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Chapter - 1

Field and Laboratory Investigations Carried out in the Underground Metro Rail Corridors

Lilly R and Prabhakaran. S

Abstract

The subsurface construction requires greater skill and precautions for the effective execution. Each operation includes specific procedures as per Indian standards. There will be both field and laboratory investigations. Proper sampling procedures has to be adopted before carrying out the laboratory investigations. Understanding the geological features below the surface are very important for the sampling. As per the classification given in the standard Indian charts the observation has to be done and it will recorded as log report. This paper makes an attempt to explore the Field and laboratory investing carried out in the soil before the massive constructions below the surface of the ground.

Keywords: Soil, sampling, standard penetration test, boring, field test, laboratory test, permeability

Introduction

Investigation at the site are very important to reveal the status of the subsurface of any construction [1]. Exploration of the soil is done to identify the profile of the soil. The sampling procedures and its determination of engineering properties founds to be crucial [4]. Disturbed samples are taken in the hard-core deposits and it is purely depends on soil structure. Undisturbed samples has to be taken without affecting soil composition matrix and the laboratory tests are conducted in the sample [3]. Various loads such as water, temperature and structural loads will be the factors that brings changes in the geological conditions. Hence Field and laboratory investigation are very much required to encounter the soil conditions [1]. In any design and construction soil investigation plays a vital role [2]. The purpose of soil investigation relies in the soil stabilization and the properties needs to be removed and include are clearly examined [5]. Soils bearing capacity is a crucial parameter which determines the stress in between the foundation and soil which causes the

shear failure in the soil [6]. The procedures of sampling has to be conducted with proper rigs and equipment. The bore holes has to be numbered properly and observations are made at regular intervals [7]. These literatures explains the importance of field and laboratory investigations.

Preliminary requirements

The requirements are classified under two categories. The first category falls under the developed area and the other one is the underdeveloped one. In developed areas, underground establishments in the form of drainage, trial pits, boreholes, and the types of foundations, etc. will be explored, its effect on the investigation will be analyzed. In general, the complete topography and the existing soil conditions have to be studied. The data concerned about the reconsolidation are very important because it will give information related to the recent excavations made in the locality.

History of the locality is very important in terms of using the ground for a particular purpose like quarries, brick, mineral workings, and ballast pits, etc. The usage of the ground changes the characterization of the soil present in the ground. Water level data is an important assessment while going for the investigations in the soil. The existing water stream sources and the influence of the wells have to be studied well before digging the test pits. The data regarding existing pipelines of the water network and the drainage networks has to be studied. This will be helpful not to damage the existing network system.

Care should be given to the instruments used for the investigation. The instruments which are used for the investigations should be properly calibrated and they should be free from errors. The accuracy and precision of the instruments are very important for reliable field information. Depends upon the soil strata condition, soil exploration methodologies will be different. For hard surfaces, the basting technology may be used for exploration. In that case, the general clearance from the local bodies has to be done then the exploration is applied.

Bore holes

Bore holes have to be taken with proper care in the ground. The specific design and dimension of the hole has to be with proper code of practice IS: 1892. Bore hole samples which are taken out from the bore holes should represent the profile of the ground, its stratification, strength and nature of the ground. If the standard penetration test shows the value above 100 in before of the specified depth it reached in boring, then further the boring will be proceeded by chiseling. During chiseling operation, the rock fragments will

be collected. When the standard penetration test ends with the soil strata and the desired depth is not reached then another SPT test will be conducted in the same soil strata with the required permission from the authorities.

Bore holes installation

Bore holes has to be installed with proper casing. Casing should be efficient enough to hold the bearing capacity of the soil. Care should be taken while driving the casing. In case of Cohesion less soil the casing has to driven in such a way it should not spoil the sample. The depth pf the casing will be 150 mm above the bottom of the bore hole ground. During bore hole installation water levels should be recorded and its availability of strata should be recorded and monitored.

Bore Hole should be properly cleaned with the minimum disturbance to the soil sample. Suitability of boring methods for different soil samples are provided in the below Table 2. Bore holes installation is given in the Figure 1.

S. No.	Boring Method	Soil suitability
1.	Auger Method	Soft to stiff Cohesive Soils
2.	Shell and Auger Boring	All types of Soil but it should be free from boulders.
3.	Percussion Drilling	Gravels, Boulders.
4.	Rotary mud circulation drilling	All types of soils below the ground surface.
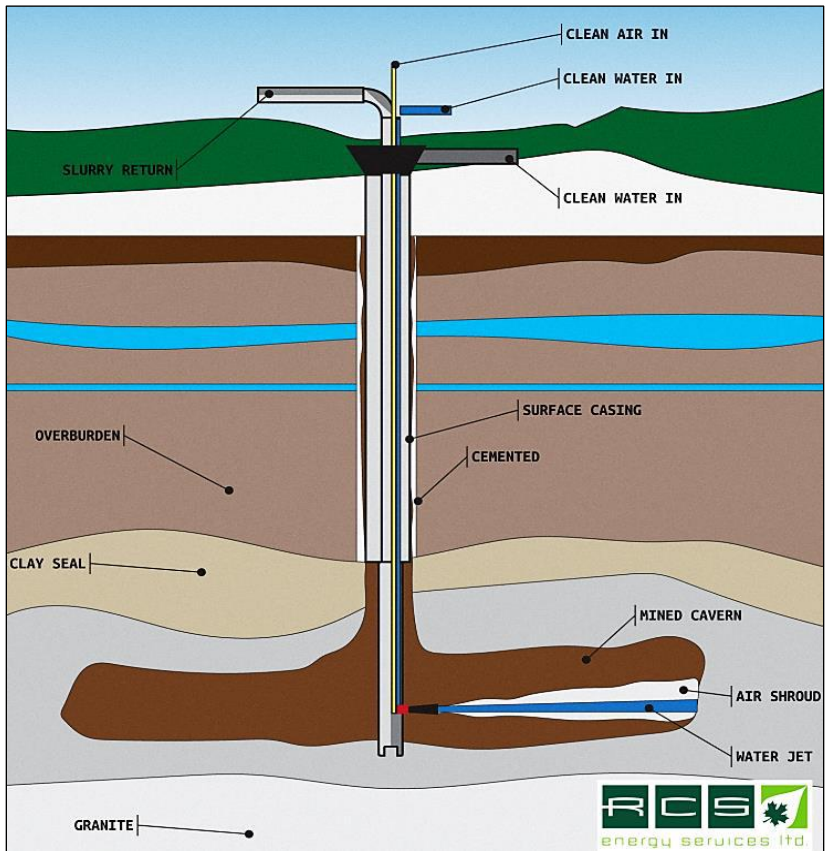
Fig 1: Bore Holes Installation

Soil investigation

Soil Investigation should be comprehensive enough to find the settlement of the structure, bearing capacity of the soil, determination of the scour depth, Aquifer data, the presence of the geological information regarding the faults and fissures. Water table level and engineering properties of the soil determination should be fulfilled by the Soil investigation. In case of rock exploration, the nature of the soil present below the ground should be well studied in terms of weathered soil, availability of rock in isolated manner or massive rock formation and the depth of the rock its variation with the various layers are very important.

Sampling

The samples which are collected from the rock cores will be stored in wooden boxes and it is provided with proper identification. Before testing of

the core samples it will be properly indexed and photographed for the future identification. Similarly for the soil samples, the bore holes at which is rigged, the number of the bore hole and the soil sample classification as per BIS standard will be indexed and photographed before testing accordingly. These are the procedures followed for the disturbed sampling.

For undisturbed sampling, the samples which are collected in the sampler should be properly sealed and waxed if necessary. In the Laboratory the samples are identified using the labels. The labels will provide the information regarding the bore hole number, depth of the bore hole, location and the sample number. Bore log report should be precisely enough to describe all the datas which are necessary to describe the sample extracted from the fields. Those details are like the time at which sample taken, depth and physical condition of the sample will be provided in the sample details. Including that the texture of the sample, its colour and weathering details also provide n the bore log report. The procedures of drilling and handling the samples will be according to the guidance of IS: 1892. Diamond core drilling is adopted for rocky strata and the disturbed sampling is done by split spoon sampler. Various Indian Standard Codes adopted for the soil investigation are shown in Table 1.

S. No.	Indian Standard Code	Purpose
1.	IS:1080	Design of Spread Foundation.
2.	IS:1498	Soil identification.
3.	IS:1892	Sub Surface Investigation.
4.	IS:1904	Foundation Design and Construction.
5.	IS:2131	Procedure of SPT test.
6.	IS:2132	Sampling of thin wall tube.
7.	IS:2809	Soil Dynamics Glossary.
8.	IS:2911	Pile Foundation Design and Construction.
9.	IS:2950	Raft Foundation Design and Construction.
10.	IS:8009	Foundation Settlement Calculation.
11.	IS:8763	Procedure for undisturbed Sampling.
12.	IS:8764	Strength Index of rock determination for point load.
13.	IS:9179	Rock Specimen preparation to test in the Laboratory.
14.	IS:9640	Split spoon Sampler specifications.
15.	IS:4453	Exploration of drills, pits and trenches.
16.	IS:5249	In-Situ dynamic properties of soil determination.
17.	IS:6403	Allowable bearing pressure determination for shallow foundation.

18.	IS:6935	Water Level determination in the bore hole.
19.	IS:12070	Shallow foundation design and Construction.
20.	IS:2720	Laboratory investigation procedure for Soil, Consolidation test.
21.	IS:4078	Storage and indexing of drill cores.
22.	IS:2131	SPT test methodology.
23.	IS:1892	Investigation on sub surface for foundations.
24.	IS:6926	Drilling with diamond drill.
25.	IS:5529	Permeability test (In-situ) procedure.

Field investigations

Field investigations and its procedures of operating depends upon the geological features present in the sub surface of the ground. For hard surface drilling operation done as per the standards. For the depth up to 200m, conventional drilling will be practiced. For the different types of rock, different drill bits are used. For harder rock, diamond is used. For softer rock, tungsten chips are used as drill bit. Clean water is used as drilling fluid. In the supervision and proper safety sometimes bentonite is used as drilling fluid. Proper observations are done at regular intervals to find the changes in the geological feature.

In-situ permeability and pump in test

In situ is conducted to find the water percolation capacity of the overburden soil. It is conducted as per the procedure of ARE: 5529, Part II. While boring, bentonite slurry should not be used. The ground water level and the conditions of the soil decides the method to be adopted for the permeability test.

Permeability test

Field permeability Lugeon test is conducted as per Indian standard IS: 5529 Part-II for rock (1983). For a given time the volume of water which is expelled out from the bore holes are measured. Proper seepage control measures are adopted while conducting this field permeability test. The depth of the section is analyzed and either single or double packer method is used. Single packer method is used when drill hole bottom and the test section bottom are in same level. When permeability has to be conducted for an isolated hole and also both the top and bottom at equal spacing is called as double packer method. Lugeon test permeability is shown in Figure 2.
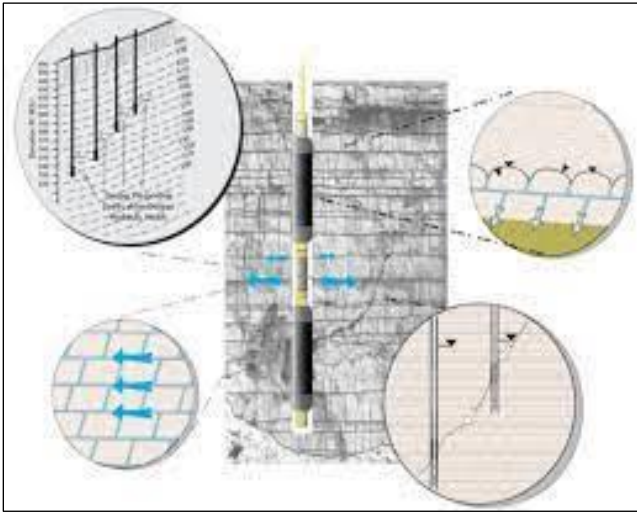
Fig 2: Lugeon test permeability

Constant head method

This method is conducted for highly permeability soils. It is done with a proper casing. To maintain the constant head, the volume of water from the bore hole at a regular time interval. It is observed for the consecutive three readings showing the same value is taken as the permeability value of the soil.

Falling head method

This method is conducted for low permeability soils. It is done without a casing. It is done for the varying heads of water fluctuation. The time taken for the falling head is taken. With the falling heads and the time taken the permeability of the soil was found.

Laboratory investigations

The laboratory investigations are very important in case of massive underground construction. The laboratory tests tells us the exact ground truth of the study and helps in implementing the design and installation procedures. The essential requirement of the laboratory investigations ae the approved labs and appliances as per Indian standards. The samples either soil or rock are tested with appropriate procedures in the laboratory. The samples should be properly sampled as per Indian standards. All the soil samples either disturbed or undisturbed should be properly handled before for the laboratory tests. In all undisturbed samples the Atterberg limits, water content and the grain size distribution are done. The following are the tests carried out in the Soil samples.

Grain size distribution

Indian standard IS2720 part IV-1985 is used for the grain size distribution to classify gravel, sand, silt and clay. As per IS1498-1970, the soil passing through each sieve in terms of percentage by weight was found then it is classified according to their size in mm.

Hydrometer test

The particles lesser than 75 μ are tested in hydrometer analysis. It is also called as wet mechanical analysis. In 75 μ sample the possibility will be the combination of clay and silt. Hydrometer is shown in Figure 3.

Fig 3: Hydrometer

Atterberg limit test

In Atterberg limit test, shrinkage limit, liquid limit and plastic limit of the soil is tested. These tests are conducted for the cohesive soils as per IS 2720 (Part V) 1985. These consistency limits finds the amount of clay, silt and organic soil. Casagrande chart is used to mark the low, intermediate and high level of plasticity nature of the cohesive soil. Atterberg limit is shown in Figure 4.

Fig 4: Atterberg Limits

Unconfined compression test or shear test

This test is conducted on the undisturbed clay samples. The cohesion, C and angle of internal friction, Ø are the findings from the shear test. It is conducted both in drained and undrained conditions. The undrained conditions are mostly conducted as tri axial shear tests. Mohr's circle can also be utilized to find the cohesion and angle of internal friction. Box shear test also used to find the C and Ø.

Consolidation test

Foundation settlement value is estimated in the consolidation test. The undisturbed clay samples are test for coefficient of consolidation C_u and Compression Index C_c. These values are plotted in the e-log p curves to find the settlement of the foundation. For soil samples one dimensional consolidation is conducted and the compression index and settlement is estimated after plotting in a semi log paper with voids ratio and pressure.

Swelling test

The swelling pressure is estimated using swelling test. This test is conducted for the soils that are expansive in nature. The swelling test is shown in Figure 5.
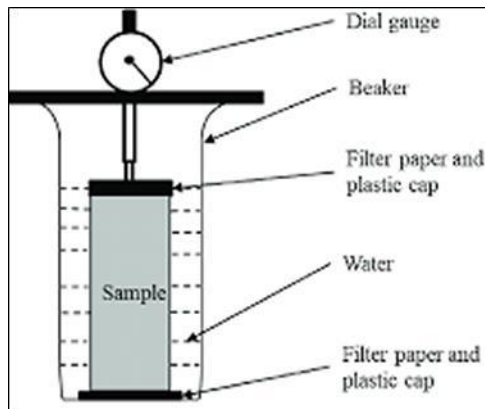

Fig 5: Swelling test

Chemical analysis

This analysis is carried out to find the soil-water properties such as turbidity, odour, colour and pH value. It is also done to find the chemical content such as nitrate, sulphate, carbonate, chloride and organic matter which are harmful when it is in excess and also it destroys the foundation material.

