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IMPLEMENTATION ON BRAIN TUMOR DETECTION USING CNN

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Abstract—The cerebrum tumors, are the most widely recognized and forceful ailment, prompting an exceptionally short future in their most elevated evaluation. In this manner, treatment arranging is a key stage to improve the personal satisfaction of patients. For the most part, different picture strategies, for example, Computed Tomography, Magnetic Resonance Imaging and ultrasound picture are utilized to assess the tumor in a brain, lung, liver, bosom, prostate... and so forth. Particularly, right now pictures are utilized to analyzeturor in the brain. Anyway the gigantic measure of information created by MRI filter upsets manual grouping of tumor versus non-tumor in a specific time. Be that as it may, it having some restriction precise quantitative estimations is accommodated predetermined number of pictures. Thus trusted and programmed grouping plan are basic to forestall the demise pace of human. The programmed cerebrum tumor characterization is exceptionally testing task in enormous spatial and auxiliary inconstancy of encompassing area of brain tumor. Right now, cerebrum tumor discovery is proposed by utilizing CNN grouping. On the off chance that tumor is recognized framework ordered the tumor and passes on quiet the phase of tumor he is likely torment.

Keywords—MRI, Brain tumor, CNN, feature extraction, classification

I. INTRODUCTION

Cerebrum tumor is one of the crucial organs in the human body, which comprises of billions of cells. The unusual gathering of cell is shaped from the uncontrolled division of cells, which is likewise called as tumor. Cerebrum tumor are partitioned into two kinds such poor quality and high evaluation tumor. Second rate brain tumor is called as kind. So also, the high evaluation tumor is likewise called as harmful. Considerate tumor isn't destructive tumor. Subsequently it

doesn't spread different pieces of the brains. Anyway the harmful tumor is a malignant tumor. So it spreads quickly with inconclusive limits to other district of the body no problem at all. It prompts quick death.¹² Cerebrum MRI picture is mostly used to identify the tumor and tumor progress demonstrating process. This data is basically utilized for tumor recognition and treatment forms. X-ray picture gives more data about given clinical picture than the CT or ultrasound picture. X-ray picture gives nitty gritty data about cerebrum structure and inconsistency recognition in brain tissue. All things considered, Scholars offered not at all like computerized strategies for cerebrum tumors finding and type inventoriing utilizing brain MRI pictures from when it got conceivable to sweep and cargo clinical pictures to the PC. Then again, NN and SVM are the typically utilized techniques for their great authorization over the latest few years.¹¹ However crisply, Deep Learning models fixed a blending pattern in AI as the underground engineering can productively speak to complex connections without requiring countless hubs like in the shallow structures KNN and SVM. Consequently, they developed rapidly to turn into the best in class in not at all like wellbeing informatics zones for instance clinical picture examination, clinical informatics and bioinformatics. A brain tumor is the irregular development of cells in the cerebrum. A brain tumor can be essential or auxiliary. An essential cerebrum tumor starts in the brain itself or tissues contiguous it, for example the cerebrum covering layers (meninges), cranial nerves, pituitary organ or pineal organ, while an optional brain tumor happens when malignancy cells from different organs like lung, kidney, bosom, and so forth spread to the cerebrum [1]. Essential brain tumor at first emerges as a result of the changes of their DNA. These changes permit the anomalous cell to develop and the ordinary cell passes on. It can cause cerebrum harm and in

A Review On: Content Based Image Retrieval Using Intelligence Techniques

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ABSTRACT: Traditionally content based image retrieval is done by using text based approached that is user have to query by metadata, name , context etc which is not very efficient and useful in the digital world to resolve this problem , the new approached is proposed that is visual based image retrieval by using the visual feature of the image like color, texture ,shape etc this can be done by using different ways such as machine learning, deep learning by using CNN algorithm to extract the feature of the image and reduce the computational time as well as cost . In this paper the different proposed system developed by different researcher used in CBIR is stated.

KEYWORDS: CBIR ;Machine learning ; CNN; deep learning

I. INTRODUCTION

CBIR aims at obtaining images that are relevant to a query image from a large collection based on their visual content. Given the feature representations of the images to be searched and the query, the output of the CBIR procedure constitutes in a search in the feature space, in order to retrieve a ranked set of images in terms of a similarity to the query representation. A key issue concerning CBIR is to extract meaningful information from raw data in order to eliminate the so-called semantic-gap . The semantic-gap refers to the difference between the low level representations of images (i.e. pixels) and their higher level concepts (e.g. persons, objects, actions, etc.) [1]. To resolve this challenge the new techniques are proposed, these machine learning ,deep learning different algorithm are used to extract the feature from image such as CNN, K means Clustering, KNN ,ANN ,cosine distance etc. In CBIR, visual image contents are represented as image features, which are extracted using automatically done feature extraction methods. Thus human intervention is eliminated. The feature extraction methods are computationally expensive and have also large dimensionality and these methods tend to be domain specific. A lot of research scope for simplifying these algorithms need to be addressed [6].

