of Nigeria, Hausa is largely spoken (Abiola, Adetunmbi, & Oguntimilehin, A Review of the Various Approaches for Text to Text Machine Translations, 2015).

English language is the Nigerian lingua franca which is commonly spoken among speakers of different indigenous languages. English Language has attained the status of a national language. It is the language of business and international relation. For proper participation in some functional activities in the country, you need to have some reasonable amount of proficiency in English language.

1.2 STATEMENT OF THE PROBLEM

English has posed a threat to the survival of indigenous Nigerian languages. Consequently, most children cannot speak their mother tongue. Therefore, experts are agitating that if a child cannot speak his or her mother tongue today, there is a probability that in the next 20 to 25 years the sons and daughters of the child may lose the language and it may result to language endangerment and language loss. This implies that in the next 50 years or more, the fate of Nigerian languages such as Yoruba, would be close to extinction. The recent policy of Nigeria Federal Ministry of Education that made the study of indigenous languages optional in the Senior Secondary Schools has not helped matters. The dominating nature of the English language is quite alarming in Nigeria (Balogun, 2013). This can be seen practically, in all domains: government and administration, education, the media, the judiciary, science and technology to mention but few. High government officials avoid using their languages in official contacts even with their own people for the fear of being labelled as tribal and parochial. In the national and state houses of assembly for instance, English language continues to be the language of debate and record in spite of the fact that Nigeria is reckoned with the three major indigenous Nigerian languages as the national languages (Akinwale, Adetunmbi, Obe, & Adesuyi, 2015).

Also, the use of computers has so far been greatly restricted only to those people who have some knowledge of the English language. This has resulted in a fast way of killing so many indigenous languages in the country especially the Yoruba language. The Yoruba language is less used among its people because its roles have been taken over by the English language (Abiola, Babalola, & Adaramola, 2015).

The only channel by which human beings present and communicate reality is language. Yoruba is a dialect continuum of West Africa with over 50 million speakers. The Yoruba language is slipping away from us because of the various trans-national structural revolutions going on in the world today in the name of globalization. Yoruba language is at the point of death because some of its roles have been taken over by the English language. Although a language only dies when nobody speaks it any more, Yoruba is endangered because the younger generation in whose hands the continuum of a language lies does not have a better understanding of the language in terms of their performance and competence. But the threat of extinction is still solidly there. Yoruba still exists in Nigeria today because of high-level of illiteracy (Abiola, Adetunmbi, Fasiku, & Olatunji, 2014).

Parents want their children to speak and learn English right from infancy and as a result, many aspects of the Yoruba language has been watered down. Many Yoruba words have virtually disappeared, and taken over by English loan words. Given to the globalization of our society, it is becoming increasingly important for people to speak indigenous languages. For instance, the ability to speak indigenous languages fosters people's mobility and increases their native language understanding. Since young children are most flexible at learning languages, starting Yoruba language learning in preschool would provide them a good opportunity to acquire the Yoruba language more fluently at a later age.

1.3 AIM AND OBJECTIVES

The aim of this project is to develop a hardware prototyping of a Yoruba language tutor for kids

The specific objectives are

1. To design a machine that can teach Yoruba language to kids
2. To implement the system using a hardware prototype
3. To evaluate the effectiveness of the developed system.

1.4 METHOD OF STUDY

The methods to be used in achieving this project will include the following step:

- ✓ Continual review of relevant literatures in the library and online resources related to language, language learning, tutor, language translator, second learning.
- ✓ Recording of actual pronunciation of alphabets, numbers and some basic terms in Yoruba language was used.
- ✓ C-programming language was be used to program the system.
- ✓ Microcontroller will be used to select the level and the lessons to play out in each level.
- ✓ Interaction with the primary school teachers about the primary 1&2 syllabus in Yoruba language
- ✓ Each level contain series of training section depends on the user level.
- ✓ Each training will have a voice note to pronounce the word correctly.
- ✓ Since it's a toy, the microcontroller will work with the remote and SD card module (external memory to hold all voice notes)

1.5 SCOPE OF THE PROJECT

This project aims to increase a better understanding of Yoruba language by developing a prototype language tutor that will help stimulate the desire to learn Yoruba in kids. Language tutor should teach the kids basic terminologies in the Yoruba language with suitable displays that will facilitate easy learning by kids within the age of one to five years old. The project will make use of C-programming language in the programming of the microcontroller; there are other programming languages as well like python, C++, Java etc.

1.6 SIGNIFICANCE OF STUDY

This project aims to emphasize the importance usage of indigenous language in teaching and learning procedure for Early Childhood Education to the younger age. Importance of mother tongue the first language of a child is part of their personal, social and cultural identity. One of the impacts of indigenous is that it brings about the reflection and

learning of successful social patterns of acting and speaking. While some argue that there is no such thing as "mother tongue", it is important to understand what it means to be a "non-native" speaker and the implications that it can have on one's life.

Below are some other significances of indigenous language;

- ✓ Indigenous language for emotional and mental growth: indigenous language has a very powerful impact in the information of the individual thought, emotion, psychological behaviour and personality.
- ✓ Indigenous language is an indicator of cultural identity: A child connects to his parents, family, relatives, culture, history, identity and religion through his mother tongue and it links the child with the culture of the society.
- ✓ Indigenous language provides the basis for learning other languages: Jim Cummins also underscores the importance of preserving mother tongue; "children who come to school with a strong foundation in their mother tongue excels".

CHAPTER TWO

LITERATURE REVIEW

2.1 DIGITAL LEARNING

Digital learning is any type of learning that is accompanied by technology or by instructional practice that makes effective use of technology. It encompasses the application of a wide spectrum of practices including: blended and virtual learning.

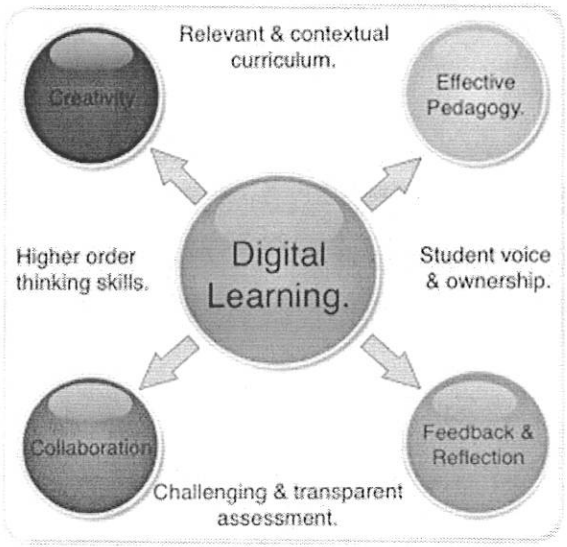


Figure 2.1: Digital learning (Denis & Schmidt-Crawford, 2010)

2.1.1 Advantages of digital learning

a) **Engagement**: improved student motivation from engaging content and game-based strategies
b) **Time**: extending the learning day and year; allowing students to learn when they learn best
c) **Location**: anywhere anytime learning creates a new world of opportunity
d) **Individualization**: customizing learning by level and modality
e) **Content**: rich, deep, and up to date
f) **Sharing:** the difference between 'turn it in' and 'publish it'; the ability to teachers to share what works
g) **Ownership**: students choosing what to learn, how to demonstrate their learning

h) **Parent involvement**: transparency and connections the classroom

2.1.2 Disadvantages of digital learning

a) **Infrastructure**: particularly affordable broadband at home
b) **Old paradigms**: teachers, administrators, and parents trapped in an old model
c) **Management and scheduling**: customized learning will require much better management and scheduling tools
d) **Preparation & development:** leaning new tools will be the easy part, learning new roles will be more challenging particularly as school models proliferate
e) **Obsolesce**: constantly changing software and hardware versions make it tough for schools to stay current (but cloud computing will help)
f) **Security and cheating**: technology will solve some problems but introduce other challenges

.2.1.3 Challenges in Adopting Digital Learning at Schools

The availability of online resources has changed everything from hunting for a new house to reading the newspaper to purchasing plane tickets, and as a result has disrupted established structures (such as the real estate, news and airline businesses). Telecommuting has become widespread. The market for popular music has transformed dramatically. Internet telephony presents a real challenge to established telecommunications companies. Millions of blogs, social networking sites, and interactive online games have created new modes of interaction and expression. In short the advent of technology touches almost every aspect of modern life. (Tomoh, 2018)

- ✓ **The Infrastructure** – It is a challenge that both schools and students face. Most schools lack IT infrastructure that can assist large scale eBooks and digital curriculum distribution. While a mature market like United States has access to fast internet that can support large data downloads required for digital books, most of the developing world still struggles with this.
- ✓ **Resistance to change** – the biggest challenges to technological change isn't technology itself, rather it has been the people affected by the change. The teachers, administrators, librarians and parents are all stuck on old ways of learning. The problem lies in trying to get them to adapt to digital ways of learning.
- ✓ **Content curation** – Digital learning is not limited to converting existing content and books to digital formats. In order to have its full affect, digital learning in schools

must be accompanied by dynamic and interactive curated content. This curated content consumes time and effort that are often the reason for the increase in implementation costs.