Conclusion

The tests conducted in the soil is basically divided for cohesive soil and cohesion less soil. For sampling procedures, cohesive soils seems to be very hard and the sampling will be a disturbed sample. Cohesive soil sampling comparatively easier than the cohesion less soil and the sampling is an undisturbed sampling. For the design and construction of the sub surface structures, both the field and laboratory tests founds to be very important and plays a vital role in taking the correct decision in the design and construction of the structure.

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Chapter - 2
Comparative Analysis with Various Scheduling
Techniques in Cloud Computing Environment

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Chapter - 2

Comparative Analysis with Various Scheduling Techniques in Cloud Computing Environment

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Abstract

Scheduling is a process of allocating resources to various tasks. In cloud computing, various scheduling approaches such as heuristics, meta-heuristics and hybrid have been incorporated for allocation purpose. In this work, basic heuristics scheduling approaches like RR (Round Robin), FCFS (First Come First Serve), SJF (Shortest Job First), max-min and min-min have been analyzed and compared using CloudSim simulator tool. CloudSim provides a mechanism for analyzing scheduling policies on a small scale in a cloud environment. Experimental results show that min-min has least execution time among all basic heuristics approaches.

Keywords: Cloud computing, FCFS, SJF

I. Introduction

Cloud Computing is a model that enables an omnipresent, on-demand and commodious access to a shared network. It comprises of a pool of computing resources that can be configured, conveniently supplied and released with minimal management efforts and service provider interaction. At present, cloud computing has the potential of providing dynamic services including applications, data, memory, bandwidth and IT services over the internet. Factors such as reliability and performance of cloud services depend upon various parameters such as task scheduling. Scheduling can be performed on task level, resource level or workflow level. In this work, the primary concern is dealing with approaches related to task scheduling. A task is generally a computing job in the form of a request, which is sent by a live- ware to a data center for its execution. Task scheduling dispatches these multiple jobs that require execution on available resources sent by the cloud users to a cloud provider.

Scheduling is performed on the basis of multiple parameters in order to increase the overall cloud performance. A certain task may comprise of

entering data, processing, accessing software or storage functions. Furthermore, a data center categorizes multiple tasks according to the service-level agreement and requested services. Each task is further assigned to one of the idle or available servers. Afterwards, the servers perform the requested task and then a response or result is transmitted back to the user. Task scheduling is an NP (Non-Polynomial) complete problem in general and in cloud. While performing task scheduling, the users submit their jobs to the cloud scheduler. Besides that, the cloud scheduler inquires about cloud information ser-vices in order to obtain the status of available resources and their properties. There-after, the allocation of various tasks on different resources as per the task requirements is performed. Afterwards, the cloud scheduler assigns multiple tasks to multiple virtual machines. Optimal scheduling always performs VMs assignment in the most effective way. A good scheduling algorithm always improves the CPU utilization, turnaround time and cumulative throughput. Task scheduling can be assimilated based on different parameters in multifarious ways. They can be statically allocated to various resources during compile time or can be dynamically allocated at run-time.

II. Comparative work

Ample number of scheduling algorithms has been proposed by developers to minimize the time taken by various tasks for the execution. Furthermore, in recent past-past, these algorithms have been improved by taking various constraints into account. A.D. Techiouba *et al*. improved traditional FCFS (First Come First Serve) scheduling algorithm by introducing backfilling method. In their proposed work, if a request was not fulfilled by resource, then that particular task was reserved for further execution until the particular resource matched with the task. This method increased the resource utilization under QoS (Quality of Service) parameter. How-ever, cost factor in FCFS algorithm was proposed by Aditya Marphatia *et al*. utilizing optimized FCFS algorithm for a cloud computing ecosystem. Tasks were grouped into two categories based on cost and deadline constraints. In this approach, if a particular request was below the threshold value, then it was considered as a "deadline" based request and resource was immediately provided to that task. In contrary, if request was above the threshold, then it was considered as cost-based task. In this approach, all tasks were grouped based on cost constraint and then scheduled in FCFS manner. FCFS was further improved by A.V. Karthick *et al*. by assimilating tri-queue approach in dynamic time quantum.

In their proposed algorithm, firstly all the jobs or tasks were arranged in descending order with respect to their execution time and further three queues were implemented named HIGH, MEDIUM and LOW. Forty (40) percent tasks or requests were queued, each in HIGH and MEDIUM queues. Rest 20 percent were queued in small queues. Tasks from HIGH queue were scheduled first, then tasks from MEDIUM queue and lastly, tasks from LOW queue were scheduled.

Traditional Round Robin (RR) was improved by Stuti Dave *et al*. for a cloud computing environment by implementing dynamic time quantum in round robin approach. TQ (Time Quantum) was calculated based on the time taken by resource round. If round is odd, then TQ would be equal to the minimum request size. In this approach, if round was even, then TQ would be the average execution time of remaining tasks. Round robin scheduling policy for balancing the load was used by Priyanka Gautam *et al*. in their proposed algorithm "Extended Round Robin Load Balancing in Cloud Computing". Different cloudlets' MIPS and memory size in MB were dynamically allocated by them. The tasks or cloudlets were randomly selected using the approach. Seema Verma *et al*. proposed an efficient algorithm EARP-RR (Earlier Account Expire Prioritized with Round Robin) for scientific community. The communities that are involved in some research work and use the same type of data should use the same resource in order to make better utilization of resources at minimum cost.

In max-min scheduling algorithm, task with maximum execution time was executed first with minimum execution time resource. O.M. Elzeki *et al*. pro-pounded an improved max-min algorithm. Execution time may be same for some tasks, but their main focus was on completion time of tasks. Hence, in their algorithm, task that had maximum completion time, was selected instead of maximum execution time. On contrary, Upendra Bhoi *et al*. proposed enhanced max-min algorithm. Their proposed algorithm did not select task with the maximum completion time; instead it selected the tasks which had a completion time of nearly or equivalently to average. This approach distributed the workload on servers.

S. Devi Priya *et al*. focused on time taken by resources to accomplish a task rather than on task execution time. For this purpose, in their proposed work, the first resource with minimum completion time was selected and the biggest task was assigned to that resource. Santhosh B *et al*. proposed an improved max-min algorithm. The proposed algorithm used two approaches. In the first approach, average execution time was calculated using the arithmetic mean and in the second approach, geometric mean was used. If

the values were independent, then arithmetic mean gives the best average execution time, whereas if the values were dependent on the other values, then the geometric mean gives the best average execution time. The user can select anyone of these approaches based on the characteristics of his data set.

Min-min scheduling algorithm is based on selecting the task that has minimum execution time and assign it to the resource that also has a minimum execution time. Rajwinder Kaur *et al.* proposed an algorithm, which at first worked on a simple min-min algorithm and then found the task that had minimum completion time of resource that had started producing make-span. Afterwards, rescheduling of that task was performed on light load resource. Lijun Cao proposed opt-min-min algorithm. The idea of min-min algorithm was primarily divided into two stages. The first phase covered a pre-scheduling by Min-Min algorithm. After the pre-scheduling, each resource carries its own execution time. The average mean CT (Completion Time) of all those execution time is then calculated. Any resource with execution time above the average mean CT is defined as a heavy load resource. Lalla Singh *et al.* proposed algorithm that compared values of ACT (Average Completion Time) and SD (Standard Deviation). If ACT was less than SD, it means the length of all tasks in MT (Meta Tasks) was in a small range, so the front of queue was selected to assign the next task. Otherwise, rear of queue was selected to assign the next task.

III. Problem formulation

Managing resources in cloud computing is a very significant task, which is done by a CSP (cloud service provider). For managing resources efficiently, scheduling algorithms have been developed by researchers using various techniques and parameters such as time, cost, energy, network, memory and so forth.

In FCFS scheduling approach, jobs that come first are served first. All jobs are placed in a queue using the order in which they enter in the cloud servers. One by one, the jobs are selected from the queue and assigned to the resources. On the other hand, in SJF (Shortest Job First), all jobs are stored in a queue in ascending order with respect to their size and then scheduled in FCFS manner. If the first shortest job is selected from a sorted queue assigned to the resource that has the minimum completion time, then it is called min-min scheduling approach. Whereas, jobs are queued in descending order and the biggest tasks are assigned to the slowest computational resource i.e. that executes the request in minimum time, it is called "Max-min" approach of scheduling. However, in RR (Round Robin),

tasks are sub- mitted in a queue using FCFS fashion. Some jobs are taken from the queue and assigned to the VMs for a specified period of time called "Time Quantum" in a time-sharing manner. After this period, other jobs are selected, where if some jobs remain incomplete, then they get resource once all tasks have been allocated resources.

IV. Experimental analysis and setup

In this work, execution time of various heuristics scheduling algorithms (FCFS, SJF, RR, Max-min and Min-min) has been compared in a cloud computing environment. The entire experiment is done using CloudSim 3.0.3 simulator. In this simulator, scheduling can be performed on various levels including data center, cloudlet and VM level. In this work, comparison has been performed on VM level. For making a comparison of aforementioned scheduling algorithms, configuration has been taken in table. 1. A host consists of many VMs. For the current experiments,

Table 1: Setup for experiment

a) Host configuration

No. Of VMs	3
RAM	1024 MB
Storage	100000 MB
BW (Bandwidth)	10000 Kbps

b) VM configuration

MIPS	300
Size	1000 MB
RAM	512 MB
BW (Bandwidth)	1000 Kbps

three VMs are taken and rest configuration of host is shown in table.1a. The configuration adopted for VMs during the experimental analysis has been shown in table. 1b. Using these configurations, algorithms were run on CloudSim 3.0.3 simulator. After executing the approach, results are shown in table. 2.

Table 2: Comparison Among Various Scheduling Algorithms

No. of cloudlets/tasks	Completion Time (in seconds)				
	FCFS	SJF	RR	Max-Min	Min-Min
50	79	70	65	59	55
100	102	89	81	79	76

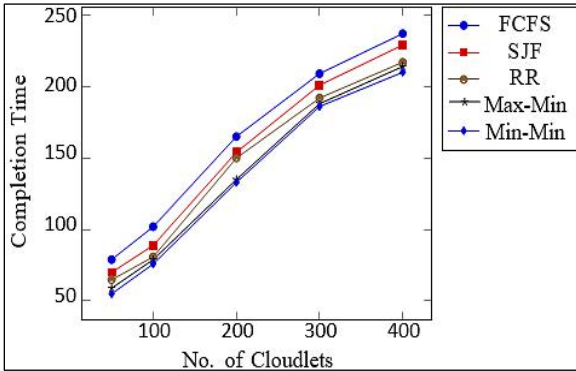| 200 | 165 | 154 | 150 | 135 | 133 |
| 300 | 209 | 201 | 192 | 188 | 186 |
| 400 | 237 | 229 | 217 | 214 | 210 |

Fig 1: Graphical Representation of Results

Completion time taken by FCFS, SJF, RR, Max-min and Min-Min scheduling algorithms has been demonstrated in table. 2 and figure. 1. Among them, FCFS takes the longest time and Min-min scheduling algorithm takes minimum time. In min-min scheduling policy, as shortest jobs are handled first, so it facilitates minimum response time and execution time of given tasks.

V. Interpretation

On the basis of performance analysis done in previous section, it is stated that Min- Min provides better results in terms of execution time or it can be said that the approach requires less time to fulfill the tasks. The results have been derived in simulated environment, so may vary in changing simulation environment.

Conclusion

In cloud computing, there exists lots of scheduling approaches. Nature of the approaches changes according to the need of the users. In this work, only FCFS, RR, Max-Min and Min-Min were compared in a simulated environment and results showed that the Min-Min executed the tasks in less time as compared to other approaches. Day by day, there is a rapid growth in cloud users. There is a lot of diversion in users need and that cannot be fulfilled on the basis of time. In recent years, almost every organization demands the cloud service, which fulfills the request in time economically. Apart from cost, optimal resource utilization, deadline and most important energy cannot be fulfilled even with the enhanced version of the Min-Min scheduling.

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Chapter - 3
Research Design and Methodology for Teaching English Language at Higher Education

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Chapter - 3

Research Design and Methodology for Teaching English Language at Higher Education

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Abstract

Language is a means of expression of human beings. These days English has conquered paramount place across the globe. English is accessed at almost each and every section of Indian society and that persuades the people to increase their learning curve of English Language. India is also one of the countries that have started shifting quite rapidly from vernacular to English language for Higher education.

Keywords: English language, higher education, teaching

I. Introduction

Research is a common parlance refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. Dictionary definition of research is a careful investigation or inquiry especially through search for new facts in any branch of knowledge. Some people consider research as a movement from the known to unknown. It is actually a voyage of discovery. We all possess the vital instinct of inquisitiveness. When the unknown confronts us, more and more our interest makes us probe and attain understanding of the unknown. This curiosity is the mother of all knowledge and the method, which one employs for obtaining the knowledge of whatever the unknown, can be termed as research.

Research is an academic activity and as such the term should be used in a technical sense. According to Clifford Woody, research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis.

Research is, thus an original contribution to the existing stock of knowledge making for its advancement. As such the term 'research' refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solution(s) towards the concerned problem or in certain generalizations for some theoretical formulation.

II. Objectives of research

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose, we mention some general objectives of research below:

I) To gain familiarity with a phenomenon or to achieve new insights into it.

II) To portray accurately the characteristics of a particular individual, situation, situation or a group.

III) To determine the frequency with which something occurs or with which it is associated with something else.

IV) To test a hypothesis of a causal relationship between variables.

III. Types of research

The basic types of research are as follow:

A. Descriptive vs Analytical

Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. In social science and business research we quire often use in the term Ex post facto research for descriptive research studies. The main characteristic of this method is that the researcher has no control over the variables; he can only report what has happened or what is happening. Most ex post facto research projects are used for descriptive studies in which the researcher seeks to measure such items as, for example, frequency of shopping, preferences of people, or similar data. Ex post facto studies also include attempts by researchers to discover causes even when they cannot control the variables. The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and co-relationalmethods. In *analytical research, on the other hand, the researcher hasto use facts or information already available, and analyze these to makea critical evaluation of the material.*

B. Applied vs Fundamental

Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization, whereas fundamental research is mainly concerned with generalizations and with the formulation of a theory. Research concerning some natural phenomenon or relating to pure mathematics are examples of fundamental research. Similarly, research studies, concerning human behavior carried on with a view to making generalizations about human behavior are also examples of fundamental research. However, research aimed at certain conclusions facing a concrete social or business problem is an example of applied research. Research to identify social, economic or political trends that may affect a particular institution, marketing research, evaluation research are examples of applied research.

C. Quantitative vs Qualitative

Quantitative research is based on the quantitative measurements of some characteristics. It is applicable to phenomena that can be expressed in terms of quantities. For instance, when we are interested in investigating the reasons for human behavior, we quite often talk of "Motivation Research", an important type of qualitative research. This type of research aims at discovering the underlying motives and desires, using in depth interviews for the purpose.

Other techniques of such research are word association tests, sentence completion tests, story completion tests and similar other projective techniques. Qualitative research is especially important in the behavioral sciences where the aim is to discover the underlying motives of human behavior. Through such research we can analyze the various factors which motivate people to behave in a particular manner or which make people like or dislike a particular thing.

D. Conceptual vs Empirical

Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones. On the other hand, empirical research relieson experience or observation alone, often without due regard for system and theory. It is data-based research, coming up with conclusions which are capable of being verified by observation or experiment. We can also call it as experimental type of research. In such a research, the researcher must first provide himself with a working hypothesis or guess as to the probable results. He then works to get enough data to prove or disprove his

hypothesis. He then sets up experimental designs which he thinks will manipulate the persons or the materials concerned so as to bring forth the desired information. Such research is thus characterized by the experimenter's control over the variables under study and his deliberate manipulation of one of them to study its effects.

