Chapter 3

Methodology/Approach of the Capstone Project.

A more experimental approach with the use of human subjects would be ideal for adequately meeting the objectives this research paper seeks to achieve. Thus, this chapter gives a detailed overview about the measures that would be taken in successfully completing the project. The significant themes considered in this chapter involve; the materials used in the research, the samples gathered, the techniques used in sample preparations, as well as every other important aspect of the experiment for the study.

The experimental approach considered for this research involves recording the audios from a group of human subjects and then proceeding to test these audios based on configured speech recognition systems. To examine if or how accents affect the interpretation of speech recognition systems. Firstly, the materials and equipment needed for this research involve, audio recorders, open source codes of speech recognition systems, a quiet area and human subjects. The audio recorder is to record the participants adequately as well as play the recordings to the configured speech recognition systems.

The sample techniques for this research would be systematically selected, and then a more stratified approach would be adopted. This sample techniques would be seen below in the selection and grouping of participants for the experiment.

For the collection and grouping of the participants, several activities such as the following would be performed. The first task involves identifying the nationals of the participants that would be adequate for the research. For this task, some African countries have been selected based on the scope of the study to aid in this experiment. This selection of African countries was in no way

random; it was instead done based on the availability and diversity of the countries present in the location of the participants. The countries for this research include, Nigeria, Ghana, Rwanda, Zimbabwe and Kenya. After the Identification of the following countries, the next task involves determining the age grades of the participants. Since the participants would be freshmen college students, the average age of the students or the age grade of the students are between the ages of 17-21. The next step to take in the grouping and selection of the participants for the project is the fact that, the participants are to sign a consent form stating that they are willing to cooperate to the success of this research.

After the identification of several underlying basis of the experiment, the grouping of the participants would be next. The grouping of participants would be a more stratified form of grouping as the participants would be originally grouped according to their nationalities. The next form of stratified grouping for this experiment involves grouping each participant based on gender. The gender-based grouping is for the existence of gender balance as gender also affects speak variability with accents. The next step in grouping of participants is to randomly select participants based on gender and nationality. After this, a list of the participants which would undertake the experiment would be made.

Another form of selection and grouping of participants involves the volunteered selection. For the purpose and objectives of this research to be met, students who may be willing to be part of the research can volunteer as human subjects in the experiment. During this volunteering task, the students would have to come from the selected countries considered for the research as well as the existence of gender balance and signing of consent forms before they are eventually chosen.

The next phase of the experiment involves the accumulation of data. In this phase, sentences and words adequate for the experiment would be created for the participants to memorize and further

speak. After speaking, each participant would be recorded, and these records saved. The records or the data would be saved based on each nationality and gender. That is, for each participant, his/her recordings would be saved as **Subject A from Nigeria and Male**. By doing this, it would aid in adequately understanding the kinds of accents subject to a gender and country. It would also help when the results of the experiment occur, as it would tell how the accents of this gender and this country affect English speaking speech recognition systems.

The next phase of the research involves identifying the speech recognition systems that would be used. For this phase, firstly, open source speech recognition systems would be searched for and considered for the purpose of the research. Although specific speech recognition systems such as IBM speech recognition system, Microsoft's Cortana, Google's Hello Google and CMU are already considered or set for use during this experiment, the availability of other open source speech recognition systems would give room for additions to the already existing speech recognition systems. After acquiring the speech recognition systems for the experiment, the next step is to configure these speech recognition systems. The configuration of this speech recognition systems would be done by editing the various recognition systems to suit the purpose of the research as well as being made perfect for the experiment.

Moving on to the testing phase, this aspect of the experiment would be done for each of the available nationalities as well as each of the available gender. This phase involves playing each participant's recording, to each speech recognition system. That is, playing Male Subject A from Nigeria's tape, to the configured IBM recognition systems, Google's Hello Google, Microsoft's Cortana and the configured CMU recognition systems. This task would be done throughout a certain period and may be done more than once to provided authenticity to the recorded results throughout the experiment and at the end of the research.

The final phase of the research is the research finding and conclusions. From the experiments, the results that would be gathered would seek to provide some form of answers to the research question which is "how does the African accent affect English speaking speech recognition systems". As well as identify to what extent the fulfillment of this research and if there are any contradicting conclusion, different from what may have been assumed from related work. This result would also show the different variations in African accents, as well as how gender may also affect how the speech recognition systems would work.