- ✓ **Technological changes** – Digital curriculum are not one time investments. The curriculum needs to be constantly upgrading the platforms as and when technologies change. Technology shifts can have an important impact on existing content.

2.2 Machine Learning

Machine learning is a subset of artificial intelligence in the field of computer science that often uses statistical techniques to give computers the ability to "learn" (i.e., progressively improve performance on a specific task) alongside with data, without being explicitly programmed (Bishop, 2006)

The name machine learning was coined in 1959 by Arthur Samuel. Evolved from the knowledge of pattern recognition and computational learning theory in artificial intelligence, machine learning adapt the study and construction of algorithms that can learn from and make predictions on data – such algorithms overcome following strictly static program instructions by making data-driven predictions or decisions, through building a model from sample inputs. Machine learning is employed in a range of computing tasks where designing and programming explicit algorithms with good performance is difficult or infeasible; example applications areas include email filtering, detection of intruders or malicious email, insiders working towards a data breach or impersonation, optical character recognition (OCR), learning to rank, and computer vision. Machine learning is closely related to (and often overlaps with) computational statistics, which also focuses on prediction-making through the use of computers (Samuel, 1959).

Machine learning tasks include the following

a) **Supervised learning**: a supervised learning algorithm analyses the training data and produces an inferred function, which can be used for mapping new examples.
b) **Semi-supervised learning:** the semi-supervised learning uses the unlabelled data to gain more understanding of the population structure in general.
c) **Active learning:** the computer can only obtain training labels for a limited set of instances (based on a budget), and also has to optimize its choice of objects to

acquire labels for. When used interactively, these can be presented to the user for labelling.

d) **Reinforcement learning:** training data (in form of rewards and punishments) is given only as feedback to the program's actions in a dynamic environment, such as driving a vehicle or playing a game against an opponent (Samuel, 1959)

e) **Unsupervised learning**: No labels are given to the learning algorithm, leaving it on its own to find structure in its input. Unsupervised learning can be a goal in itself (discovering hidden patterns in data) or a means towards an end (feature learning).

2.2.1 Decision Tree Learning

Decision tree learning (Rokach & Maimon, theory and applications. World Scientific Pub Co Inc., 2008) uses a decision tree as a predictive model, which maps observations about an item to conclusions about the item's target value. (Represented in the leaves). It is one of the predictive modelling approaches used in statistics, data mining and machine learning. Tree models where the target variable can take a discrete set of values are called classification trees; in these tree structures, leaves represent class labels and branches represent conjunctions of features that lead to those class labels. Decision trees where the target variable can take continuous values (typically real numbers) are called regression trees. In decision analysis, a decision tree can be used to visually and explicitly represent decisions and decision making. In data mining, a decision tree describes data (Rokach & Maimon, theory and applications. World Scientific Pub Co Inc., 2008), but the resulting classification tree can be an input for decision making.

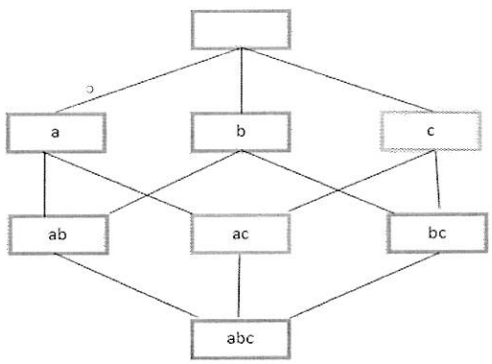


Figure 2.2 Decision tree learning (Techleer,2019)

2.2.2 Association Rule Learning

Association rule learning is a method for discovering interesting relations between variables in large databases. It is intended to identify strong rules discovered in databases using some measures of interestingness. Based on the concepts of strong rules, introduced association rules for discovering regularities between products in large-scale transaction data recorded by point-of-sale (POS) system in supermarkets (Agrawal, Imielinski, & Swami, 1993).

2.2.3 Artificial Neural Networks

An artificial neural network (ANN) learning algorithm, usually called "neural network" (NN), is a learning algorithm that is vaguely inspired by biological neural networks. Computations are structured in terms of an interconnected group of artificial neurons, processing information using a connectionist approach to computation.

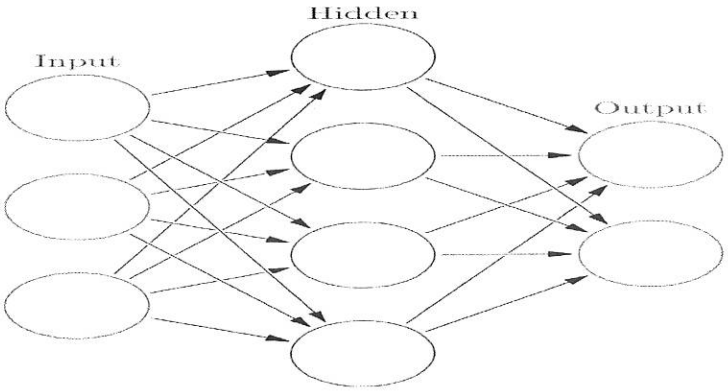


Figure 2.3 ANN (Glosser, 2013)

2.2.4 Deep Learning

This approach tries to model the way the human brain processes light and sound into vision and hearing (Schmidhuber, Deep Learning in Neural Network:, 2015). Some successful applications of deep learning are computer vision, deep belief networks and recurrent neural networks have been applied to fields including computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics, drug design and board game programs, where they have produced results comparable to and in some cases superior to human experts (Schmidhuber, Deep Learning in Neural Network:, 2015).

2.2.5 Inductive Logic Programming

Inductive logic programming (ILP) (Plotkin, 1970) is an approach to rule learning using logic programming as a uniform representation for input examples, background knowledge, and hypotheses. Given an encoding of the known background knowledge and a set of examples represented as a logical database of facts, an ILP system will derive a hypothesized logic program that entails all positive and no negative examples. Inductive programming is a related field that considers any kind of programming languages for representing hypotheses (and not only logic programming), such as functional programs (Plotkin, 1970).

2.2.6 Support Vector Machines

Support vector machines (SVMs) (Cortes & Vapnik, 1995) are a set of related supervised learning methods used for classification and regression. Given a set of training examples, each marked as belonging to one or the other of two categories, an SVM training algorithm builds a model that assigns new examples to one category or the other, making it a non-probabilistic binary linear classifier (although methods such as Platt scaling exist to use SVM in a probabilistic classification setting). An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall (Cortes & Vapnik, 1995).

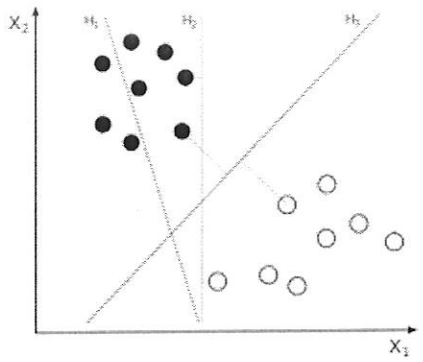


Figure. 2.4 SVM model (Cortes & Vapnik, 1995)

2.2.7 Reinforcement Learning

Is an area of machine learning inspired by behaviourist (Auer & Ortner, 2010) psychology concerned with how software agents ought to take actions in an environment so as to maximize some notion of cumulative reward? The problem, due to its generality, is studied in many other disciplines, such as game theory, control theory, operations

research, information theory, simulation-based optimization, multi-agent systems, swarm intelligence, statistics and genetic algorithms. In the operations research and control literature, reinforcement learning is called approximate dynamic programming, or neuro-dynamic programming. The problems of interest in reinforcement learning have also been studied in the theory of optimal control, which is concerned mostly with the existence and characterization of optimal solutions, and algorithms for their exact computation, and less with learning or approximation, particularly in the absence of a mathematical model of the environment. In economics and game theory, reinforcement learning may be used to explain how equilibrium may arise under bounded rationality (Auer & Ortner, 2010).

2.3 HUMAN–COMPUTER INTERACTION (HCI)

Human–computer interaction (HCI) researches the design and use of computer technology, focused on the interfaces between people (users) and computers. Researchers in the field of HCI both observe the ways in which humans interact with computers and design technologies that let humans interact with computers in novel ways. As a field of research, human–computer interaction is situated at the intersection of computer science, behavioural sciences, design, media studies, and several other fields of study (Stuart, Moran, & Newell, 1980). Humans interact with computers in many ways; the interface between humans and computers is crucial to facilitating this interaction. Desktop applications, internet browsers, handheld computers, and computer kiosks make use of the prevalent graphical user interfaces (GUI) of today. Voice user interfaces (VUI) are used for speech recognition and synthesizing systems, and the emerging multi-modal and Graphical user interfaces (GUI) allow humans to engage with embodied character agents in a way that cannot be achieved with other interface paradigms. The growth in human–computer interaction field has been in quality of interaction, and in different branching in its history. Instead of designing regular interfaces, the different research branches have had a different focus on the concepts of multimodality rather than unimodality, intelligent adaptive interfaces rather than command/action based ones, and finally active rather than passive interfaces. (Stuart, Moran, & Newell, 1980).