IV. Research approaches

The above description of the types of research brings to light the fact there are two basic approaches to research, viz: quantitative approach and the qualitative approach. The former involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. This approach can be further sub-classified into inferential, experimental and simulation approaches to research. The purpose of inferential approach is to form a data base to infer characteristics or relationships of population. This usually means survey research where a sample of population is studied (questioned or observed) to determine its characteristics and it is then inferred that the population has the same characteristics.

Experimental approach is characterized by much greater control over the research environment and in this case some variables are manipulated to observe their effect on other variables. Simulation approach involves the construction of an artificial environment within which relevant information and data can be generated. This permits an observation of the dynamic behavior of a system (or its sub-system) under controlled conditions.

The term "simulation" in the context of business and social sciences applications refers to "the operation of a numerical model that represents the structure of a dynamic process. Given the values of initial conditions, parameters and exogenous variables, a simulation is run to represent the behavior of the process over time". Simulation approach can also be useful in building models for understanding future conditions. Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behavior. Research in such a situation is a function of researcher's insights and impressions. Such an approach to research generates results either in non-quantitative form or in the form which is not subjected to rigorous quantitative and analysis. Generally, the techniques of focus group interviews, projective techniques and depth interviews are used.

V. Proposed research framework

A. Research design

The research component that is being selected here in this work is to ensure the effectiveness and efficacy of using Audio-Visual Aids in Teaching Grammar in engineering college and it demands experimental design. It includes the formulation of problem statement, hypothesis and to ponder over the probable results.

B. Population

The population of the present study consists of the students who were/are taught English as a second language. The students of degree engineering college (Atmiya Campus) of Rajkot were included in the population.

C. Sample selection

The present study was/is experimental in nature. The experiment was to be conducted for specific duration in planned academic sessions in a well set-out time. The research framework indeed necessitated the basic infrastructural and other curricular facilities for the experiment and for that Atmiya Campus, Rajkot was selected. There were students of Engineering, selected. *300 students were selected as a convenient experimental sample.*

In which 150 girls and 150 boys were equally included. The experiment of the present study was conducted on the girls as well as boys. The size of the sample was kept intermediate for the reason that the responses of the students were t individualized. During the experimentation, individual practice of learning specific modules of grammar i.e. tenses, determiners and prepositions was provided.

D. Experimental design

When the investigator wants to observe the effects of an independent variable on dependent variables within certain situation experimental method is preferred. The investigator selected the experimental design for the present study. The one group Pre-test & Post-test design was employed during the experiment. The experiment was conducted on 150 deliberately selected boys and girls. For the duration of experiment, different kinds of Audio-visual aids have been used and emphasized for the teaching of English grammar thereby improving the linguistic proficiency of the students. Theoretically, experiment method is found the most suitable method. Experimental method deals with the future. That means it tries to predict what will happen in the future by studying the relationship between the

variables under study. It makes a cause and effect relationship among the variables. The causal variable is called independent variable and effect is called dependent variable because it depends on independent variable. Then investigator studies the relationship between dependent variable and independent variable. And how an investigator manipulates the independent variable and observes then changes happening in the dependent variable due to the change in independent variable. From that observation investigator can make a cause and effect relationship between independent variable and dependent variable. According to Campbell experimental designs can be described into three broad categories (Best).

1) Pre-experimental designs.
2) True-experimental designs.
3) Quasi-experimental designs.

1. Pre-experimental designs

This type of design provides little or no control of extraneous variables. They are generally used for 'one shot case study' or action research type work.

There are two types of pre-experimental designs.

1) One group pre-test-post-test design.
2) Two groups static design.

2. True-experimental designs

True experimental design is regarded as the most accurate form of experimental research, in that it tries to prove or disprove a hypothesis mathematically, with statistical analysis. Martyn Shuttle worth has written about this design that for some of the physical sciences, such as physics, chemistry and geology; they are standard and commonly used. For social sciences, psychology and biology, they can be a little more difficult to set up. For an experiment to be classed as a true experimental design, it must fit all of the following criteria.

- The sample groups must be assigned randomly.
- There must be a viable control group.
- Only one variable can be manipulated and tested. It is possible to test more than one, but such experiments and their statistical analysis tend to be cumbersome and difficult.

- The tested subjects must be randomly assigned to either control or experimental groups.

3. Quasi-experimental designs

Quasi-experimental design is a form of experimental research used extensively in the social sciences and psychology. Martyn Shuttle worthin 2008 has written about this design that whilst regarded as unscientific and unreliable, by physical and biological scientists, the method is nevertheless and a very useful method for measuring social variables. The inherent weaknesses in the methodology do not undermine the validity of the data, as long as they are recognized and allowed for during the whole experimental process. Quasi experiments resemble quantitative and qualitative experiment, but lack random allocation of groups or proper controls, so firm statistical analysis can be very difficult. Quasi experimental design involves selecting groups, upon which a variable is tested, without any random pre-selection processes. For example, to perform an educational experiment, a class might be arbitrarily divided by alphabetical selection or by seating arrangement. The division is often convenient and especially in an educational situation, causes as little disruption as possible.

There are five main types of quasi experimental designs.

1) Pre-test and post-test nonequivalent groups design.
2) Counter-balanced design.
3) The time-series design.
4) The equivalent time-samples design.
5) The equivalent materials, pre-test and post-test design.

After this selection, the experiment proceeds in a very similar way to any other experiment, with a variable being compared between different groups or over a period of time.

One group pre-test post-test design

In this design only one group has been used: As in the pre-test &post-test group design, analysis of covariance may be used with the pre-test as the covariate. Because this design may be the only feasible one, the comparison is justifiable, but, as in all quasi-experimental studies, the result should be interpreted cautiously.

The investigator wanted to compare the effectiveness of the pre-test and post-test. Audio-Visual Aids have been used to improve their English grammar. The investigator wanted to compare the effectiveness of the two groups of 150 girl students and 150 boy students.

A graphical presentation of the research design of experiment

Pre-test		Post-test
Exp. Gr.	**Audio-Visual Aids** →	Exp. Gr.
T_{1B}		T_{2B}
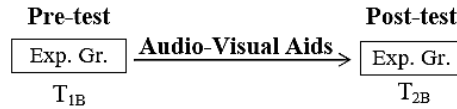
Effectiveness of the experiment to improve grammar through Audio-visual aids = $T_{2B} - T_{1B}$ ($T_{2B} > T_{1B}$).

Tool construction

A tool for the data collection of the present study was constructed. The aim of the present study was to find out the effectiveness of Audio-visual aids to improve grammar of English language in which the students find difficulties. So the lessons are planned based on visual aids. The investigator has prepared pre-test and post-test to test students' achievement in English Grammar. For the experiment she used Audio- visual aids which are related to grammar.

Collection of audio-visual aids

The collection of the various types of Audio-visual aids was being carried out with the help of internet, text book of diploma engineering students called "Active English" as well as collection of a few modules of "Longman English Grammar" which are used to teach English language. References of the books of IELTS, TOEFL and other English Studies Books were used.

Procedure of the study

Following steps were followed in the procedure of the study:

- Construction of pre-test and post-test.
- Preparation of teaching lessons based on pre-test and post-test.
- Administration of the pre-test.
- Treatment of lessons related to Audio-visual aids emphasized onimprovement of English Grammar.
- Administration of the post-test.
- Testing the effectiveness of the experiment.
- Replication of the entire experiment.

Experimental programme

Sr. No.	Date	Topic	Teaching & Learning tools	Kind of Work
1	27-06-17	Pre-test		Individual
2	01-07-17	Preposition of time (in, on, at, till, until, before, after, from, to, for, since)	Videos/Projector/Black-board/Pictures/Handout	Group
3	05-07-17	Preposition of place (in, on, at)	Videos/Projector/Black-board/Pictures/Handout	Group/Individual
4	06-07-17	Preposition of direction (to, towards, from)	Videos/Projector/Black-board/Pictures/Handout	Group/Individual
5	08-07-17	Preposition of place and movement (out of, off, inside, outside, above, below, under, over, in front of, behind, opposite, between, among, near, beside, up, down)	Videos/Projector/Black-board/Pictures/Handout	Group/Individual
6	10-07-17	Prepositions for means of transport (by, on, in)	Videos/Projector/Black-board/Pictures/Handout	Group/Individual
7	12-07-17	Articles (a, an, the)	Videos/Projector/Charts/Black-board /Handout	Group/Individual
8	15-07-17	Demonstratives (this, that, these, those)	Videos/Projector/Pictures/Black- board/Handout	Group/Individual
9	18-07-17	Quantifiers (some, any, much, many, few, a few, little, a little)	Videos/Projector/Charts/Pictures/Black-board/Handout	Group
10	20-07-17	Possessives (my, your, his, her, its, our, their)	Pictures/Black-board/Videos/Projector/Handout	Group
11	22-07-17	Numbers (one, two, thirty)	Charts/Pictures/Black-board/Handout Videos/Projector/	Group
12	25-07-17	Distributives (both, all, each, every, either, neither)	Charts/Pictures/Black-board/Handout Videos/Projector/	Group
13	26-07-17	Simple present tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair
14	29-07-17	Simple past tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair
15	02-08-17	Simple future tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair
16	03-08-17	Present continuous tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair

17	05-08-17	Past continuous tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair
18	08-08-17	Future continuous tense	Black-board/Chart/PPT/ Handout Videos/Projector/	Group/Pair
19	09-08-17	Present perfect tense	Black-board/videos /Chart/PPT/Handout	Group/Pair
20	12-08-17	Past perfect tense	Videos/Projector/Black- board/Chart/PPT/Handout	Group/Pair
21	16-08-17	Future perfect tense	Videos/Projector/Black- board/Chart/PPT/Handout	Group/Pair
22	19-08-17	Post-test		Individual

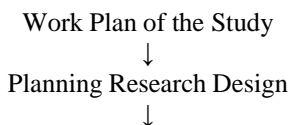## VI. Effectiveness of the experimental programme

After the experimental programme was over, the effectiveness of the experimental programme was evaluated. The process which was followed during pre-testing was entirely followed in post-testing. The obtained marks of experimental programme were scored out. The same scoring pattern was followed as it was followed in finding the weakness in grammar during pre-testing. Significant difference of 0.05 levels in mean scores of post-testing and pre-testing was considered as effectiveness of the experimental programme. Mean score, SD, SE and DF were found out of post-test and pre-test. The difference between mean scores was observed by applying t-test. As research hypothesis regarding the effectiveness of the programme was directional, the significant levels were treated as one tail test. Serial Number representing 1 stands for 10 students.

Calculation of data

Statistically calculations on the data were carried out using computer system. Mean and SD were found with the help of the computer system using raw scores of the data. 't' test was used for the analysis and interpretation.

Diagrammatical presentation of the research

The research work for the present study was carried out through various stages. The discussion of each stage has been presented. The details from planning and proposal of this study to the analysis and interpretation of data is presented diagrammatically through the figure. 1.
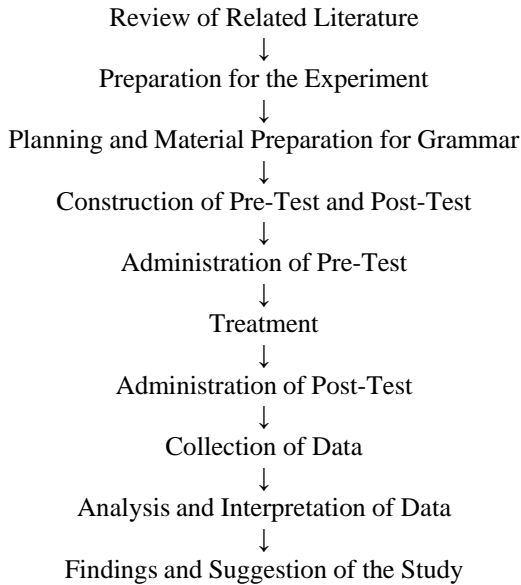
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Work Plan of the Study

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Planning Research Design

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Review of Related Literature
↓
Preparation for the Experiment
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Planning and Material Preparation for Grammar
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Construction of Pre-Test and Post-Test
↓
Administration of Pre-Test
↓
Treatment
↓
Administration of Post-Test
↓
Collection of Data
↓
Analysis and Interpretation of Data
↓
Findings and Suggestion of the Study

Fig 1: Work plan of the Research

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Chapter - 4
Photo Voltaic System fed DSTATCOM for Power Quality Improvement

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Chapter - 4

Photo Voltaic System fed DSTATCOM for Power Quality Improvement

P. Sarala and M. Dilip Kumar

Abstract

The major objective of this research work is to model and implement the effectiveness of DSTATCOM fed voltage source inverter-based power electronics devices to store energy in the dc capacitor. The three-phase supply is connected to load, while the VSI fed DSTATCOM acts as a filter at PCC to inject current in the distribution system. The proposed topology of VSI fed DSTATCOM has been simulated. Solar photovoltaic is an advanced energy source for the future. The most important function of MPPT is to regulate the voltage and is used for converting the unregulated dc input to the controlled output voltage. The charge controller of P & O algorithm was simulated to track the reference current from the inverter. Based on the algorithm, the numerical variables were identified from the membership function for a change in the error. The hardware set up was designed for 18 V PV panel to regulate the voltage.

Keywords: Power quality, dstatcom, PV system

I. Introduction

Solar Photovoltaic is a recent advanced technology for electricity source in the future. The fluctuations in the output power arising from to non-linearity might lead to undesirable performance. Hence the DC-DC converter used in solar PV system should be stable and the input voltage is kept within the specified range under disturbances at the source voltage and the change in irradiation. The challenge of the research work and the new areas for studywere the motivations behind the research, the proposed system requires 70W power. Therefore manufacturer data sheet of ECEN 2060 is used as 6-PV Array 85*6=510W in DC system, ECEN2060.

II. Solar energy

A variety of renewable energy resources like solar, wind, hybrid, fuel cell and etc. are used for producing the electricity. A solar cell is a

photovoltaic cell that converts light energy into electrical energy by a photoelectric effect. Solar power is produced by collecting sunlight and energy is transmitted. An array of solar cells converts solar energy into electrical energy by an amount of direct current and this conversion wasanalyzed by PV powered system.

III. MPPT Controller

MPPT is an algorithm that includes charge controllers used for extracting maximum available power from PV module under certain conditions. The voltage which produces the maximum power in the PV system is called Maximum Power Point (MPP). The maximum power changes resulting from solar radiation and the ambient temperature. The major principle of MPPT is to extract themaximum available power from PV module through their operation at the desired voltage. The proposed control technique is the modified ripple-correlation for tracking the maximum power, which is independent of rotatingreference frame to inject the quality of current.

IV. MPPT with BOOST Converter

The most important functions of MPPT were used for regulatingthe voltage. The boost converter was used for converting the unregulated dc input to the controlled output voltage. The MPPT was used to convert the input voltage as a regulated voltage. The PV provided load balancing for maximum power transfer. The Figure. 1 shows an equivalent circuit boost converter.
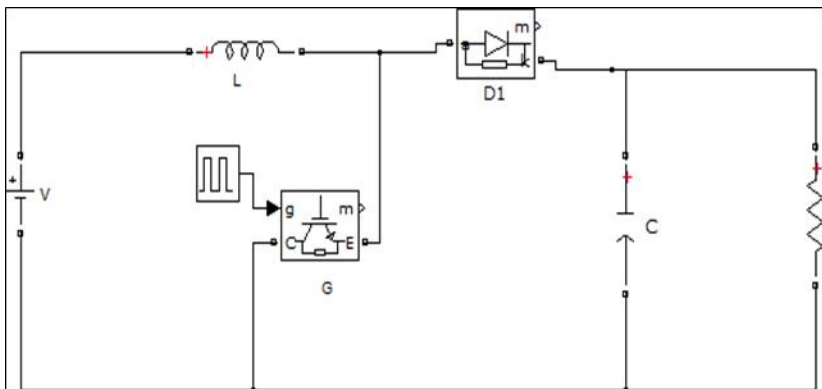

Fig 1: Equivalent circuit boost converter

The DC input voltage was less than DC output voltage which meantPV input voltage was less than the battery voltage in the system.