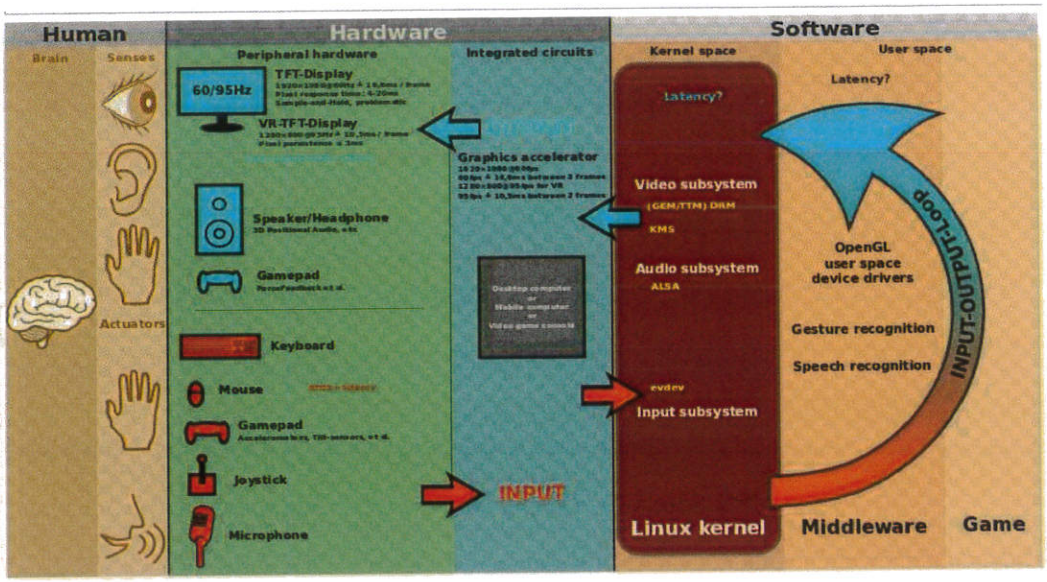


Figure 2.5 Human–computer interactions (Stuart, Moran, & Newell, 1980)

2.4 PROTOTYPING TECHNIQUE

Prototyping is a technique for building a quick and rough version of a desired system or parts of that system. The prototype illustrates the system to users and designers. It allows them to see flaws and invent ways to improve the system. It serves as a communications vehicle for allowing persons who require the system to review the proposed user interaction with the system. For this purpose it is far more effective than reviewing paper specifications. (Houde & Hill, 1997).

There are four steps to successful prototyping: (Jones & Richey., 2000)

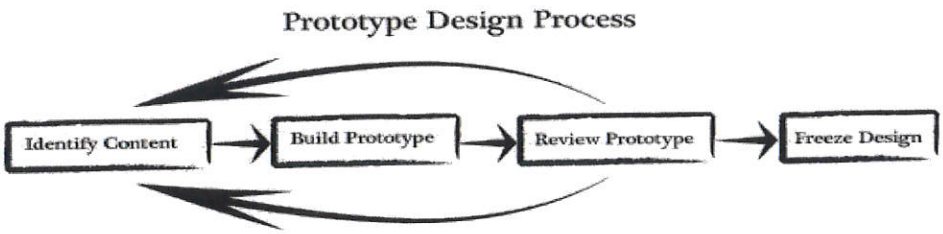


Figure 2.6 Prototype Design Process (Houde & Hill, 1997)

1. **Identify prototype content** - What salient features of your design do you want to test? What do you hope to learn about your design? Select a minimal amount of content to prototype.
2. **Build prototype** - Using the methods described below, build a prototype of your concept.
3. **Review prototype** - Evaluate your prototype on pre-determined standards. Does the prototype provide insight into your design? Are all stakeholders satisfied with the results? If not, return to steps 1 and 2.
4. **Freeze design** - Once all stakeholders and designers are satisfied, cease adding new features and begin development of the pilot, or beta, version of the instruction.

Benefits of prototyping are as follow

a) Prototyping introduces early reality testing into a project. The users can see what is being built for them and critique it.
b) It encourages users to contribute creative input into the design process.
c) Prototypes can generate excitement and improve the morale of the users and developers
d) Prototypes are valuable for communicating what is required to programmers.
e) Prototypes provide users with early experience with the system and may be used as training tools.

2.5 MICROCONTROLLER

A microcontroller (MCU for *microcontroller unit*) is a small computer on a single integrated circuit. In modern terminology, it is similar to, but less sophisticated than, a system on a chip (SoC); and SoC may include a microcontroller as one of its components. A microcontroller contains one or more CPUs (processor cores) along with memory and programmable input/output peripherals. Program memory in the form of ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips (Augarten, 1983)

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems. In the context of the internet of things, microcontrollers are an economical and popular means of data collection, sensing and actuating the physical world as edge devices. (Augarten, 1983)

Some microcontrollers may use four-bit words and operate at frequencies as low as 4 kHz, for low power consumption (single-digit milliwatts or microwatts). They generally have the ability to retain functionality while waiting for an event such as a button press or other interrupt; power consumption while sleeping (CPU clock and most peripherals off) may be just nanowatts, making many of them well suited for long lasting battery applications. Other microcontrollers may serve performance-critical roles, where they may need to act more like a digital signal processor (DSP), with higher clock speeds and power consumption.

The microcontrollers are characterized regarding bus-width, instruction set, and memory structure. For the same family, there may be different forms with different sources. This article is going to describe some of the basic types of the Microcontroller that newer users may not know about.

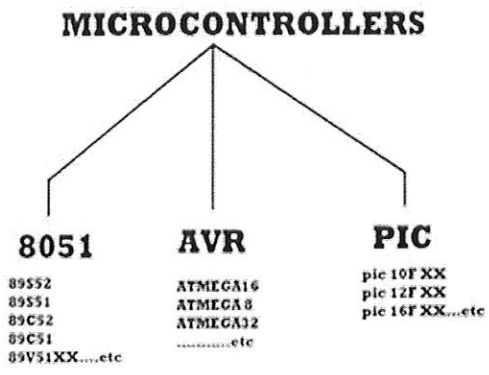


Figure 2.7 Microcontroller classification

2.5.1 Classification of Microcontroller According to Memory Devices

The memory devices are divided into two types, they are

- **Embedded memory microcontroller**: When an embedded system has a microcontroller unit that has all the functional blocks available on a chip is called an embedded microcontroller. For example, 8051 having program & data memory, I/O ports, serial communication, counters and timers and interrupts on the chip is an embedded microcontroller.
- **External Memory Microcontroller**: When an embedded system has a microcontroller unit that has not all the functional blocks available on a chip is called an external memory microcontroller. For example, 8031 has no program memory on the chip is an external memory microcontroller (Augarten, 1983).

2.5.2 Classification According to Instruction Set

CISC: CISC is a Complex Instruction Set Computer. It allows the programmer to use one instruction in place of many simpler instructions.

RISC: The RISC is stands for Reduced Instruction set Computer, this type of instruction sets reduces the design of microprocessor for industry standards. It allows each instruction to operate on any register or use any addressing mode and simultaneous access of program and data.

2.6 RELATED WORK

Oyelami (2008) made an attempt to consult textbooks on Igbo language and an Igbo-English dictionary so as to know the rudiments of the language taught at the elementary level of education. Two existing Web-based e-learning systems were also studied and from the experiences gathered, Igbo e-Learning system was developed using Java and compiled using Netbeans IDE 5.0 and Microsoft Access 2007 as the database.

According to Oyèbádé (2010), there are conventional terms used to denote 'less than' and 'greater than' in the Yorùbá counting system. For instance, in the cardinal context, 'ó dín.../dín ní...' (It reduces/reduces by) is used to count from 15 'mẹ́ẹ̀dógún' (i.e. mú-árùn-dí-ní-ogún meaning twenty lesser than five) to 19 'mọ̀kàndínlógún' (i.e. mú-ọ̀kan-dín-ní-ogún meaning twenty lesser than one). Further states that ogún is the basic word for twenty, okòó the word used when counting objects. According to each of the decades is coded; units in 1–4 are derived by adding to the decade, while units in 5–9 are formed by subtracting from the next decade. The odd decades are derived by subtracting ten

from the next even decade i.e. 'lé ní...' (Increase by...) is used from 1- 4 (i.e. adding to 10) while 'ó dín ní...' (Decrease by...) is from 5 – 9 (i.e. subtracting from 10).

It is also noticed that the influence of tens is not in the number twenty. According to Oyèbádé (2010), the counting pattern, from what is observed from numbers 11 to 14, changes from numbers 21 to 24. "Reference [8]" proceeds that numbers 21 to 24 are counted as mọ́kànlélógún (i.e. mú-ọ̀kan-lé-ní-ogún meaning take one more over twenty), méjìlélógún (i.e. múèjì-lé-ní-ogún meaning take two more over twenty), mẹ́tàlélógún (i.e. mú-ẹ̀ta-lé-ní-ogún meaning take three more over twenty) and mẹ́rinlélogún (i.e. mú-ẹ̀rin-lé-ní-ogún meaning take four more over twenty) respectively. Using Oyèbádé (2010), conclusion from the previous paragraph, the counting of numbers from 25 is '...dín lógbọ̀n' (...less than thirty) which denotes that 25 is 'márùn-ún-dín-ní-ọgbọ̀n/méẹ̀dógbọ̀n' meaning (five lesser than thirty) up to 29 'mọ́kàndínlógbọ̀n' meaning (one lesser than thirty). 30 are ọgbọ̀n. The same procedure is applied in the counting from 31 to 50.

Balogun (2013) examined the low-usage of Yorùbá language among some selected secondary school students in Yoruba land. The paper used questionnaire with cloze test to measure the knowledge of Yorùbá language among respondents in three Yoruba speaking states in south-western Nigeria. The results of the data showed that Yorùbá language enjoys low patronage and patriotism amongst the students used for the data. Many of the students found it extremely difficult to express themselves freely in Yorùbá language and at the same time, they were unable to provide meanings for selected Yorùbá proverbs, words, and expressions. The significance of his work was seen in the fact that Yorùbá language stands the risk of gradual extinction if urgent measures are not taken by all stakeholders concerned to arrest the dwindling fortunes of the language.

Yoruba is a popular indigenous language in Nigeria alongside Hausa and Igbo. (Omoregbe et al, 2014). English language is however the main medium of communication especially in schools and institutions of learning. Over the years there has been unhealthy rivalry and competition between English language and the indigenous Nigerian languages with the latter struggling for survival. The rivalry is further worsen by the wide adoption of mobile technology which is mostly bundled with resources written in English language. Young Nigerians who have not been exposed to Yoruba language as their native language often find it difficult to speak, read, learn and

write Yoruba language. There is the fear of trading Nigerian indigenous languages for English Language as the main means of communication due to modernization. The focus for this work is to present the design and implementation of an interactive mobile application with basic tutorials in the learning of Yoruba language on handheld devices. The system has features that assist users to do basic translation of English to Yoruba and fundamental tutorials that will enable people to learn, write, read and speak Yoruba language fluently. The application was designed and modelled with Unified Modelling Language and developed using HTML5, JavaScript and CSS. The application runs seamlessly on handheld devices which has a deep level of penetration and adoption in Nigeria.

Omotosho et al (2015) proposed the development of a Yoruba language E-Tutor on mobile phones using android platform. The e-learning application developed is simple light-weight mobile based software that can train both kids and adults on the basics of Yoruba language, which is the native indigenous language of people in south western Nigeria. The architecture of the mobile E-tutor for Yoruba language was developed based on three main components. These are the Android application development environment, database design and software design with the use case diagram. Evaluation of the developed mobile app was carried out by distributing questionnaires to 40 participants who installed and explored the app and then rated it based on three criteria (extensibility, ease of use and learning speed). The results obtained showed that 32 out of the 40 respondents (80%) rated the app as above average (excellent or very good) based on extensibility criterion. Similarly 87.5% (35 users) and 77.5% (31 users) rated the ease of use and learning speed above average respectively (Omotosho, Adeyanju, & Odeniran, 2015).

Considering all the earlier reviewed system, they were all done as either online or offline application, which depends fully on computer system or mobile phone (with specific requirements) before it can be used, which implies that prospective users without computer system or specific grade and platform mobile phones will not have access to such application. This proposed system is to work as stand - alone toy (work without either computer or mobile phone), this is to make it easier to teach the kids without computer or mobile phones basics of Yoruba language.

The importance of indigenous languages in the dissemination of information to local people cannot be over emphasized. Abiola *et al* (2015) focused on the perceived benefits of one of the major indigenous languages in Nigeria (the Yoruba language), in the learning and usage of diseases names in health sectors. Machine translation (MT) has been defined as a subfield of computational linguistics that investigates the use of computer software to translate text or speech from one natural language to another. This system employed the use of the direct approach to machine translations in building a bilingual lexicon for English diseases names to Yoruba. The tool has been designed uniquely to provide an easy to use platform for medical practitioners. The effectiveness of the system was evaluated both formally and informally and the implementation was carried out using Visual Basic 6.0. This system will be of immense benefits to people in the health sectors.

Akinwale (2015) proposed the development of an English to Yoruba machine translation due to the fact that the growth of globalization in the world today has increased the rate at which people interact and integrate, which has increased the level of international integration from interchange of world views, products, ideas and other aspects of culture. Language differences therefore pose a major barrier to smooth running of these processes. Therefore there is need for existence of system that will help translate between languages. English is a West Germanic language which has become the lingual Franca in Nigeria and 53 other countries. Therefore vital information are written and spoken in English language in Nigeria. Meanwhile, Yoruba language is largely spoken in Nigeria with over 40 million speakers in the south-western part of the country and also in parts of Benin republic. This research deals with the translation of English text to Yoruba text using rule based method. Twenty two rules were formulated for the translation which is specified using context free grammar. A bilingual dictionary dataset containing English words and the corresponding translation in Yoruba language was used. The research model was implemented with ASP.net and C# programming languages which have been hosted on http://www.naijatranslate.com. The translator was evaluated to have accuracy of 90.5% (Akinwale, Adetunmbi, Obe, & Adesuyi, 2015).

Abiola *et al* (2015) reviewed various approaches for text to text machine translation. According to him, Machine Translation (MT) is defined as a subfield of computational linguistics that investigates the use of computer software to translate text or speech from

one natural language to another (Abiola, Adetunmbi, Fasiku, & Olatunji, 2014) it is a key application in the field of natural language processing. At its basic level, MT performs simple substitution of words in one natural language for words in another. Effort to access documents from one language to another leads to the development of machine translation system which involves lots of heterogeneous features and its implementations. Approaches to machine translations are different and each of this approach has its own benefits and drawbacks. This study looks at the various approaches to machine translations and future needs in order to provide more robust and sensible system in the area of natural language processing which will be resistant and impervious to failure regardless of users' inputs. It is hopeful that researchers in the area of language processing can make use of our valuable improvement and suggestions (Abiola, Adetunmbi, Fasiku, & Olatunji, 2014)

Safiriyu (2017) designed a multimedia learning system a project that was conceptualized using Unified modelling language (UML) tools. The resulting design and software specification was implemented using Python programming language due to its cross-platform compatibility and PyQt graphical user interface (GUI) module for the GUI. System evaluation was done using questionnaire to determine how the system is perceived by potential users.

CHAPTER THREE

DESIGN METHODOLOGY

3.1 OVERVIEW

The design of the project is divided into four modules which are the power supply, control, display and speech. In this system the AC supply (220-240V) was stepped down and converted to DC (5V) by the power supply unit which then gives supply to all other units. Control units gives coordination of what the display unit will show based on the input of the user and then gives necessary audio signal (speech) out of the speech unit. The system is designed by categorizing the basics of Yoruba languages into levels and each levels has lessons. All the lessons under each level was converted into audio waveform using FL studio.

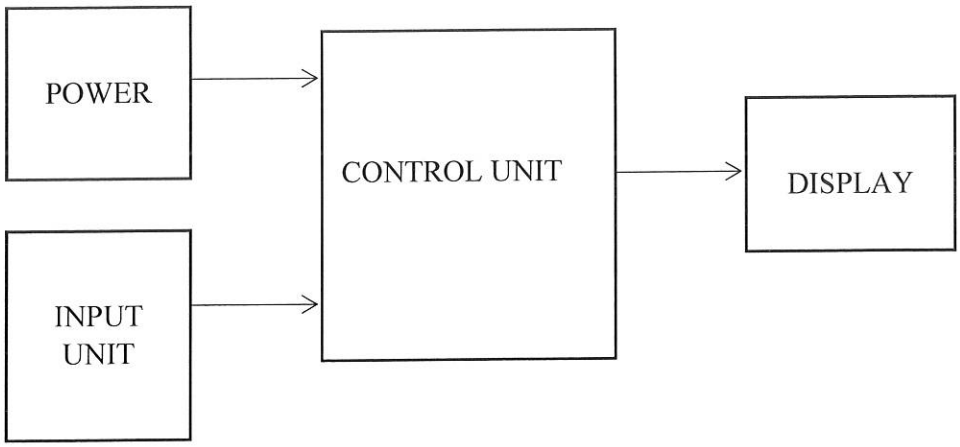


Figure 3.1 Block diagram

3.2 POWER SUPPLY UNIT

A power supply, as we'll be referring to it here, converts alternating current from the outlet on the wall into direct current which is required to power ON the system. In order to get a steady and reliable Direct current (DC) for the system the power unit is developed following these stages;

3.2.1 STEP DOWN STAGE

Alternate Current Input Coming from the wall, the AC alternates from a minimum to a maximum voltage at a frequency of 50Hz between the range of 220 – 240 volts (in Nigeria and other 60Hz countries) is step down through the use of step down transformer to about 22 -24 volts.