V. Schematic diagram of pv fed DSTATCOM

The PV fed DSTATCOM was used mainly for mitigating the power quality issues for active power flows through the grid. The extraction of maximum power from an inverter was to change the solar irradiation and the stability of the system in an unbalanced load was maintained. The schematic diagram of PV fed DSTATCOM is shown in Figure. 2.
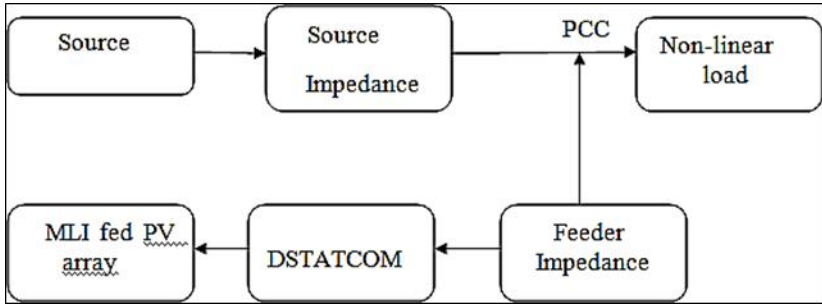

Fig 2: Schematic diagram of PV fed DSTATCOM

VI. Modeling of incremental conductance method

Incremental conductance method uses two voltage and current sensors to sense the output voltage and current of the PV array. At MPP the slope of the PV curve is 0.

$$P = V \times I \tag{5.1}$$

$$\partial P/\partial V = [\partial(V \times I)]/\partial V \tag{5.2}$$

$$\partial I/\partial V = -I/V \tag{5.3}$$

The left-hand side is the instantaneous conductance of the solar panel. When this instantaneous conductance equals the conductance of the solar then MPP is reached. Here we are sensing both the voltage and current were send simultaneously. Hence the error arising as a result of change in irradiance was eliminated. However, there was increase in the complexity andthe cost of implementation.
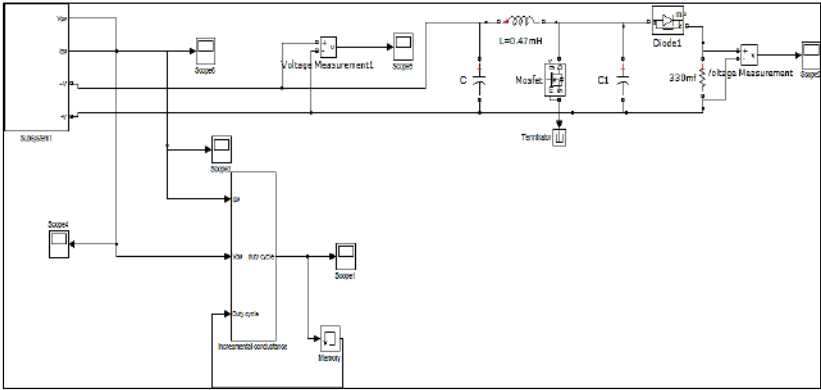
Fig 3: Simulation of PV fed MPPT by Incremental conductance

The MPPT was used to optimize the solar array to the amount of power obtained from the supply voltage. The incremental changes with peak current ($\partial I/\partial V$) and power ($\partial P/\partial V$) was independent of the voltage. It could produce fluctuations in the voltage due to temperature and irradiance. The simulation of PV fed MPPT by Incremental conductance is shown in Figure. 3.
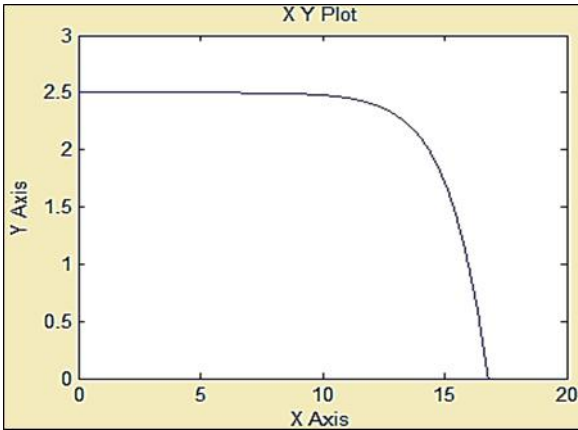

Fig 4: V-I characteristics of Incremental conductance

The V-I characteristics curve is shown in Figure.4. The amount of current produced by I_{SC} equal to the light current emitted by I_D remained constant at V=0. Under the atmospheric condition, the maximum current extracted by PV coincided with the short circuit current to get 50W. The P-V characteristics curve is shown in Figure.5. The output voltage was 20V and the current was 2.5A is obtained from the simulation. It could cause variations in the irradiance by atmospheric condition to obtain MPP which had a higher accuracy compared to P&O method.
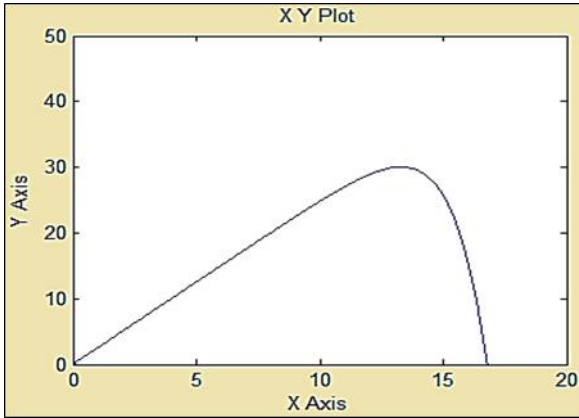
Fig 5: P-V characteristics of Incremental conductance

VII. Modeling of perturb and observe method

Perturb & Observe (P&O) is a simplest method. In this we use only one sensor, that is the voltage sensor is used for sensing the PV array voltage and so the cost of implementation is less and hence easy to implement. The time complexity of this algorithm is very small but on reaching very close to the MPP, it does not stop at the MPP but keeps on perturbing in both the directions. When this happens, the algorithm would have reached very close to the MPP and an appropriate error limit can be set or a wait function can be used which ends up increasing the time complexity of the algorithm. However, the method does not take account of the rapid change in irradiation level (due to which MPPT changes) and considers it as a change in MPP due to perturbation and ends up calculating the wrong MPP. Incremental conductance method can be used for avoiding this problem.

$\Delta V/\Delta P = 0$ ($\Delta I/\Delta P = 0$) at the MPP.

$\Delta V/\Delta P > 0$ ($\Delta I/\Delta P < 0$) on the left MPP.

$\Delta V/\Delta P < 0$ ($\Delta I/\Delta P > 0$) on the right MPP.

When we give a positive perturbation is seen, the value of ΔP becomes negative, it is therefore imperative to change the direction of perturbation to achieve MPP. The flowchart for the P&O algorithm is shown in Figure. 6.
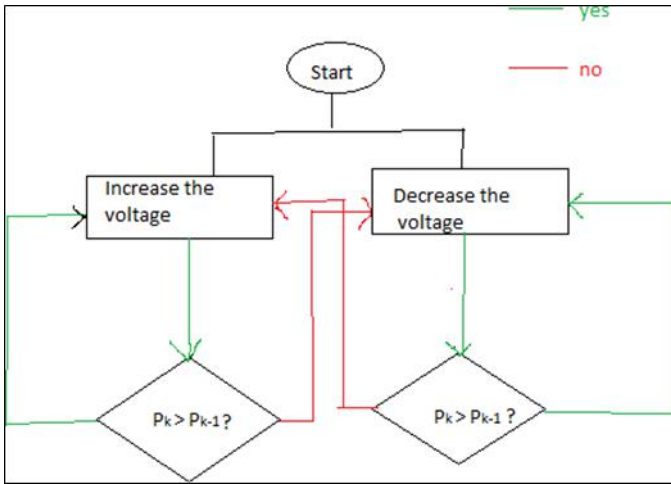
Fig 6: Flowchart of the P & O algorithm

The model was simulated for 0.2s. Solar irradiance input given to the PV Module was kept at 700W/m² for about 0 to 0.06s, and 1000W/m² for about 0.06s to 0.12s, and 800W/m² for about 0.12s to 0.2s. This was for the purpose of performing the MPPT implementation.
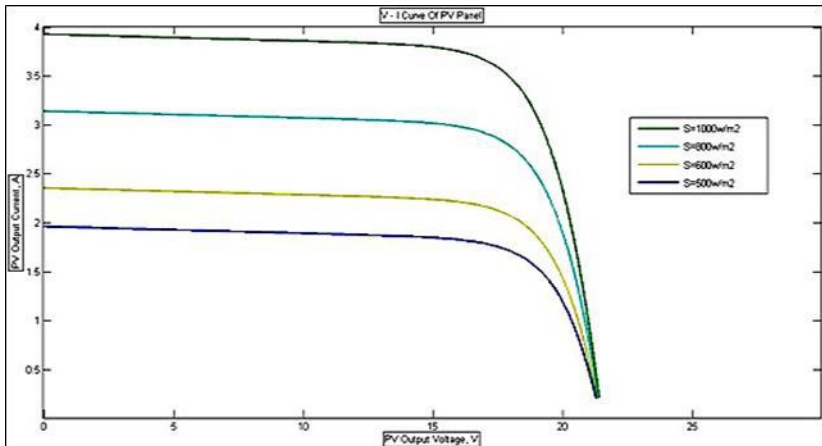

Fig 7: V-I curves: Effect of solar irradiance

There was a gradual increase in the solar irradiation withenvironmental changes due to the fluctuation in different load conditions. When the solar power magnitude increased at the rated voltage, irradiation effect was very high. It could cause irradiation of voltage to the corresponding maximum power. This was due to the fact that, sunlight incidents on PV arraycausing to absorb the excitation energy, could increase in the electrons

of carrier density region leading to mobility to enable generation of the maximum power. The V-I characteristics for the effect of solar irradiance are shown in Figure. 7.
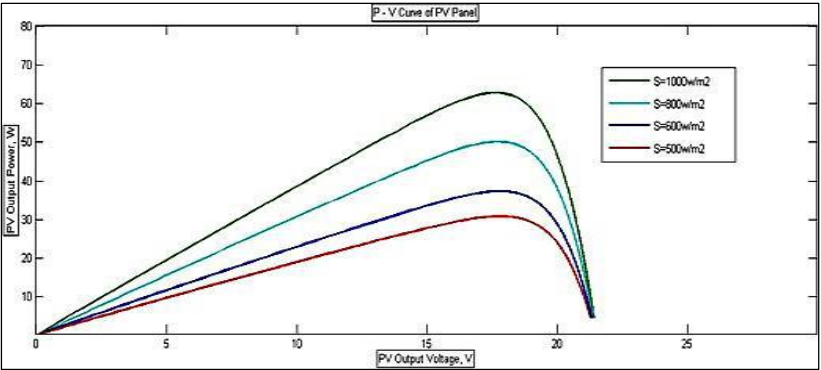

Fig 8: P-V curve: Effect of solar irradiance

The peak voltage and the open circuit voltage of the PV array are shown in Figure. 8. The effect of solar irradiance of P-V and V-I curves are dependent of temperature and irradiance.

VIII. Modeling of MPPT for pv system

The simulation of PV based MPPT using the perturbing& observe method that uses the boost converter was meant to maximize the efficiency of maximum power. The dc source was independent of the photovoltaic cell.

The inputs were the product voltage and current of the PV terminals and theoutput produces duty cycle for the boost converter.
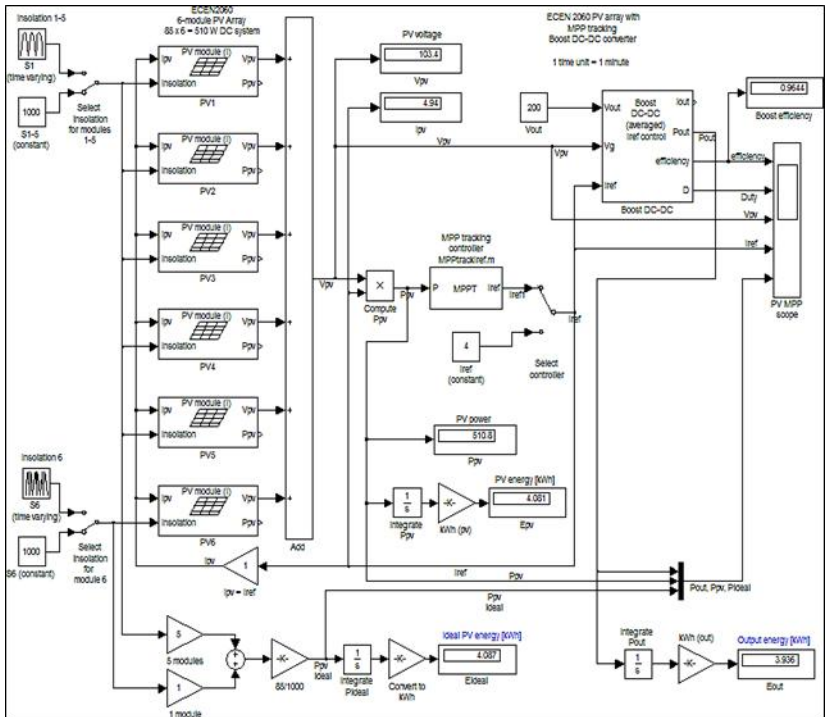
Fig 9: Simulink of MPPT for PV system by P & O

The simulation of MPPT for PV system by P & O is shown in Figure. 9. The boost converter was used for regulating the voltage which was equal to the PV maximum voltage to attain the good efficiency in a controlled manner.

Table 1: Designed Parameters of PV panel

Components	Range
Short-Circuit Current	5.45A
Open-Circuit Voltage	22.2V
Current at Pmax	4.95A
Voltage at Pmax	17.2V
Switching loss current	0.03A
Input port Resistance	1.5Ω

The parameters of PV panel are shown in Table. 1. The inductive type of boost converter used was highly efficient at the desired frequency. Hence, a 90% improvement in the efficiency of the boost converter and D=0.5 of the duty cycle was maintained.
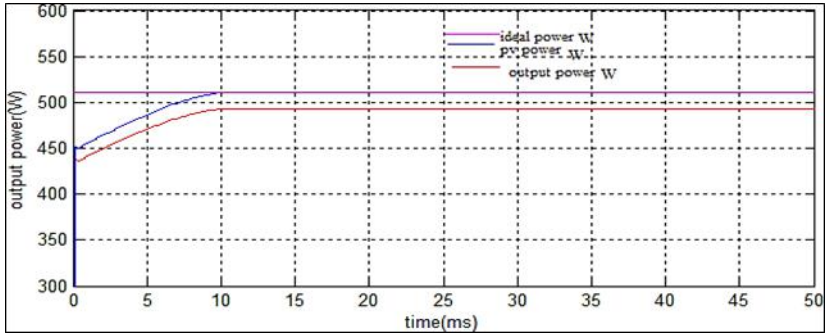
Fig 10: Comparison of output power

The regulation of the desired output voltage using PWM for adjusting the duty cycle ratio and the converter was achieved. The design parameters could be tuned by the PV panel with the switching loss of current element. The output power of inverter, output power of PV and ideal power were measured by 510W. The PV module was used for extract the maximum power to get an efficient voltage and the comparison of output power is shown in Figure. 10.

The MATLAB coding was used to initialize the MPP with the help P&O algorithm for tracking the maximum power and solar PV to regulate the rated voltage. The research processes was extended further with a different controller.

Conclusion

In this work, the basics of the simulation and modeling of solar PV cell and its MPPT controller algorithm have been explained. The concept behind P & O relates to the modification of the operating voltage or current of PV module to obtain the maximum power from it. The MPP was operated by tracking the incrementing or decrementing the PV array voltage. The high efficiency of the DC-DC converter had be designed which is suitable for solar PV application. In addition, the fluctuations in the output power due to non- linearity might was seen leading to undesirable performance and the input voltage was kept within the specified range under disturbances at the source voltage and the change in irradiation. The operation point of each PV module was set at its own MPP for maximizing the overall power generation of the solar PV power system and improvement in converter conversion efficiency of the power conditioning system. The implementation of PV fed DSTATCOM was tested and the results were simulated.

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Chapter - 5
Control and Operation of a DC Grid-Based Wind Power Generation System

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Chapter - 5

Control and Operation of a DC Grid-Based Wind Power Generation System

T. Obulesu, Raja Reddy Duvvuru and K. Vimal Kumar

Abstract

This work presents the design of a dc grid-based wind power generation system in a poultry farm. The proposed system allows flexible operation of multiple parallel-connected wind generators by eliminating the need for voltage and frequency synchronization. A model predictive control algorithm that offers better transient response with respect to the changes in the operating conditions is proposed for the control of the inverters. The design concept is verified through various test scenarios to demonstrate the operational capability of the proposed microgrid when it operates connected to and islanded from the distribution grid.

Keywords: Wind system, DC, micro grid

I. Introduction

Poultry farming is the raising of domesticated birds such as chickens and ducks for the purpose of farming meat or eggs for food. To ensure that the poultries remain productive, the poultry farms in Singapore are required to be maintained at a comfortable temperature. Cooling fans, with power ratings of tens of kilowatts, are usually installed to regulate the temperature in the farms [1-3]. Besides cooling the farms, the wind energy produced by the cooling fans can be harnessed using Wind turbines (WTs) to reduce the farms' demand on the grid. The Singapore government is actively promoting this new concept of harvesting wind energy from electric ventilation fans in poultry farms which has been implemented in many countries around the world [4]. The major difference between the situation in poultry farms and common wind farms is in the wind speed variability. The variability of wind speed in wind farms directly depends on the environmental and weather conditions while the wind speed in poultry farms is generally stable as it is generated by constant-speed ventilation fans. Thus, the generation intermittency issues that affect the reliability of electricity supply and power

balance are not prevalent in poultry farm wind energy systems. In recent years, the research attention on dc grids has been resurging due to technological advancements in power electronics and energy storage devices, and increase in the variety of dc loads and the penetration of dc distributed energy resources (DERs) such as solar photovoltaics and fuel cells. Many research works on dc microgrids have been conducted to facilitate the integration of various DERs and energy storage systems. In [5, 6], a dc microgrid based wind farm architecture in which each wind energy conversion unit consisting of a matrix converter, a high frequency transformer and a single-phase ac/dc converter is proposed. However, the proposed architecture increases the system complexity as three stages of conversion are required. In [7], a dc microgrid based wind farm architecture in which the WTs are clustered into groups of four with each group connected to a converter is proposed. However, with the proposed architecture, the failure of one converter will result in all four WTs of the same group to be out of service. The research works conducted in [8-10] are focused on the development of different distributed control strategies to coordinate the operation of various DERs and energy storage systems in dc microgrids. An alternative solution using a dc grid-based distribution network where the ac outputs of the wind generators (WGs)in a poultry farm are rectified to a common voltage at the dc grid is proposed in this paper. The most significant advantage of the proposed system is that only the voltage at the dc grid has to be controlled for parallel operation of several WGs without the need to synchronize the voltage, frequency and phase, thus allowing the WGs to be turned ON or OFF anytime without causing any disruptions. Many research works on designing the controllers for the control of inverters in a microgrid during grid-connected and islanded operations is conducted in [13-15]. A commonly adopted control scheme which is detailed in [13, 14] contains an inner voltage and current loop and an external power loop to regulate the output voltage and the power flow of the inverters. Although there area lot of research works being conducted on the development of primary control strategies for DG units, there are many areas that require further improvement and research attention. These areas include improving the robustness of the controllers to topological and parametric uncertainties, and improving the transient response of the controllers. To increase the controller's robustness against variations in the operating conditions when the microgrid operates in the grid-connected or islanded mode of operation as well as its capability to handle constraints, a model-based model predictive control (MPC) design is proposed in this paper for controlling the inverters. As the microgrid is required to operate stably indifferent operating

conditions, the deployment of MPC for the control of the inverters offers better transient response with respect to the changes in the operating conditions and ensures a more robust microgrid operation. There are some research works on the implementation of MPC for the control of inverters. In [16], a finite control set MPC scheme which allows for the control of different converters without the need of additional modulation techniques or internal cascade control loops is presented but the research work does not consider parallel operation of power converters.

II. Wind power generation

The overall configuration of the proposed dc grid-based wind power generation system for the poultry farm is shown above. The system can operate either connected to or islanded from the distribution grid and consists of four 10 kW permanent magnet synchronous generators (PMSGs) which are driven by the variable speed WTs. The PMSG is considered in this paper because it does not require a dc excitation system that will increase the design complexity of the control hardware. The three-phase output of each PMSG is connected to a three-phase converter (i.e., converters A, B, C and D), which operates as a rectifier to regulate the dc output voltage of each PMSG to the desired level at the dc grid.
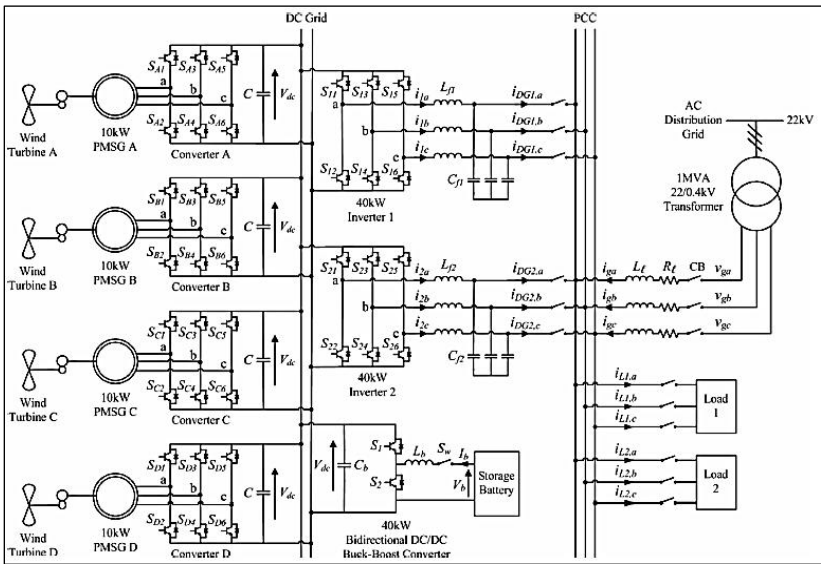

Fig 1: Block diagram of wind system

The aggregated power at the dc grid is inverted by two inverters (i.e., inverters 1 and 2) with each rated at 40 kW. Instead of using individual

inverter at the output of each WG, the use of two inverters between the dc grid and the ac grid is proposed. This architecture minimizes the need to synchronize the frequency, voltage and phase, reduces the need for multiple inverters at the generation side, and provides the flexibility for the plug and play connection of WGs to the dc grid. The availability of the dc grid will also enable the supply of power to dc loads more efficiently by reducing another ac/dc conversion. The coordination of the converters and inverters is achieved through a centralized energy management system (EMS). The EMS controls and monitors the power dispatch by each WG and the load power consumption in the microgrid through a centralized server. To prevent excessive circulating currents between the inverters, the inverter output voltages of inverters 1 and 2 are regulated to the same voltage. Through the EMS, the output voltages of inverters 1 and 2 are continuously monitored to ensure that the inverters maintain the same output voltages.

A somewhat hilarious misconception that some people may have is that the only place that wind power is utilized is in Holland, where windmills have existed for centuries. It is almost as silly that most books about wind power do not recognize that wind power has been arguably the most important energy form man has ever used. When discussing wind power, it is necessary to specify what kind of wind power is meant. As the fuel for transportation, fishers or other people using boats have used the power of the wind. The United States could truthfully say that without the power of the wind, Columbus and other European explorers might not have found the Western world. A more exact presentation of the history of wind power is discussed at another page devoted to showing the changes in utilization of wind power over time. The power of the wind is everywhere, and is found in most abundance in some areas of the world that are not extremely accessible to humans. As a general rule, as the elevation is increased, the wind speed will also increase. Suppose a person decided to climb to the of a two-story building. Standing on top of the building, he can feel the great increase of wind speed compared to being on the ground. Wind power stations are often found in the same place as large radio station antennae. Just as the high elevation helps the radio signals to travel farther, the increase high above sea level increases the wind speed and helps the station to produce more power. These tidbits of wind power geography are expanded at the wind power geography page.

Wind Power as an electricity provider is popular in many places across the world. One of the reasons that wind power is implemented across the world is the simplicity of the physical science processes that make the

conversion from mechanical energy to electricity. The work of the wind moves the blades of the turbine, and the kinetic energy of the wind is converted to kinetic energy in the blades. By manipulating some basic physics equations, the energy transferred can be found. Wind power physics tackles the science of wind machines.

One characteristic of most alternative energy forms (excluding nuclear power), is the application for use in a home setting. Wind Power is often used on farms and housing in rural areas where there are fewer visual housing restrictions, and uses for wind powered devices. Many ancient civilizations used wind power for grain processing or irrigation, and these routines are still in high demand today. It is interesting to compare an industrial size wind power station and a home implementation of wind power because of the number of similarities. Often the new technologies of industrial strength wind power machines are passed directly onto smaller systems. A page complete with diagrams of wind power systems, both on the industrial level, and the home level are given. After learning about where the best places are for a wind power station, you can go to some of the different sites for wind power all over the world. This site offers a limited collection of links to English web sites in different countries that utilize wind power.

Wind turbines

Clearly, wind energy is high on the governmental and institutional agenda. However, there are some stumbling blocks in the way of its widespread. Wind turbines come with different topologies, architectures and design features.

Some options wind turbine topologies are as follows,

- **Rotor axis orientation:** Horizontal or vertical.
- **Rotor position:** Upwind or downwind of tower.
- **Rotor speed:** Fixed or variable.
- **Hub:** Rigid, teetering, gimbaled or hinged blades.
- **Rigidity:** Still or flexible.
- **Number of blades:** One, two, three or even more.
- **Power control:** Stall, pitch, yaw or aerodynamic surfaces.
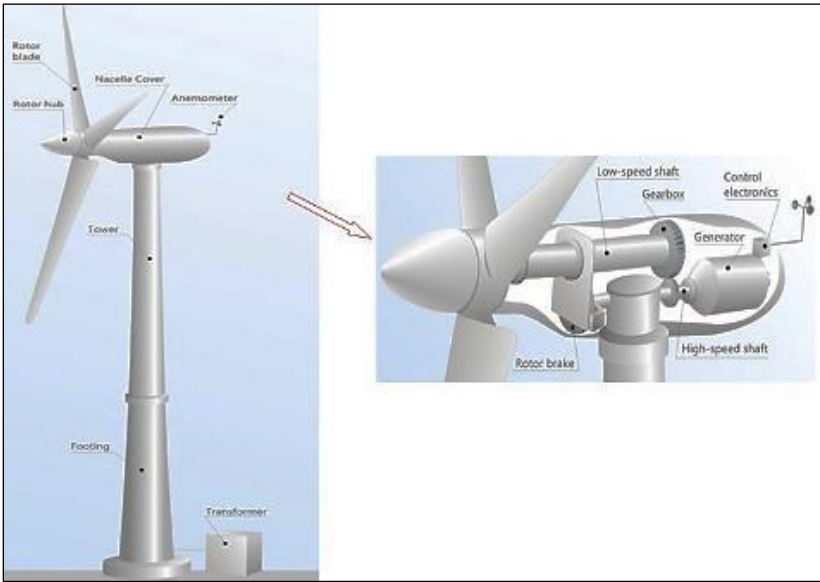- **Yaw control:** Active or free.

Fig 2: Schematic diagram wind turbine generation

Wind turbines include critical mechanical components such as turbine blades and rotors, drive train and generators. They cost more than 30% of total capital expenditure for offshore wind project. In general, wind turbines are intended for relatively inaccessible sites placing some constraints on the designs in a number of ways. For offshore environments, the site may be realistically accessed for maintenance once per year. As a result, fault tolerance of the wind turbine is of importance for wind farm development.
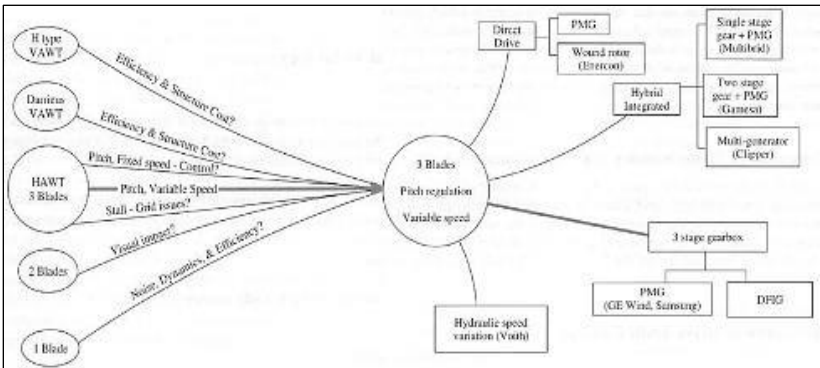

Fig 3: Divergence wind turbine generation

One of key components in the wind turbine is its drive train, which links aerodynamic rotor and electrical output terminals. Optimization of wind

turbine generators cannot be realized without considering mechanical, structural, hydraulic and magnetic performance of the drive train. An overview of the drive train technologies is illustrated for comparison. Generally, they can be broken down into four types according to their structures:

- **Conventional:** Gearbox and high-speed generator with few pole pairs.
- **Direct drive:** Any drive train without a gearbox and low speed generator with many pole pairs.
- **Hybrid:** Any drive train with a gearbox and the generator speed between the above two types.
- **Multiple generators:** Any drive train with more than one generator.

Drive train topologies may raise the issues such as the integration of the rotor and gearbox/bearings, the isolation of gear and generator shafts from mechanical bending loads, the integrity and load paths. Although it may be easier to service separate wind turbine components such as gearboxes, bearings and generators, the industry is increasingly in favor of system design of the integrated drive train components.

Wind turbine generators

One of limiting factors in wind turbines lies in their generator technology. There is no consensus among academics and industry on the best wind turbine generator technology. Traditionally, there are three main types of wind turbine generators (WTGs) which can be considered for the various wind turbine systems, these being direct current (DC), alternating current (AC) synchronous and AC asynchronous generators. In principle, each can be run at fixed or variable speed. Due to the fluctuating nature of wind power, it is advantageous to operate the WTG at variable speed which reduces the physical stress on the turbine blades and drive train and which improves system aerodynamic efficiency and torque transient behaviors.

Conclusion

In this work, the design of a dc grid-based wind power generation system in a microgrid that enables parallel operation of several WGs in a poultry farm has been presented. As compared to conventional wind power generation systems, the proposed microgrid architecture eliminates the need for voltage and frequency Synchronization, thus allowing the WGs to be switched on or off with minimal disturbances to the microgrid operation. The

design concept has been verified through various test scenarios to demonstrate the operational capability of the proposed microgrid and the simulation results has shown that the proposed design concept is able to offer increased flexibility and reliability to the operation of the microgrid. However, the proposed control design still requires further experimental validation because measurement errors due to inaccuracies of the voltage and current sensors, and modeling errors due to variations in actual system parameters such as distribution line and transformer impedances will affect the performance of the controller in practical implementation. In addition, MPC relies on the accuracy of model establishment; hence further research on improving the controller robustness to modeling inaccuracy is required. The simulation results obtained and the analysis performed in this paper serve as a basis for the design of a dc grid Based wind power generation system in a microgrid.