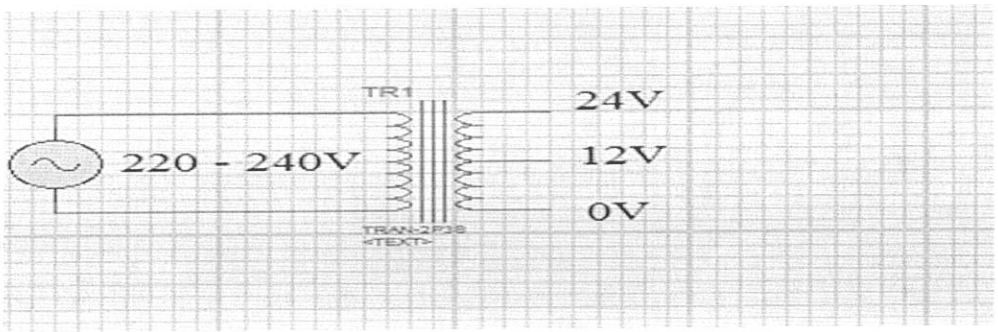


Figure 3.2 Step down transformer

3.2.2 RECTIFICATION

Rectification is the conversion of alternating current (AC) to direct current (DC). This involves a device that only allows one-way flow of electrons. As we have seen, this is exactly what a semiconductor diode does. The simplest kind of rectifier circuit is the *half-wave* rectifier. It only allows one half of an AC waveform to pass through to the load. For most power applications, half-wave rectification is insufficient for the task. The harmonic content of the rectifier's output waveform is very large and consequently difficult to filter. Furthermore, the AC power source only supplies power to the load one

half every full cycle, meaning that half of its capacity is unused. There is a need to rectify AC power to obtain the full use of *both* half-cycles of the sine wave, a different rectifier circuit configuration is used which is a circuit is called a *full-wave* rectifier this is shown in figure 3.

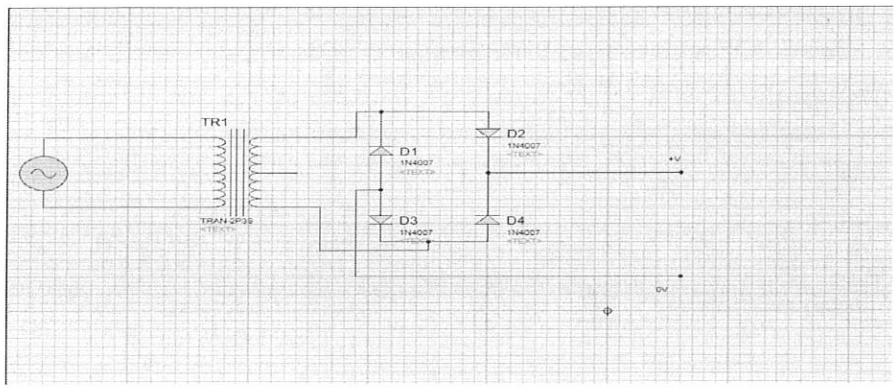


Figure 3.3 Rectification (Full wave rectifier)

3.2.3 SMOOTHING

Now we have at least consistently positive voltage levels, but they still dip down to zero 120 times per second. A large capacitor, which can be thought of like a battery over very short time periods, is installed across the circuit to even out these rapid fluctuations in power. The capacitor charges when the voltage is high and discharges as the voltage is low.

3.2.4 REGULATION

In this stage the smoothed voltage is then controlled to maintain a constant range. For this project I utilize two voltage regulators LM7805 and LM7812 which are to regulate the voltage to 5V and 12V respectively.

- 5V to power the micro controller, light emitting diodes (LED), Liquid crystal display (LCD).
- 12V to power the relay

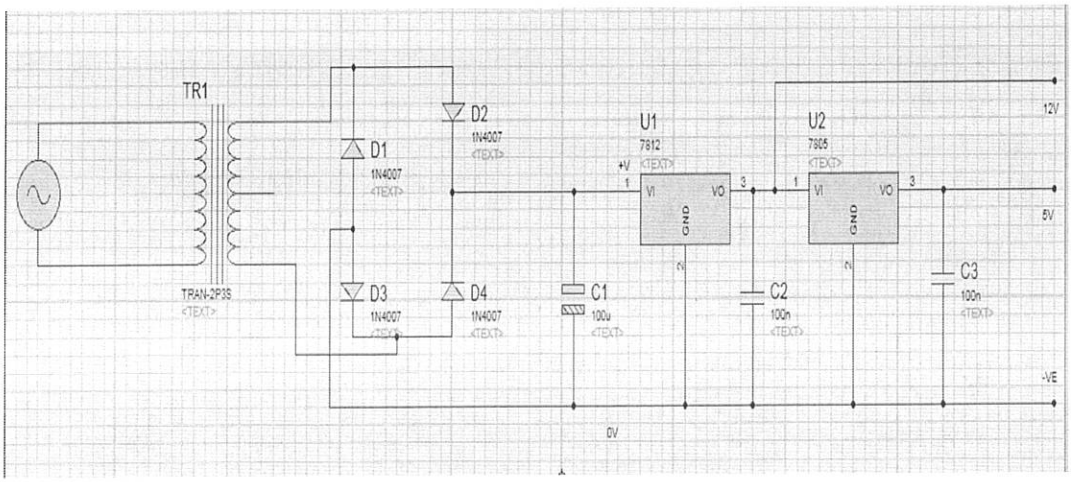


Figure 3.4 Power Unit

3.3 CONTROL UNIT

This unit is to coordinate the perception from the sensor and activate the signal to power the pumping machine through the relay. The microcontroller ATMega328 is used in the design. ATMega328 is a high-performance Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI

serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts (Atmel Cooporation, 2000).

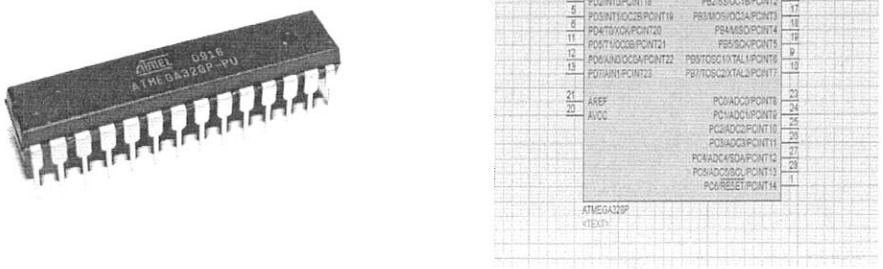


Figure 3.5 (a) ATMega328 microcontroller (b) Pin diagram

3.4 INPUT UNIT

This input unit is consisting of six (6) buttons, there functions are as follows:

a) Demo button: performs a demo where the Yoruba alphabets are played using an audio feedback that describes how to pronounce the Yoruba alphabet.

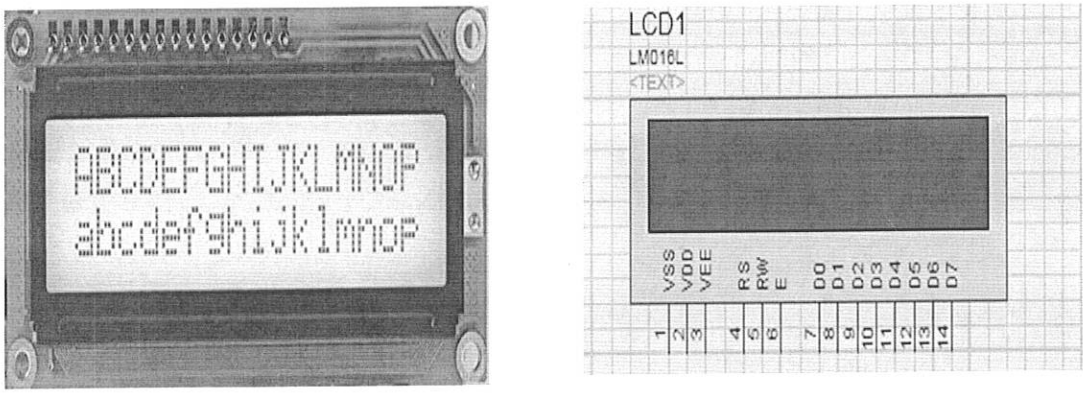
b) Set button: is used to select which of the lesson to play out as audio feedback

c) Cancel button: used to cancel out any wrong input by the user.

d) Increment & decrement button: are both used to increase or decrease from one lesson to another

3.5 DISPLAY UNIT

LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pin outs have already been visualized above now let us get a bit technical.16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD and 16×2 will be used to implement the propose project to display the level selected and the input data.



The LCD screen the pin diagram

Figure 3.6 (a) The LCD screen (b) Pin diagram

3.6 SOFTWARE COMPONENTS

Software development of this project involves series of steps, which involves set of activities that are necessary to be taken for the development of reliable and maintainable software.

The software coding of the project was done following the Figure 3.7

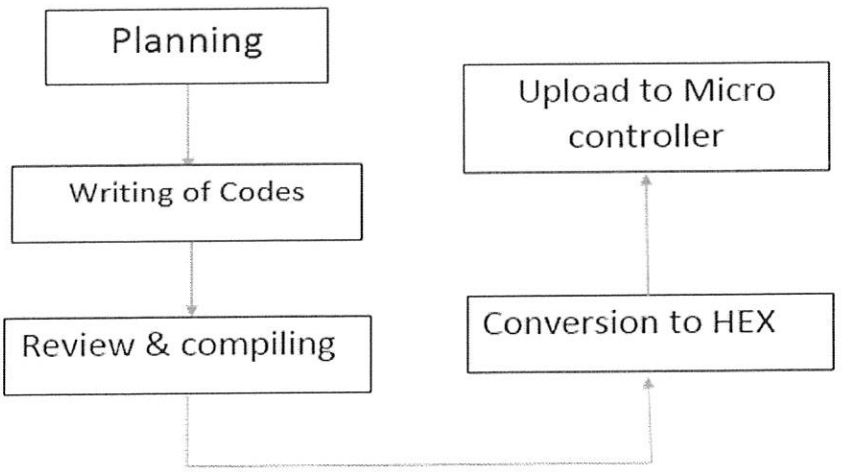


Figure 3.7 Software coding sequence

The Software which have used for this project is "Proteus" version 8.1. Proteus is one of the user friendly software in simulation world. For both electrical and electronics based circuit simulation and implementation can be done very easily with this software. Before starting the implementation and the simulation of the project circuit it is necessary to make an algorithm. Because a fruitful algorithm can makes the path easier to implement a circuit both virtually and practically.