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Chapter - 6
Implementation of Fuzzy Logic Controller for Multilevel Inverter Fed D-STATCOM

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Chapter - 6

Implementation of Fuzzy Logic Controller for Multilevel Inverter Fed D-STATCOM

P. Venkata Kishore and M. Kondalu

Abstract

The implementation of fuzzy logic controller for multilevel inverter fed DSTATCOM was used for the synthesis of the regulated voltage. The control strategy used for the space vector modulation is meant to track the reference voltage from the inverter using a PI and fuzzy logic controller. This helped speedy achievement of a fast response time of three-phase system voltage with reduced THD and regulation of voltage. The comparative results of MLI fed DSTATCOM with SV modulation and the results have been seen and verified. The prototype model of cascaded H-bridge five-level inverter supported DSTATCOM was implemented using a design parameter.

Keywords: Fuzzy, DSTATCOM, PI

I.   Introduction

This work presents the implementation of Cascaded H-bridge five-level inverter fed D-STATCOM. Modulation strategies were used for the space vector to track the reference voltage. The feedback control of the inverter was simulated by a PI controller with the application of grid-connected inverter. The result showed the extraction of switching signals which synthesized the balanced set of three-phase output voltages. Hence, the fast response of system voltage with reduced THD and overshoot voltage of fuzzy logic controller helped in achieving good performance compared to the proposed PI controller.

II.   Cascaded h-bridge five-level inverter fed D-STATCOM

As the name suggests, this type of multilevel inverter requires full H-bridges which are connected in series producing an inverted output voltage from separate dc sources. The dc sources may be any natural resource as, for example wind energy or fuel cell. It does not require any filter and power transformer. The output of each cell can be obtained by connecting the dc source voltage to the ac output voltage by different combinations of the four

switches S11, S12, S31 and S32. The switches S11and S31 are turned on for obtaining +Vdc, whereas −Vdc can be obtained by turning on switches S12 and S32.The output voltage is 0 when S11 and S12 or S31 and S32 are turned on. The output voltage was generated by the no of levels 2(m+1) in each cell of the inverter.

Where m-no of cells in the output voltage

The single H-bridge level of output voltage as follows:

$$v_0(t) = \sum_{k=1}^{n} v_{0k}(t)$$

(4.1)

Where k is a number of the kth cells.

Table 1: Switching states of CHBMLI

Switching States						
S11	S31	S12	S32	VH1	VH2	VH3
0	0	0	0	0	0	0
0	0	0	1	0	-Vs	-Vs
0	0	1	0	0	+Vs	+Vs
0	0	1	1	0	0	0
0	1	0	0	+Vs	0	-Vs
0	1	0	1	-Vs	-Vs	-2Vs
0	1	1	0	-Vs	+Vs	0
0	1	1	1	-Vs	0	-Vs
1	0	0	0	+Vs	0	0
1	0	0	1	+Vs	-Vs	0
1	0	1	0	+Vs	+Vs	+2Vs
1	0	1	1	+Vs	0	0
1	1	0	0	0	0	0
1	1	0	1	0	-Vs	-Vs
1	1	1	0	0	+Vs	+Vs
1	1	1	1	0	0	0

The output voltage of the inverter is almost sinusoidal and with less than 5% of total harmonic distribution with each leg of the H-bridges at the o fundamental frequency. The phase voltage was shifted by 90, the average value of each dc capacitor over a cycle was found to be zero. The switching states of CHBMLI are shown in Table. 1.

Table 2: Component of m-level cascaded H-bridge inverter

m-level Cascade H-Bridge	No. of Elements
DC bus Capacitors	3 (m-1)/2
Main Diodes	6 (m-1)
Main Switches	6 (m-1)

The components of m-level cascade H-bridge inverter are shown in Table. 2.

III. Modeling of multilevel inverter fed-dstatcom

A model of Cascaded H-bridge MLI fed DSTATCOM is shown in Figure. 1. D-STATCOM has six H- bridge cells, six dc-link capacitors *C* that provides the dc voltages to H-bridge cells and a coupling inductance with an inverter. The voltage provided by MLI was used for reducing the number of levels and synthesis the average switching frequency. The terminal voltage and the load current are used for compensating and balancing the voltage regulation. The PLL was synchronized to the fundamental voltage of the primary transformer for generating the desired frequency. The integral part of the controller which is a feedback to the controller to generate the average switching frequency of the inverter, when turn-off the switching pulses.
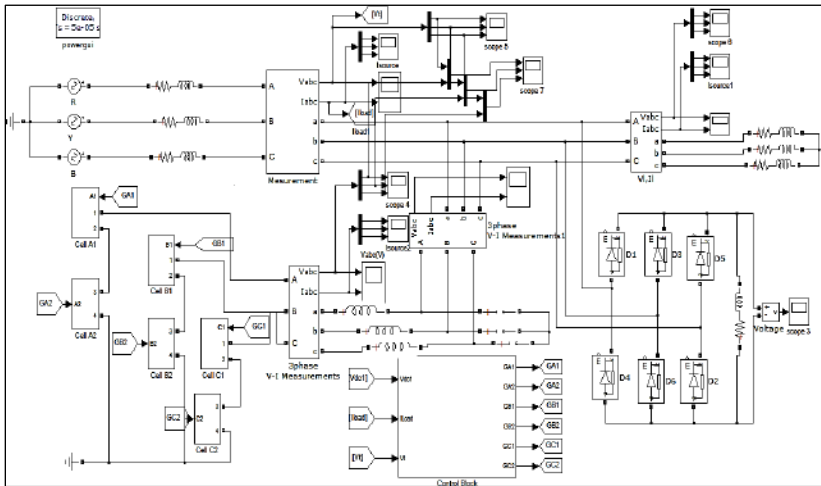

Fig 1: Cascaded H-Bridge MLI fed DSTATCOM

IV. Closed loop control of mli fed DSTATCOM using PI controller

The closed-loop control of MLI fed DSTATCOM for reduction of THD in the terminal voltage of the inverter was analysed. The Proportional Integral controller was designed and simulated using MATLAB. The performance of

DSTATCOM was validated for the distribution system. The magnitude of the load current was unbalanced and distorted due to non-linearity in before compensation of terminal voltage and load current which is shown in Figure. 2.
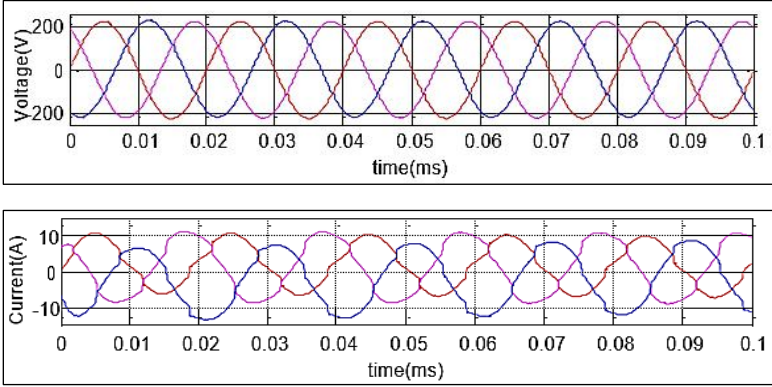

Fig 2: Before compensation of terminal voltage and load current

The Cascaded H-bridge five-level inverter fed DSTATCOM regulated the voltage and improved the THD. The reactive power exchange between MLI fed DSTATCOM and grid maintained the unity power factor balancing the power system.
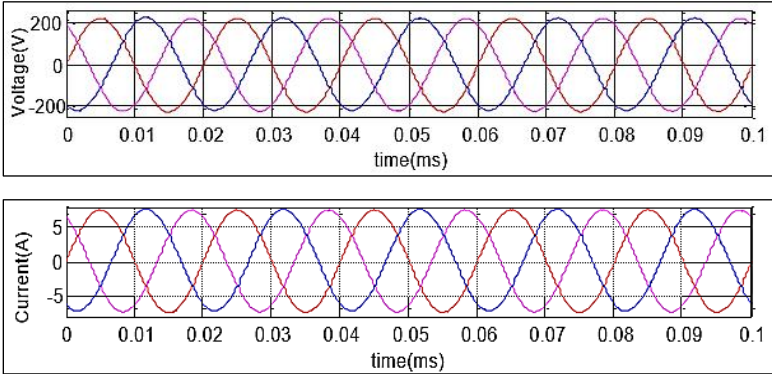

Fig 3: After compensation of terminal voltage and load current

The terminal voltage and load current of after compensation are shown in Figure. 3. The dc voltage of MLI fed DSTATCOM using a PI controller is shown in Figure. 4.
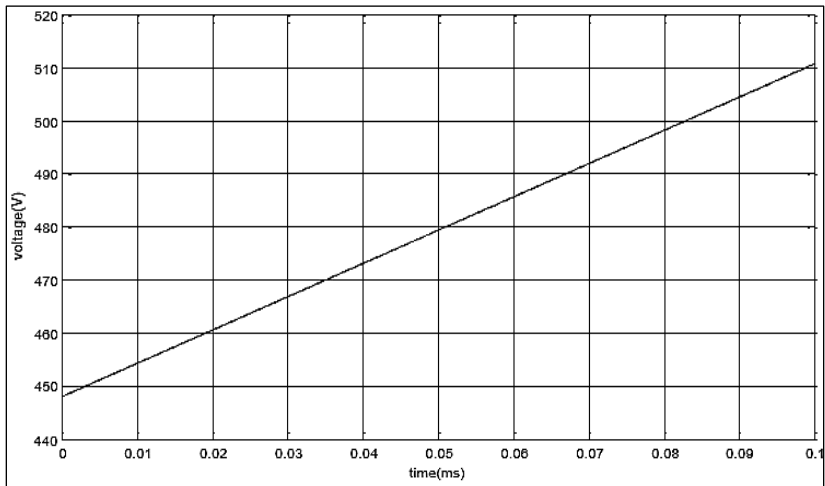
Fig 4: DC voltage of MLI fed DSTATCOM of PI controller

A steady state was attained by t=0.1 sec and the magnitude of the reference voltage was 510 V. The THD was found to be 3.87% of inverter voltage at a fundamental frequency of 50 Hz. The frequency spectrum of inverter voltage with PI controller is shown in Figure. 5.

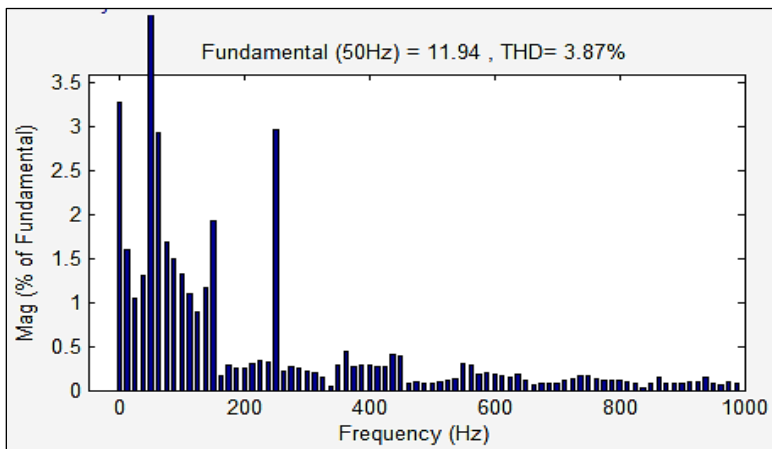

Fig 5: Frequency spectrum of inverter voltage with PI controller

V.   Proposed model of MLI fed DSTATCOM using fuzzy logic controller

The fuzzy control system is a real-time control and symbolic representation of rule base function. It provides fast response and interpretation of mathematical modelling in a simple manner. The structure of Fuzzy logic controller is shown in Figure. 6.
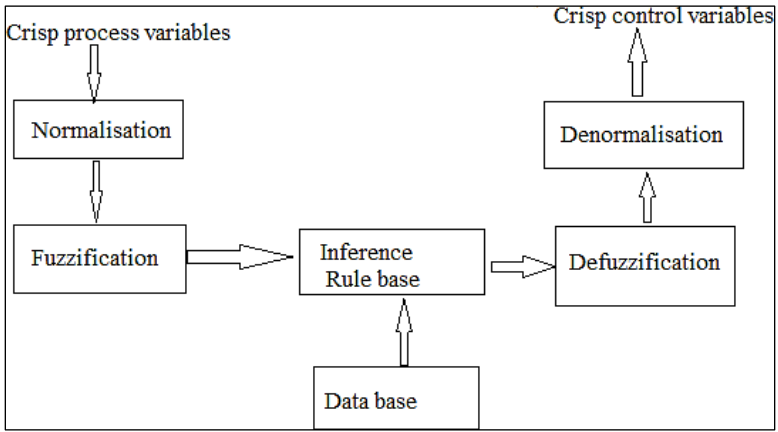
Fig 6: Structure of Fuzzy logic controller

Fuzzy logic controller was used for overshooting the terminal voltage and getting a fast-dynamic response. The basic control was determined by a set of linguistic rules which are determined by the system and numerical variables were converted into linguistic variables. The implementation of fuzzy logic control was designed to overshoot the voltage and attain the steady state in a faster response of DSTATCOM. The control block of DSTATCOM is shown in Figure. 7. There was delay in getting the input signal due to sampling time and the change of error was provided a feedback to the controller for generating the switching pulse of the inverter which was provided a fed back to PV. The rule base of fuzzy logic controller is shown in Table. 3.

Fig 7: Control block of DSTATCOM
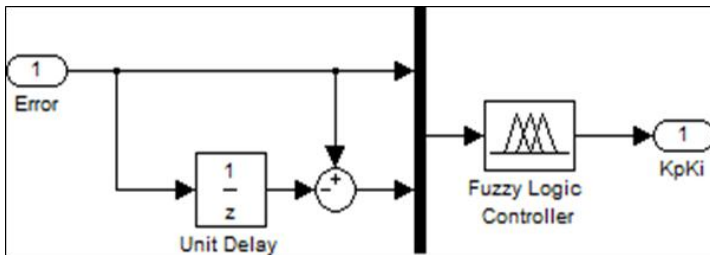
Table 3: Rule base of Fuzzy logic controller

E	AE				
	NM	**NS**	**ZE**	**PS**	**PM**
NM	ZE	ZE	NM	NM	NM
NS	ZE	ZE	NS	NS	NS
ZE	NS	ZE	ZE	ZE	PS

PS	PS	PS	PS	ZE	ZE
PM	PM	PM	PM	ZE	ZE

The fuzzy logic control for cascaded H-bridge five inverter of MPPT was simulated. In this case, five fuzzy levels were used: NM (Negative Medium), NS (Negative Small), ZE (Zero), PS (Positive Small), and PB (Positive Medium). The membership function of fuzzy logic controller is shown in Figure. 8.
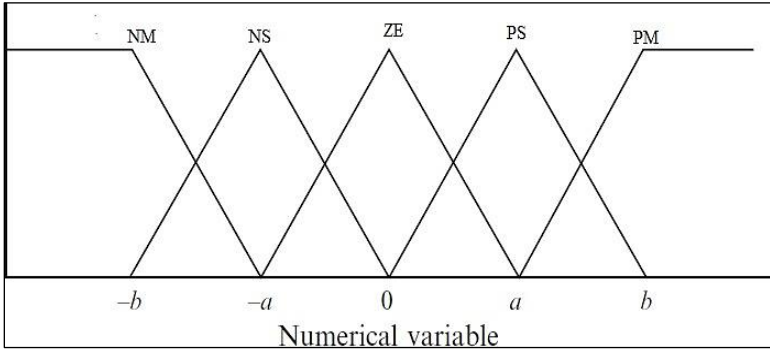

Fig 8: Membership function of Fuzzy logic controller

It is mainly based on a range of values of numerical variables to create accuracy. The input of fuzzy logic controller for MPPT was considered as error E and change of error as ΔE. Due to the elimination of $\partial P/\partial V$ at the MPP, to control the power inverter.

$$E(n) = \frac{P(n)-P(n-1)}{V(n)-V(n-1)}$$

$$\Delta E(n) = E(n) - E(n-1)$$

Similarly $e = \frac{I}{V} + \frac{\partial I}{\partial V}$ has been calculated by numerical variables of rule function shown in Table 4.3 by different combination of E and ΔE respectively.

Considering this, the operating point is far away from the left of the MPP, i.e., the error E was PM and the change in error was ZE. There was an increase in the duty cycle of the inverter through variations in MPP to PM. The reverse process was done by defuzzification of membership function.

The dc voltage of MLI fed DSTATCOM using a fuzzy logic controller is shown in Figure. 9. The steady state is attained by t=0.1 sec and the magnitude of the reference voltage is 335 V.
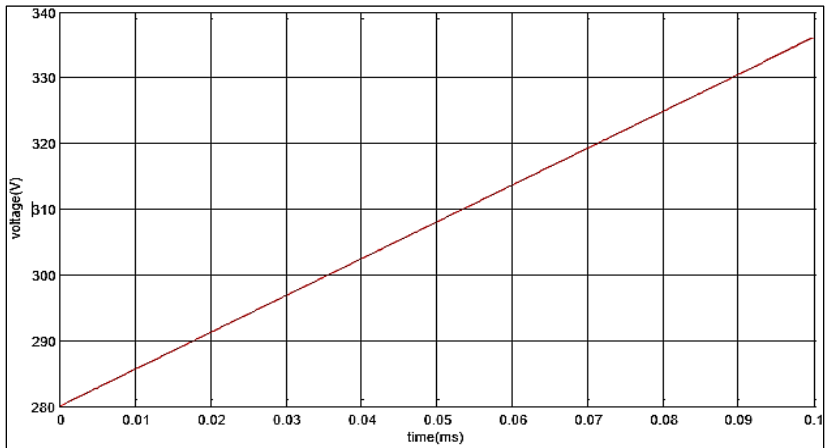
Fig 9: DC voltage of MLI fed DSTATCOM of fuzzy logic controller

The THD was found to be 1.38% of inverter voltage at a fundamental frequency of 50 Hz which is shown in Figure.10. The fast response of system voltage with reduced THD and overshoot voltage of fuzzy logic controller achieved good performance compared to the proposed PI controller.
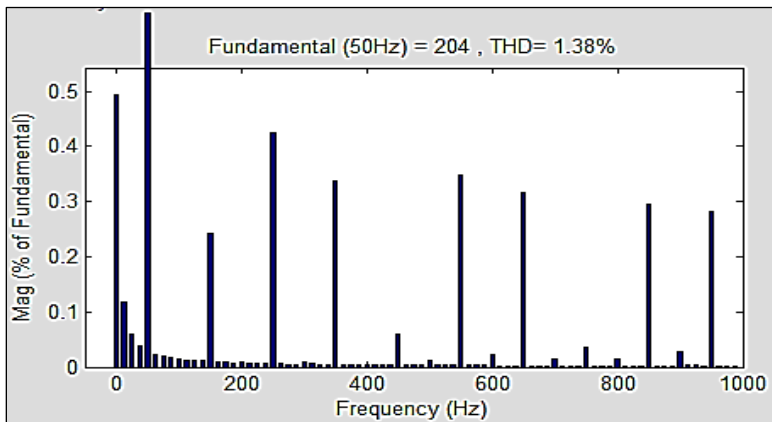
Fig 10: Frequency spectrum of inverter voltage with Fuzzy controller

VI. Conclusion

The performance of the multilevel inverter fed DSTATCOM was modelled and verified with hardware setup. The implementation of the fuzzy logic controller was meant to track the fast response time and improved THD of the system. The proposed model has been simulated with MATLAB. The hardware components of the multilevel inverter fed DSTATCOM were designed. The Cascaded H-bridge multilevel inverter fed DSTATCOM was

proposed by the control strategy to mitigate the power quality problems in the distribution system.

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Chapter - **7**
A Study of Self-Reflexivity in Select Dalit Writings

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Chapter - 7

A Study of Self-Reflexivity in Select Dalit Writings

Vemuganti Sreehari and Sukanta Ghosh

Abstract

In this present and current global research scenario, the theme of subaltern has become a household word in regular usage and also in various disciplines other than literature. Literature, on the other hand, represents life in relation to social reality. The word 'subaltern' has its origin in the German word which means 'inferior rank' or 'secondary importance'. Julian Wolfreys defines subaltern as a concept: 'It contains the groups that are marginalized, oppressed and exploited on the cultural, political, social and religious grounds'. Thus, subaltern literature reflects various themes such as oppression, marginalization, gender discrimination, subjugation of lower and working classes, disregarded women, neglected sections of society and deprived classes of the existing society. As De Boland rightly confesses, 'literature is an expression of society'. Literature in itself embodies life and life is a social reality of society.

A writer, who is a member of a society, is influenced by specific social status and receives some degree of social recognition and recompense. Though this may benefit them in one way: it obviously helps them bring to limelight the sufferings and difficult paths the downtrodden tread upon. Thus, this article focuses on the voice of the voiceless in bringing out their voices to be heard in the outer world. In Bama's *Karukku*, she testifies her situation of life and narrates her feelings in this small writing. In a world where problems relating to human privileges have been under perilous focus, literary portrayals of the experiences of demoted groups have assimilated great implication. The modern stream in Dalit literature in India is a challenge to bring to prime the experiences of discrimination, inequality, violence, injustice and poverty of the Dalits.

Keywords: Dalit writing, reflexivity

1. Introduction

Dalit writings as a literary phenomenon emerged during 1970s and 1980s. The credit goes to the emergence of Dalit Panther Movement in

Maharashtra against the caste dominant forces that perpetuate and maintain caste-based hierarchies in India. The organisation of socio-cultural structure in India is based on binary oppositions. These binary oppositions can be categorised as fixity versus fluidity, liberty versus dependence, hierarchy versus interdependence, individualism versus collective identity, past and present, tradition versus modernity1 and upper and lower castes. This division determines the social relationship of people among various cultures in India and particularly in caste system it helps to maintain the difference and division of castes. Similarly literary production in India is mostly dominated by dominant section/caste and is considered an upper caste vocation keeping aside few exceptions historically. In their worldview, the central position was dominated by upper caste or middle-class character whose experience, perspective and worldview was considered as universal in nature that represents Indian reality.

There were texts written from the perspectives of downtrodden as well but are duly rejected by Dalit intelligentsia 2. Hence Dalit literature has a unique space in Indian literature and the displacement of narrative worldview from the elite or middle class to a Dalit, an untouchable, a downtrodden, is a part of the political and cultural transgression that challenge the formalist realist writings that validates a belief in collective nationalist movement and the conflation of caste and class politics in literary arena. Literature on caste system in India is innumerable and dates back to centuries. Writers offer various views about the origin of the caste system in India. First reference to the caste system is found in a Brahmanical text, Purusha Sukta in Rig Veda that talks about the division of society on the basis of four varnas, i.e., the Brahmins, the Kshyatriyas, the Vaishyas and the Shudras 3. Caste system is the basis of Indian social structure in terms of maintaining social relationship. Writings by untouchables talk about their experiences of being at the lower caste order and how they face discrimination and humiliation. This self-reflexive tradition of writing exists in India and forms a theoretical framework for the meta-narrative tradition of writings that dates back to Buddha and his preaching.

2. Objective and scope of work

A. Self-Reflexive narrative and Sharankumar Limbale's Akkarmashi,

Sharankumar Limbale, born on 01st June 1956, is a Marathi language Dalit poet, novelist and literary critic. He has published his autobiography titled as Akkarmashi in Marathi in 1984, English transition titled as Akkarmashi: The Outcaste in (2007) and semi-autobiographical work The Hindu: A Novel. His literary treatise Towards an Aesthetic of Dalit

Literature (2004) has won him critical acclaim in the literary sphere. His writings concentrate of issues related to untouchability, gendered identity, exploitation of downtrodden and identity crisis of socially mobilized ex-untouchables. His writings question the formation of Dalit identity, its process and the role of Dr. Ambedkar's teaching that acts as an emancipatory factor for ex untouchables. His autobiography Akkarmashi: The Untouchable acts on the similar thematic concern of identity issue and the effect of Ambedkarism on his mental growth as a politically conscious Dalit figure who decides to work to emancipate his community from the clutches of vicious circle of caste. Sharankumar Limbale's Akkarmashi.

The Outcaste is a major text by a Dalit writer that acts as a meta-narrative of caste atrocities faced by millions of untouchables in India since ages. Originally written in Marathi, it was translated into English by Santosh Bhoomkar and published by Oxford University Press Delhi in 2007. It captures Limable's twenty years of experience that culminates in writing this autobiography. It is an account of Limbale and his growth into an Ambedkarite figure which can be interpreted as a life narrative of the entire Mahar community. It portrays the exclusion and discrimination of entire community on the basis of their caste identity that for grounds the discourse of caste discrimination and atrocities in Indian social structure. This text exposes the functioning of caste identity as central to the social structure that determines the life trajectory of any individual, as G.N Devy.

B. Self-Reflexivity in Omprakash Valmiki's Joothan: A Dalit's life story

Omprakash Valmiki was born on 30th June 1950 in Barla, District Muzaffarnagar Uttar Pradesh. He was a poet, playwright and a dalit writer. He is known for his autobiography Joothan: A Dalit's Life. He has published three collections of poetry: Sadiyon ka Santaap (1989), Bas! Bahut Ho Chuka (1997), Ab Aur Nahin (2009), Dalit Sahitya: Anubhav, Shangrash or Ytharth, Amma and Other Stories, Salaam (2000), and Ghuspethiye (2004). He wrote a treatise on Dalit aesthetic Dalit Sahitya ka Saundrayshastra (2001), a history of Valmiki community Safai Devata (2009) and a play, Do Chehra. He was awarded Dr. Ambedkar National Award in 1993, Parivesh Samman in 1995, Jayshri Samman in 1996, Kathakram Samman in 2001, New India Book Award in 2004, Sahitya Bhushan Samman in 2006 and 8th World Hindi Convention in 2007. He also translated Arun Kale's collection of poems from Marathi to Hindi as Shayran Ka Shahar and Kancha Illaihi's Why I am not a Hindu into Hindi. He died on 17th November 2013. His treatise Dalit Sahitya ka Saundraya Shastra is a ground-breaking work that

attempts to define aesthetics of Dalit literature that for grounds Dalit aesthetics and principles within Ambedkarite movement that is the back-bone of anti-caste movement.

His novel, Safai Devata, traces history of people belonging to Bhangi caste and studies various aspects of socioeconomic conditions of sweepers and cleaners in India. Valmiki's writings are about lower caste people and their day to day struggle to survive against the rampant caste discrimination that eats up the dignity of lower caste people and their community. His writings question the dehumanized identity of untouchables that is associated with their entire community and that has a religious sanction through which the caste-based discrimination is justified in Indian society. His writings voice his protest against 2 various kinds of discriminations that kills human His autobiographical narrative, Joothan: A Dalit's Life, is a classical text that exposes the caste biasness of Tyagi and Taga caste people in a UP village against Chuhra, Bhangi and Chamar community in which Valmiki was born and raised. Published in 2007 in English translation this autobiography captures the narrative of Omprakash Valmiki who was born in a Chuhra community and his and the entire community's struggle with caste humiliation and its atrocities. His text also reflects on power and discipline politics of dominant community that is seen as natural and essential part of their day to day social interaction with dominant caste as their caste identities determine conditions of sociality. Power struggle is another concern which is central to Valmiki's autobiography and his experience after social mobilization, either through education or companionship that reflects on implicit existence of power and caste politics that act as a defeating force against mobilization of untouchable communities. In his autobiography, as a grown-up man, he reflectively looks back at the historical trajectory and reflexively portrays his and other people's lives. Exploration of their own nature and self-reflexivity is a central concern to Dalit writings. According to Margaret S. Archer "reflexivity is a regular exercise of the mental ability, shared by all normal people, to consider themselves in relation to their (social) contexts and vice versa" (4). According to Giddens "reflexivity is a capacity via which individual and social lives are produced and changed as people react to their circumstances in ways no longer governed by tradition" (Cited in Holmes, 140).

C. Caste stratification and the narrative of Uchalyas

Laxman Maruti Gaikwad was born on 23rd July 1956, in Dhanegaon, Latur District, in Uchalya community and he is famous for the autobiographical account of his life and that of his branded community in

Uchalya: The Branded. He was awarded Maharashtra Gaurav Pursakar and the Sahitya Akademi Award for his autobiography. He has also penned other novels like, Dubang, Chini Mathachi Divas, Samaj Sahitya Ani Swatantra, Wadar Vedna, Vakila Pardhi, Utav and Swathantra Konasat. Uchalya: The Branded by Laxman Gaikwad is an account of social and vocational stratification of his community due to which their condition remain downtrodden and they face different kinds of exploitations from state and other dominant community. It narrates the life of Gaikwad, his experiences with society as large and his community's lives as part of his autobiography. It is an autobiographical account of Laxman Gaikwad that delineates the history, past and present, of his Uchalya community which was branded as a born thief community by the English government during colonization1 of India from where this text derives its title. The text begins by exposing his community's condition and how stratification as born thief leads to create conditions that perpetuate their dependency on the state machinery to survive. Law plays the role of the superstructure in the context of Uchalya community as they were tagged as born and natural thief that stratifies a historically negative image on them.

Ganesh Devy, in his research on denotified community talks and contextualizes the stratification of Uchalya community, traces their history to the early years of British colonial rule in India where those who opposed and stood against the policy of colonial expansion were considered and tagged as criminals, especially those who used armed struggle against them. They were tagged as criminals and treated accordingly and their list included "the wandering minstrels, fakirs, petty traders, rustic transporters and disbanded groups of soldiers were included by the British in their list of the criminal groups." (Devy, 51) So rather than hailing them as anti-colonials who opposed the British dominance and stood against their might, they are treated as criminals even in post-independent India. In post independent India they are treated as born thief and their treatment as criminals continuous. This shows the double standard of Indian politicians which was dominated by the upper caste intelligentia and even right now as well. Rather then removing the negative identity marker from their caste identity the dominant section continues to harrass and exploit them in the name of their caste and colonial identity as criminals.

So their lower caste status and thieving profession become synonymous to each other which Gaiwad delineates in his autobiography. Gaikwad begins his narrative with the larger question of caste and gives his autobiography a larger view by including small biographical incidents of his grandfather,

Lingappa and his brother Manikdada's lives where Manikadada is trained to be a thief that provides an overarching presence of vocational identity as a dominating factor that decides their life trajectories. Through these incidents from their lives Gaikwad attempts to create a discourse and exposes the vicious circle of caste and vocation in Indian social structure that determines its structural values and functions. Through this strategical move, Gaikwad represents an environment of insecurity faced by Uchalya community where the issue of survival becomes paramount. Due to the imposition of colonial identity, that led to their social and economical stratification they are always seen as potential threat to the normative society and as a result not given any job by anyone.