3.6.1 Development Process

In writing the software for this project, a modular approach was employed. This made it easier to check for errors and debug the program. Arduino IDE version 1.8.3 was used, because of its multifunctional abilities which include:

- Text Editor
- Compiler
- Linker
- Loader and Testing

3.6.2 System Control and Programming Steps

The operation of the Yoruba robotic tutor system is summarized as follows;

i The display unit display the present status of the system

ii Button was introduced in order to allow the user to interact with the system

iii Speaker was used in order to allow user to hear the output information from the Yoruba robotic tutor.

iv External memory was introduced with the Yoruba robotic tutor in order to store the audio files which are too heavy for microcontroller's memory.

3.6.3 Arduino Programming IDE

Arduino is a cross-platform application written in the programming language Java. That provides an open-source and easy-to-use programming tool, for writing code and uploading it to your board. It is often referred to as the Arduino IDE (Integrated Development Environment). It includes a code editor with features such as text cutting and pasting, searching and replacing text, automatic indenting, brace matching, and syntax highlighting, and provides simple *one-click* mechanisms to compile and upload programs to an Arduino board. It also contains a message area, a text console, a toolbar with buttons for common functions and a hierarchy of operation menus A program written with the IDE for Arduino is called a *sketch.* (Kushner, 2011) Sketches are saved on the development computer as text files with the file extension *.ino.* The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. The implementation programming language for this project is a C programming reason being the fact that C combines the element of high-level language with functionalism of assembly language. C is a structured programming language which allows a complex program to be broken into simpler programs called functions. It also allows free movement of data across these functions. C language has rich libraries which provide number of built-in functions. It also offers dynamic memory allocation. (Kushner, 2011)

3.6.4 Fruity loops Studio (FL Studio)

FL Studio (formerly known as Fruity Loops) is a digital audio workstation (DAW) developed by the Belgian company Image-Line. FL Studio features a graphical user interface based on a pattern-based music sequencer, speech generator and waveform editor. The program is available in four different editions for Microsoft Windows, including Fruity Edition, Producer Edition, Signature Bundle, and All Plugins Bundle. Image-Line offers lifetime free updates to the program, which means customers receive all future updates of the software for free. Image-Line also develops FL Studio Mobile for iPod Touch, iPhone, iPad and Android devices.

FL Studio can also be used as a VST instrument in other audio workstation programs and also functions as a Rewire client. Image-Line also offers other VST instruments and audio applications. In this project FL Studio was used to generate text to speech and exported as a waveform.

3.7 SYSTEM OPERATION

The system operations algorithm is a detailed series of instructions for carrying out an operation of the system, the system flowchart are connected by lines that show the directions of flow. Text inside the symbol describes its specific functions.

Step 1: Start.

Step2: Initialize the system

Step3: Display request for input

Step3.1: check the level selected

Step4: Check ALL button

Step4.1: If ALL button selected play all

Step4.2: else go to step3.1.

Step5: Display request for number of lesson

Step5.1: Play the waveform of the lesson selected

Step6: Sense Demo button

Step6.1: If Demo button is pressed Play Demo

Step6.2: Else go to step3

Step7: Stop.

Figure 3.8 Algorithm showing how the system operates.

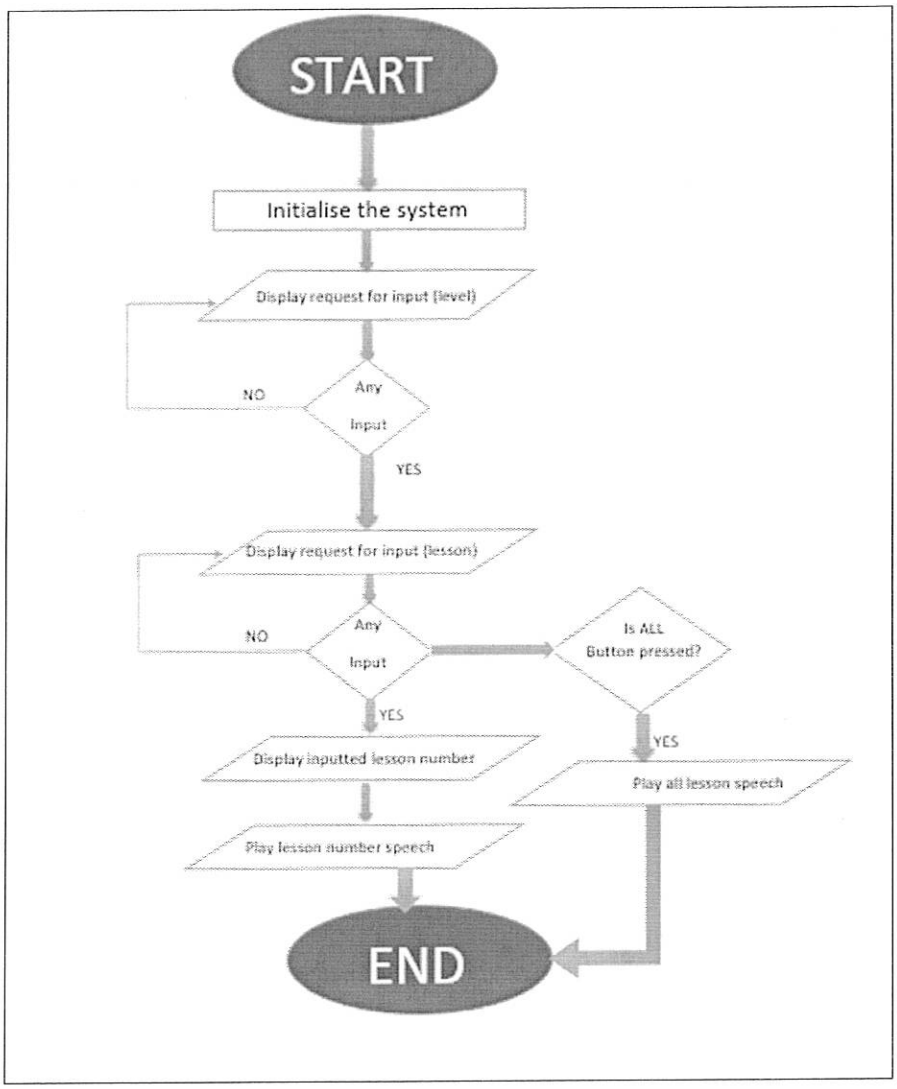


Figure 3.9 system flowchart of Yoruba language tutor

3.8 QUESTIONNAIRE DESIGN

The questionnaire design was divided into three parts: the introduction to the questionnaire, background information of the user and the performance metrics rating from excellent to poor (5 scale rating). The following parameters were rated:

a) **Functionality**: is the ability of the system to do the work for which it was design for.

b) **Reliability**: reliability of a product is defined as the probability that the product will not fail throughout a prescribed operating period.

c) **Ease of use**: usability is the ease of use and learnability of a human made object such as tool a tool or device.

d) **Efficiency**: a system has to be effective and efficient for the highest utility to the user of the system, or effectiveness is a measure of the goodness of the output, while the efficiency is a measure of the productivity.

e) **Portability**: is a characteristics attributed to a computer program if it can be used in an operating system other than the one in which it was created without requiring major rework.

f) **Response time**: is the time a system or functional unit takes to react to a given input.

g) **Audio Clarity:** is typically an assessment of the accuracy, fidelity, or intelligibility of audio output from an electronic device.

CHAPTER FOUR

IMPLEMENTATION AND RESULTS

4.1 SIMULATION TEST AND RESULT

Proteus software version8.1 was used for the simulation of the project which enables me to be able to know the interaction of the hardware with the software before the implementation in order to reduce damages of the components. The arduino IDE version 1.83 was used to type and compiled code and also used to generate HEX files which were uploaded to the ATMega328 integrated circuit on proteus in order to perform the simulation.

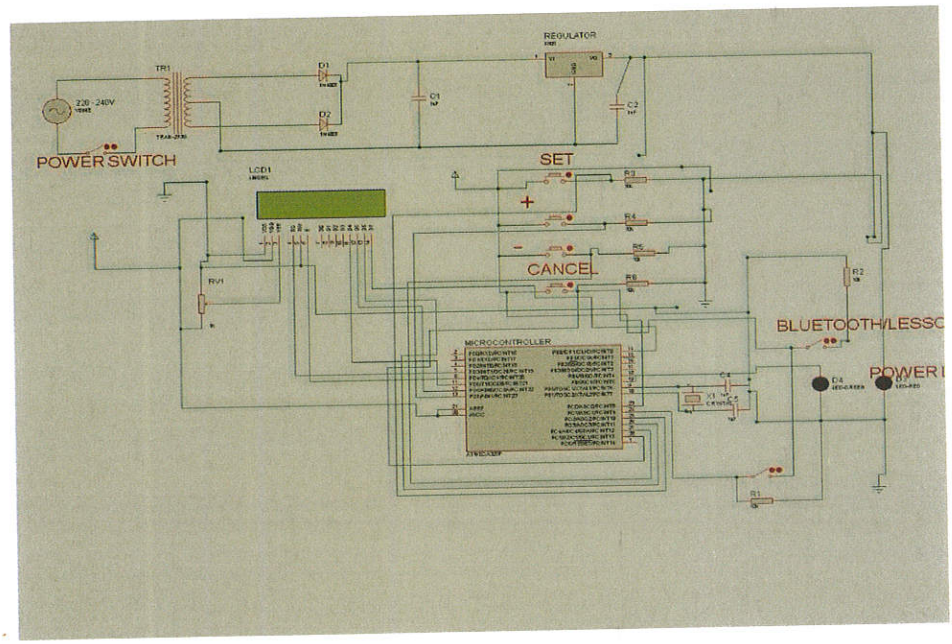


Figure 4.1 Circuit design

4.2 HARDWARE IMPLEMENTATION

For the power supply 12-volt 1.2 amps rated transformer was used for this design, a full wave rectifier circuit was design using four diodes (IN4001). This value of diode is used here because from the specification of voltage/diodes rectifying data books this value is adequate for lower voltage say 0.24 volt current =1 amps therefore 1.27 amps is the maximum load current that can be drawn in the whole system. Also it is known that after rectification, the same voltage (12 volt) continues to flow, after the voltage is

step down to 5-voit using a voltage regulator LM7405. The implementation was done through these connections:

- Micro controller (ATMega328) was connected with 28pins IC socket (to avoid direct soldering of IC on the board). Vcc of the micro controller was connected to the 5V of power supply and GND to the negative terminal of power supply. Crystal oscillator 16MHz was connected to the pin 9 and 10 with 22pF capacitor to ground it. AREF and AVCC was connected to 5V of the source to measure AC input through the analog pin. A reset button was connected to pin1 of the IC with 10kΩ resistor one end connected to pin1 and the other end to 5V source to reset the microcontroller in case of error.

  Liquid Crystal Display (LCD) was connected as follows

  * LCD RS pin to digital pin D2
  * LCD Enable pin to digital pin D3
  * LCD D4 pin to digital pin D5
  * LCD D5 pin to digital pin D6
  * LCD D6 pin to digital pin D7
  * LCD D7 pin to digital pin D8
  * LCD R/W pin to ground
  * LCD VSS pin to ground
  * LCD VCC pin to 5V
  * 10K variable resistor:

  Ends to +5V and ground and wiper to LCD VO pin (pin 3)

- The buttons was connected to the analogue pin of the microcontroller from A0-A5.
- Power indicator LEDs was connected to 5V from the voltage regulator with 220ohms resistor to reduce current flowing into the LED

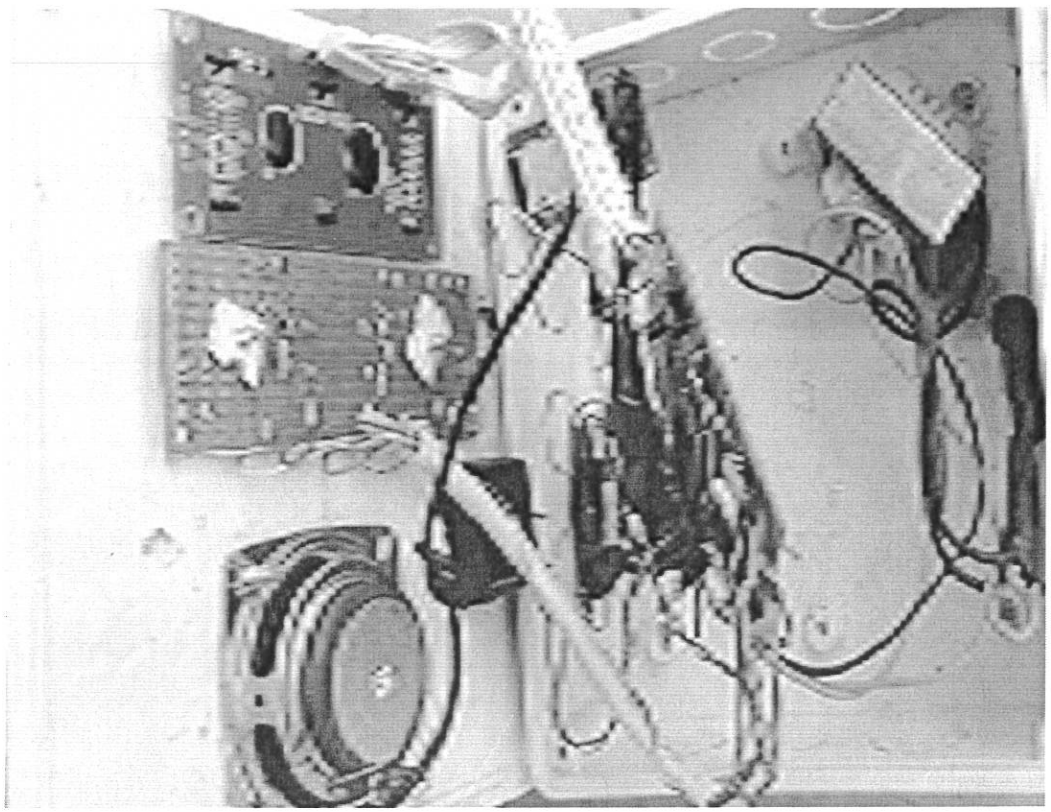


Figure 4.2 Coupled Hardware Components

4.3 SYSTEM TESTING

The overall system consisting of integrated design, testing and integration was tested to ensure that the design is functioning properly. However, this involves checks made to ensure that all the various unit and subsystem function adequately also there has to be good interface existing between the output/inputs unit subsystem.

4.3.1 Component Test

Similar component like resistor were packed together. The other component include capacitor, switch, transformer, resistor, Diodes (rectifier and LEDs), transistor, voltage regulators etc. Reference was made to colour coding data sheet to ascertain the expected

value of resistors used. Table 4.1 below showed each resistor was tested and the value read and recorded.

Table 4.1 Resistor Test

RESISTOR	DIGITAL MULTIMETER VALUE
1KΩ	1.0KΩ
10KΩ	9.9KΩ
220Ω	219Ω

4.3.2 Test For Transistors

For transistor test the DIMM was switched to the diode range. The collector, base, emitter junctions were tested in the following order. The collector, emitter and base pins were gotten from the data analysis on power transistor.

Table 4.2 Test for Transistors

Sequence of test	Black probe	Red probe	Values on multimeter
1st test on pins	collector	Base	705.21
2nd test on pins	Emitter	Base	710.24

4.3.3 Transformer Test (Step Down)

Expectedly the transformer was rated 220v/12v, 1200mA. From the mains power supply, the primary coil receives 223v input, the output was measure to be 17.75v using a Digital Multimeter. Test data on transformer has it that the resistance of the primary windings for step down transformer is higher than that of the secondary sides this was ascertained.

Table 4.3 Experimented result and actual result of the component

COMPONENT	EXPERIMENTED VALUE	ACTUAL VALUE	UNIT	TOLERANCE
REGULATOR	5.00	5.02	Ω	
TRANSFORMER OUTPUT	12Vac	13.2	V	
TRANSISTORS	Rbe 520 Rbc 510	550 548		
CAPACITORS	10 10	10.20 10.15	F	
RESISTORS	1000 2000 220 1000	1000 2000 218 9980	Ω	5%

Table 4.4 Input and Output Test

S/N	DEVICE	RESPONSE	DELAY
1	Power switch	Active	0s
2	Demo button	Active	5s
3	Cancel button	Active during selection of lesson	2s
4	Set button	Active during selection of lesson	2s
5	Increment button	Active during selection of lesson	2s
6	Decrement button	Active during selection of lesson	2s
7	Speaker	Active during selection of lesson (volume 6)	0s