3. Self-reflexive mode of narrative

3.1 Self-reflexive mode of narrative: An analysis of Bama's Karukku

Dalit Women autobiographies emerged during 1970s and 1980s in India. The period before their literary emergence is considered as a period of non-existence of different voices, as Rege refers to it as 'silent' or 'silenced years of feminism' where dominant class and caste feminism dominated Indian literary arena (cited in Chakravarti 142). The invisibility and inability of Indian feminists to represent issues of Dalit women led to an autonomous assertion as "a different voice" of Dalit feminists (Rege, WS-39). 1980s was the time when the assertive voices of Dalits ringed the political environment in terms of Dalit identity, consciousness and their socio-economic and cultural function became an issue of debate. Difference came to occupy the central stage of discussion in feminist analysis that was exercised to historically locate different voices and to represent the inability of both the Dalit social movement and women's movement to include the voices of Dalit women. Dalit feminism is a challenge to the hegemony of Indian feminism and the hegemony of Dalit men. Till 1970s and 80s their voices were represented by the dominant feminist movement in India and their distinctive experiences of life was submerged under the expressions like 'all women are Dalits because all women were involved with cleaning jobs for their children' (cited in Chakravarti 142). It fails to understand the distinctive relationship between labour, caste and stigma that gave impetus to form separate understanding of Dalit women within feminist movement in India. It brings to forefront the issue of re-visioning of feminist politics in India.

The mingling of caste and gender produces a combined discourse that suggests a Dalit feminist standpoint which was non-existent earlier. This step is solidified by writings of various Dalit women who used various genres to

express their pain through writing as 'the exclusion of Dalit Women from the Women's movement gave rise to Dalit Feminism 1'. Almost all Dalit women writers write in their native language, apart from Sujatha Gidla and Viramma, who speaks to Racine and narrate her story to her. Viramma: Life of an Untouchable (1998) is a poignant life story of Viramma who recounts her life of caste discrimination to Racine. Kumud Pawade's Antahspot (Outburst, 1981) narrates Kumud's gaining education in Sanskrit language, marrying an upper caste male, giving birth to a child and despite that she is not accepted by upper caste in-laws. Shantabai Kamble's Majhya Jalmachi (The Kaleidoscopic View of My Life, 1983) talks about Kamble's life in caste and sexually divided space and the experience of women inside and outside of the home. Babytai Kamble's Jine Amuche (Prisons We Broke, 1987) talks about the tryst of eternal poverty with lower caste people and how hunger, caste and labour, all mixed together, are parts of their lives.

Urmila Pawar's Aydaan (Weave of My Life, 1988), recounts Urmila's struggles to get education amid perennial poverty, caste discrimination and achieving the dream of her father to become an educated person. Gogu Shaymala's Father May Be an Elephant and Mother Only a Small Basket, But... (2012), weaves the struggle, caste oppression and gender discrimination faced by women in one of the village in Telangana 2. Sujatha Gidla's Ants Among Elephants: An Untouchable Family and the Making of Modern India (2017), talks about their struggle to overcome poverty, caste oppression, social ostracism and territorial stratification in the name of caste. It critiques the modernist agenda of political parties and emergence of Maoist activities of those who are tagged as threat to national security and integrity. Caste stigma is a running theme in all these writings and they articulate the difference, in terms of gender and caste experience through their writings.

Conclusion

Secularism and nationhood are the two defining notions of modern India drawing strength from the India Constitution. Secularism supports individual right to practice one's faith and the notion of nationhood is invoked to create a sense of belongingness in terms of geographical and national identity. Dalit writings do not engage with the larger homogenous categories. Instead, Dalit writings constantly interrogate and challenge the common-sense notion of secular-modern nation. This resistance to association with categories of modern markers is at the core of Dalilt Literature's structure and thematic concerns. Their writings deestablish the abstract universalism of human condition that purportedly presented itself as an emancipatory discourse

dwelling upon the diverse conditions of human kind. Dalit writings are explicit resistance to such notions of representations that tend to homogenize in order to present their own experiential accounts of their lives. Dalit writings first emerged in native language in India and in English in 1990s.

These writings situate the question of human rights, equality and caste discrimination within the larger discourse of autobiographical genre wherein personal becomes synonymous with collective. Prior to 1970s their voices were represented by dominant section and similarly their existence was within a given master narrative that espoused homogenous categories of existence. The uniqueness and difference of their experiential narratives and the particularities of their experiences got submerged in the grand narratives of nationalism and secularism. Similarly, during the period of sanskritization their identity gets submerged or lost in the larger cultural space dominated by upper caste politics/identity. They live a life of dependent, at the mercy of dominant caste who exercises the monopoly over resources.

Future scope

This research is important in terms of applying the sociological framework to analyse the work of literature and providing a different perspective of "self-reflexivity" to analyse the work of Dalits. Available literature on dalit subjects indicate a possible direction towards which the dalit writings seems to be heading. This direction would historically associate it with the historical movement of Dalit Panthers and their later subsequent development within the literary disourse. Just like Harlem Renaissance brought back the pride in being black among Afro-American writers in the same strain Dalit writings accept the identity of being downtrodden and humiliated by the upper caste ideology.

Just like 1st generation of African writers, Chinua Achebe and NgugiWaThiango and others, have exposed the colonial mentality of the west and their exploitative tendency, 1st generation of Dalit writes like Valmiki, Vasant Moon and others expose the existence of caste biasness in India society. The contemporary generation of African writers like Ben Okri who celebrates black-ness, black identity and black culture in his writings similarly Dalit writers like Kalyana Rao in Untouchable Spring celebrates the Dalit culture, identity, self and its tradition. He reclaims the grotesque of dirt and celebrates it by weaving a beautiful narrative around it. The self-respect movement which was started by E.V. Periyar in the South in the beginning of 20th century in India. In the similar strain Kalyana Rao's texts celebrates Dalitness and Dalit culture which is natural in Untouchable Spring.

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Chapter - 8
The Application of ICT Tools for Learning English and Communication Skills: A Case Study of Undergraduate Engineering Learners

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Chapter - 8

The Application of ICT Tools for Learning English and Communication Skills: A Case Study of Undergraduate Engineering Learners

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Abstract

The main aim of this work was to use ICT based tools with a view for developing the Basic English and communication skills, and to evaluate the impact, effectiveness and usefulness of ICTs for language learning, especially for the students of Engineering. The researcher used various ICT approaches by selecting the tools to share and teach English as language to them the researcher also employed the learning material through various channels like; Face book, WhatsApp, You Tube Videos, Blogs and Mobile Applications. The comparative result analysis was prepared with the help of results of pretest and posttest of the learners. At the end overall analysis was done by the researcher about the improvement graphs of the learners after using different ICT based tools for English language and to boost communication skills of the learners.

Keywords: ICT, Communication skills, English tools

1. Introduction

Including India most of the world learns English as a second language and consequently the age at which this learning begins is higher for them than those for whom it is the first language. For learning of English as second language there are two dissimilar purposes or inspirations that people usually have, they are to be able to read and understand English texts and also be able to write in English, and, to be able to have effective verbal communication in English. In India If we ask a question to any Indian Parents that in which school they want their children to get education in; then their answer definitely would be, 'in any good English Medium school. English has left this much deep impact in the minds of Indian people. Even though it is a foreign language, we get impressed by a person who is a fluent and excellent speaker of English or even consider them as intellectual

people. There is no exaggeration in saying that, "English has become language of high estimation". Every language has a curtailment for its reach but English has none. Even if an individual's group of English is restricted but there is no limit to reaching out to the world at large. Whatever be the level of mastery over this international language, English can be pondered to stand for empowerment, novelty, creation, learning, internet, science, success and honors. It is ample for most people to procure a rock-bottom level of English for a majority of aspiration. (Enokizono 29).

Acquaintance of English in India today has become very obligatory. English is used in numerous fields more than any other language. English is imperative in India because most of the higher education books are printed in English. English is the third most spoken language in the world. "How to learn English" keyword is searched on Google monthly and 44.9% (55,364) people searching in India. If one has to continue to exist in today's cut throat competition one should have a good command in English. The world is filled of diverse languages. Our country which is a land of diversity has profuse languages as well. And along with that Hindi, English and additional languages as the bureaucrat languages. On the other hand Hindi give out a lingua common language although English have turned out to be more imperative and all the rage language at the in attendance. English is used almost everywhere and that's why it has turn out to be a necessitate to be excellent in English. Now a day English language is a associate language for those who doesn't have common language for communication. So in that case English language has unlock the gate of opportunities, thus we can say that English to day is window of the world or language of the globe. (Reddy; 781).

2. Statement of the problem

In this research project an endeavor is made to fetch transformation and revolution in conventional methods of teaching by integrating TCT (Information and Communication Technology) tools. This research study is prepared with the students of Engineering of under Graduate level. Consequently the statement of problem is formulated as given below. "The Application of ICT tools for learning English and Communication Skills: A Case Study of Undergraduate Engineering Learners".

3. Elucidation of terms

ICT: The tenure ICT stands for Information and Communication Technology. These technologies encompasses computers, the Internet, broadcasting technologies (radio and television) and telephony. Usually tools

of ICTs are divided as synchronous and asynchronous tools. Asynchronous tools possibly will comprises email, blogs, wikis, newsgroups, podcasts, RSS Feeds, you Tube, Audio graphics and Online forums. while Synchronous tools might contain Skype. Google Talk, MSN, yahoo messenger and video messaging. (Ajayi 139).

English: English language is an origin of West Germanic language. It was earliest came to existence in near the beginning of middle age in England and in due course turn out to be a worldwide lingua franca. English is extensively spoken language in the world today. Now a day it is possible to pass through the whole world if you understand and speak English language. Consequently English is also known as "Link" language and "Global Language as well. English is widely spoken language in India also. In India English is known as second language or foreign language. (Wood 5).

Communication skills: Communication skills are aptitudes we use when giving and in receipt of dissimilar types of information. A communication skill engrosses listening, speaking, observing and empathizing.

Undergraduate learners of engineering: In this research study the sample learners are Under Graduate students of engineering field, who learns English as obligatory subject in both first and second semesters of their first academic year.

4. Objectives of the study

Key Objectives of this research study are as follows: The foremost objective is to evaluate the effectiveness ICT applications compare to conventional methods of English language teaching and to improve communication Skills in English of undergraduate learners of engineering. To compare vocabulary learning by ICT based tools and classical method. And to compare reading comprehension ability taught by ICT based methods and traditional method.

To compare listening comprehension ability taught by ICT based method and conventional method, to compare speaking ability taught by ICT based method and conventional method, to compare reading and writing ability taught by ICT based methods and traditional method.

5. Variables of the study variables in this research work are listed as follows

Treatment variable: The two-treatment variable in this study is; 1. Teaching of English language and communication skills using ICT based

tools. 2. Teaching of English language and communication skills by means of conventional Independent Variables: During this research work the efficacy of ICT based tools and their application is evaluated in the dissimilar background of independent variables such as;

1) Edifying environment of parents.
2) Gender of learners.
3) Exploit of English language by learners at home environment.

Dependent Variables:

In this research study dependent variables are scores achieved by students in different language components such as;

1) Score achieved in learning vocabulary.
2) Score achieved for appropriate pronunciation, sound recognition, and for accurate spelling recognition.
3) Score achieved for Listening, Speaking, Reading and, Writing ability.

6. Analysis and Interpretation of data

This work provides details of the experiment conducted to use and experiment and try out some ICT tools that were selected for the students to understand and improve communication skills of undergraduate learners of engineering, which commence with the design of the project, which provides information about the research procedure, sample and the test. The chapter also depicts in details, the process of the use and experiment of ICT based undertaking in the classroom. The use of modern computers has accelerated large-scale statistical computation, and has also made possible new methods that are impractical to perform manually, [n applying statistics to a scientific, industrial, or societal problem, it is necessary to begin with a population or process to be studied. A population can also be composed of observations of a process at various times, with the data from each observation serving as a different member of the overall group. Data collected about this kind of "population" constitutes what is called a time series. For practical reasons, a chosen subset of the population called a sample is studied-as opposed to compiling data about the entire group. Once a sample that is representative of the population is determined, data is collected for the sample members in an observational or experimental setting.

7. Research procedure

This research study and mainly employs the qualitative procedure to evaluate the impact, effectiveness and use and experiment of ICT based task

and tools to improve English language communication skills of English, to the students of Undergraduate students of Engineering. Qualitative research is based on the phenomenological paradigm, which uses a variety of interpretive research methodologies. A variety of terms have been used for the various forms of qualitative methods, including: ethnographic, case study, phenomenological constructivist, and participant, observational and so on. This chapter depicts the data were analyzed on the basis of the scores obtained by the sample group in pre-test and post-test. Several types of statistical parameters were used to verify the validity of the finding of the experiment. They are like; Measure of Standard Deviation - S, Measure of Mean Score-M and Measure of Z scores.

8. Statistical methods

A common goal for a statistical research project is to investigate causality, and in particular to draw a conclusion on the effect of changes in the values of predictors or independent variables on dependent variables or response. There are two major types of causal statistical studies: experimental studies and observational studies. In both types of studies, the effect of differences of an independent variable (or variables) on the behavior of the dependent conducted. Each can be very effective. An experimental study involves taking measurements of the system under study, manipulating the system and then taking additional measurements using the same procedure to determine if the manipulation has modified the values of the measurements.

Contrast, an observational study does not involve experimental manipulation. Instead, data are gathered and correlations between predictors and response are investigated. An example of an experimental study is the famous Hawthorne study, which attempted to test changes to the working environment at the Hawthorne plant of the Western Electric Company. The researchers were interested in determining whether increased illumination would increase the productivity of the assembly line workers.

The researchers first measured the productivity in the plant, then modified the illumination in an area of the plant and checked if the changes in illumination affected productivity. It turned out that productivity indeed improved (under the experimental conditions). However, the study is heavily criticized today for errors in experimental procedures, specifically for the lack of a control group and blindness. The Hawthorne effect refers to finding that an outcome (in this case, worker productivity) changed due to observation itself Those in the Hawthorne study became more productive not because the lighting was changed but because they were being observed. An

example of an observational study is one that explores the correlation between smoking and lung cancer. This type of study typically uses a survey to collect observations about the area of interest and then performs statistical analysis. In this case, the researchers would collect observations of both smokers and non-smokers, perhaps through a case-control study, and then look for the number of cases of lung cancer in each group. ("Qualitative Research Practice").

9. Statistics in linguistic research

At present statistics is viewed not only as a mere device for collecting Numerical data but as a means of sound technique for their handling and analysis and drawing valid inferences from them. It embraces all sciences. Today it is rather impossible to think of any sphere of human activity where statistics does not creep in because statistical methods and tools provide quantitative measurements to complex and uncertain social phenomena. The word 'Statistic' has been used to convey different meaning, in plural and singular sense. When word Statistic is used as plural, it means numerical set of data and when used in singular sense, it means the science of statistical methods embodying the theory and techniques used for collecting, analyzing and drawing inferences from numerical data. Statistics also deals with the variations of variables.

The variables to be studied should be homogeneous as whole series is specified in terms of one individual only. Since statistics is a sciences dealing with a set of numerical data, it can be applied to the study of only those phenomena which can be measured quantitatively. Thus the basic knowledge about statistics becomes Inevitable for research works for systematic analysis and accurate and precise interpretation of data. (Best, John. W, Kahn James V).

Conclusion

In the last decade, changing conceptions of learning and rapid technological advances have been accompanied by changes in language teaching and learning. Language classrooms are increasingly turning into blended learning environments that focus on active learning. It is commonly, known that active learning advances the learning process and thus raises the quality of the language learning experience. Blended language learning uses multiple teaching and guiding methods by combining face-to-face sessions with online activities and utilizing a mix of technology-based materials. The growing use of ICT in blended language learning environments has changed the face of language teaching and learning in a beneficial way and will

continue to do so along with future technological innovations. The main benefits of ICT to language learning are presented below by drawing on the perspectives of Jonassen *et al.* (1999) who define technology-enhanced meaningful learning as active, authentic and cooperative.

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