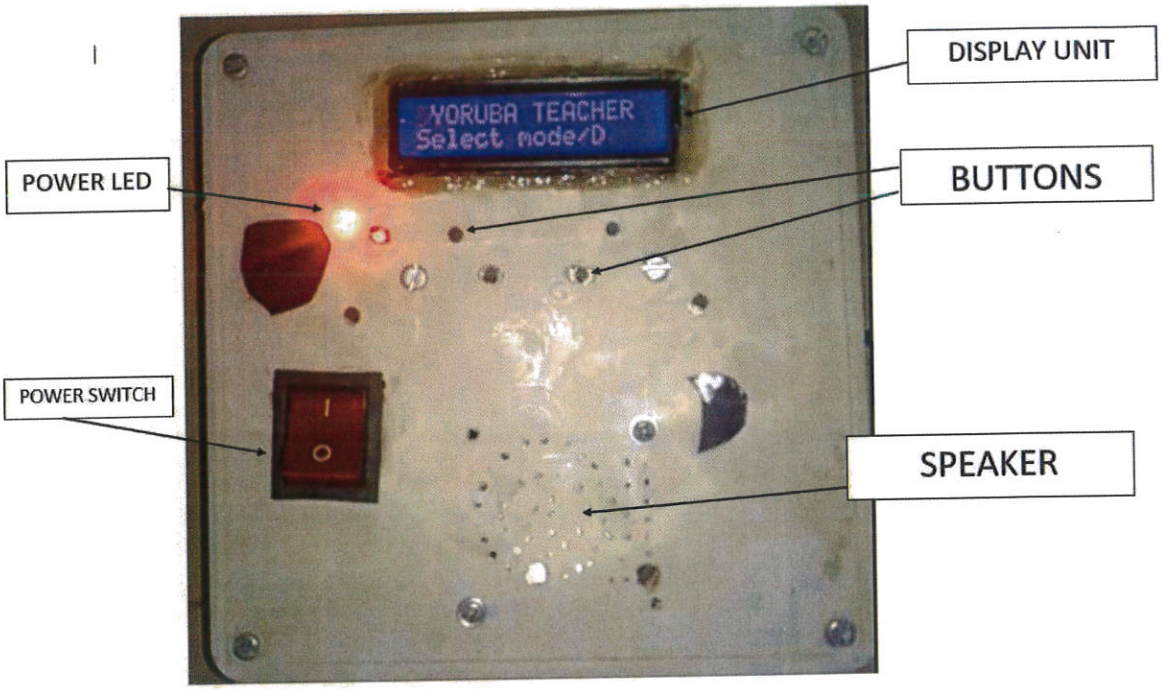


Figure 4.3 Yoruba Language Tutor System

4.4 PERFORMANCE EVALUATION

From the data below and chart, it shows the administered questionnaire to collect users assessment of the developed system based on performance parameters, the questionnaire was distributed among the students and the system was also tested and the students were able to rate the system performance base on the following parameters which includes functionality, reliability, ease of use, efficiency, portability, response time, audio clarity of the system. From the collated data it shows the following details in the table below.

Table 4.4 Analyzed data from the questionnaire responses

S/N		**Excellent**	**Very good**	**Good**	**Fair**	**Poor**
1	**Functionality**	7 (21%)	16 (48%)	10(30.3%)	0 (0%)	0 (0%)
2	**Reliability**	8 (24%)	11 (32%)	15 (44%)	0 (0%)	0 (0%)
3	**Ease of use**	12 (34%)	14 (40%)	9 (26%)	0 (0%)	0 (0%)
4	**Efficiency**	8 (24%)	14 (41%)	12 (35%)	0 (0%)	0 (0%)
5	**Portability**	11 (32%)	14 (41%)	9 (27%)	0 (0%)	0 (0%)
6	**Response time**	11 (32%)	10 (29%)	6 (18%)	7 (21%)	0 (0%)
7	**Audio clarity**	4 (12%)	5 (15%)	7 (21%)	16 (49 %)	1 (3%)

A total number of thirty five (35) of user which comprises of both male and female used the system to rate the performance of the system based on the performance parameters. From the below chart it can be deduced that based on functionality very good has the highest rating with 48% user rating the device functionality, while 44% rate the device good based on reliability, while 34% user rated the device excellent based on ease of use, 35% of the user rated the device good based on how efficiency, 41% rated it very good based on portability, 32% rated it excellent based on response time while 49% rated it fair based on audio clarity.

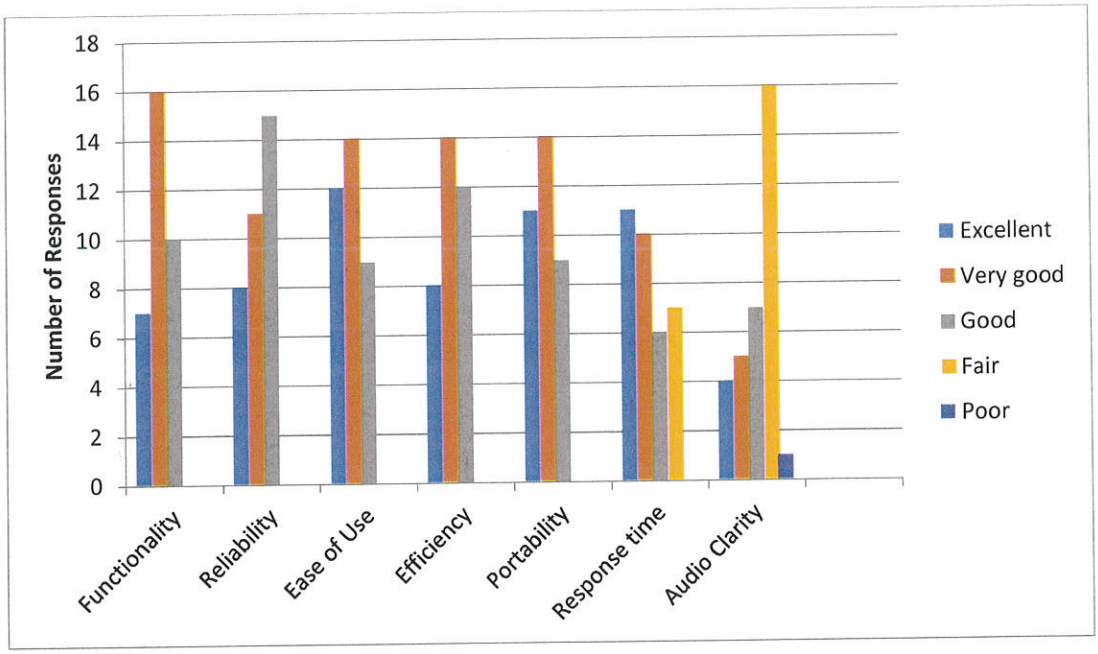


Fig 4.4 column chart for the user evaluation responses.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The project work was carried out to emphasize the importance usage of indigenous language in teaching and learning procedure for early childhood education to the younger age. Importance of mother tongue the first language of a child is part of their personal, social and cultural identity. One of the impacts of indigenous is that it brings about the reflection and learning of successful social patterns of acting and speaking. it is important to understand what it means to be a "non-native" speaker and the implications that it can have on one's life. Indigenous language has a very powerful impact in the information of the individual thought, emotion, psychological behaviour and personality. Indigenous language is an indicator of cultural identity: A child connects to his parents, family, relatives, culture, history, identity and religion through his mother tongue and it links the child with the culture of the society.

5.2 PROBLEMS ENCOUNTERED AND POSSIBLE SOLUTION

During the course of designing this system there was series of problem encountered during the means of achieving the desired goals of this project which includes:

- Some parts require re-designing even the circuit board was changed two times for more accuracy, neatness and functionality.
- Software debugging also created a bit of the problem as the timing of the simulation was very different from real time.
- There was limitation of microcontroller memory as the maximum memory for ATMega328 is 32KB. The functions has to be reduced because of several library function required to be imported.
- Power supply was not very available in Ikole Ekiti (Maximum of 12hours in a week), which actually slow down the implementation process.

- Bluetooth was introduced to make interaction with the project easier using mobile phones to communicate with it but due to low memory it has to be removed.

5.3 RECOMMENDATIONS

No system is 100% accurate neither perfect, the accuracy and the performance can be improved

- Using a larger LCD display
- Developing a robotic toy of the system with more functionality and moving parts
- Adding more words to the program alongside with its Yoruba meaning with more features like moving part, animation, moving object to encourage and attracts the kids.
- And the memory size can also be expand so as to enable Bluetooth module to be add to it as part of it functionality for communication between my prototype and mobile phones.

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APPENDIX (A) QUESTIONNAIRE

EVALUATION QUESTIONNAIRE

FEDERAL UNIVERSITY OYE-EKITI, EKITI STATE NIGERIA,
DEPARTMENT OF

COMPUTER ENGINEERING.

PROJECT TOPIC: Development of a Yoruba Language Robotic Tutor for Kids.

Dear Sir/Madam,

I am a final year undergraduate from the Department of Computer Engineering at the Federal University Oye-Ekiti, Ekiti State.
My project aim to emphasize the importance usage of indigenous language in teaching and learning procedure for Early Childhood Education to the younger age, Importance of mother tongue the first language of a child is part of their personal, social and cultural identity. One of the impacts of indigenous is that it brings about the reflection and learning of successful social patterns of acting and speaks.

Please be assured that your responses will be kept confidential and will only be used for academic purposes.

I sincerely thank you for your valuable time!

PART ONE: BACKGROUND INFORMATION

Please provide the information as required below by ticking (√) in the appropriate box.

AGE: 17 and below ( ) 18-24 ( ) 25-40 ( ) 41-60 ( ) 60 and above ( )

GENDER: Male ( ) Female ( )

OCCUPATION: Self-Employed ( ) Civil Servant ( ) Others ( )

HIGHEST ACADEMIC QUALIFICATION:

NCE ( ) ND/HND ( ) BSC ( ) M.Sc. ( ) Ph.D. ( )

PERFORMANCE METRICS	EXCELLENT	V. GOOD	GOOD	FAIR	POOR
Functionality					
Reliability					
Ease of use					
Efficiency					
Portability					
Response time					
Audio clarity					