Convolutional networks have been tremendously successful in practical applications. The name “convolutional neural network” indicates that the network employs a mathematical operation called convolution. Convolution is a specialized kind of linear operation. Convolutional networks are simply neural networks that use convolution in place of general matrix multiplication in at least one of their layers [2]. Machine Learning from examples means we have a tendency to attempt to construct a machine (i.e. a PC program) that may be taught to carry out a chore by observant examples. Naturally, the list uses the guidance examples to create a model of the globe that permits reliable predictions [3] Machine learning within the field of technology that offers computers the flexibility to be told while not being specifically programme. The essential premise of machine learning is to build algorithms which will obtain computer file relate degreed use practical math scrutiny to envisage an output worth with an suitable vary. [3]

Convolutional neural networks or ConvNets is a neural network that uses a convolution method to extract activation values from a volume for another volume layer. ConvNets in a simple sense is a sequence of layers, where each layer of ConvNets, convert one activation volume to another volume, with different functions. There are 3 main types of layers that have three main layers, namely convolution layer (conv layer), pooling layer, and fully connected layer [4].

Good physician's prediction For Healthcare Planning using Big Data Analytics

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Abstract: The fast growing field of big data analysis has started to play a fundamental role in the evolution of healthcare research. The huge data growth in biomedical and healthcare businesses, accurate analysis of medical data benefits from early detection, patient care, and community services. It has provided tools to analyze, manage and assimilate large volumes of big data produced by current healthcare systems. Data analysis has recently been applied to help the disease delivery and treatment process. This proposed system rationalizes machine learning algorithms to effectively predict the physician outbreaks in disease-frequent communities we are experimenting with the modified predictive models with real hospital data.

Keywords: Big data, Open data, Decision Tree, Multidisciplinary diagnosis

1. Introduction

Big Data is the art of finding information or knowledge in a large amount of data. Like statistics, Big Data is becoming increasingly common in companies and organizations that want to extract relevant information from their databases, which they can use for their own needs. Big Data tasks can, in general, be classified as tasks of description and prediction. To understand the discovery goal, it is vital to understand the difference between descriptive

and predictive tasks. Big Data technology is applied in an increasing variety of fields.

Prediction should be done to reduce the risk of Disease. Diagnosis is usually based on signs, symptoms and physical examination of patient. All most all the doctors are predicting diseases by learning and experience. The Diagnosis of disease is difficult and tedious task in medical field. Predicting disease from various factors and symptoms is a multi-layered issue which may lead to false presumptions and unpredictable effects. Health care industry today generates large amounts of complex data about patients, hospital resources, disease diagnosis, electronic patient records, medical devices etc. The large amount data is a key resource to be processed and analyzed for knowledge extraction that enables support for cost-savings and decision making. We use Machine Learning algorithms should aim to predict disease and Physician.

1.1 Problem Statement

To create a model which can provide accurate diagnosis based on patients profile using multidisciplinary approach to avoid incorrect diagnosis.

The role of predictive data analytics in retailing

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Abstract— big data analytics is the new practice in Business Analytics today. However, recent industrial surveys find that big data analytics may fail to meet business desires because of lack of business context and lack of expertise to connect the dots, incorrect scope and cluster arranged framework. In this paper, we present a goal-oriented big data analytics framework for better business decisions, which consists of a conceptual model which connects a business side and a big data side providing context information around the data, a claim-based evaluation method which enables to focus the most effective solutions, a process on how to use proposed framework and an assistant tool which is a real-time big data analytics platform. In this framework, problems against business goals of the current process and solutions for the future process are explicitly hypothesized in the conceptual model and validated on real big data using big queries or big data analytics. As an exact examination, a shipment choice process is utilized to indicate how IRIS can bolster better business choices as far as extensive understanding both on business and information investigation, high need and quick choices.

Keywords- Big Data Analytics, Goal-Orientated Approach, Business Process, Big Data, Conceptual Model.

I. INTRODUCTION

Big data analytics is a technology which helps turn hidden insights in big data into business value by using advanced analytics techniques in order to support better business decisions, as the hottest new practice in Business Analytics today. According to some surveys, about 80% of CEOs or executive teams view that big data analytics initiatives have the potential to drive business value such as creating new revenue streams, improving operational efficiency or cutting cost, and over 80% of the participant organizations do ongoing projects. However, according to another survey, 55% of big data projects

do not get completed, and many others fall short of their business objectives.

Additionally, the quality of big data analytics can only be as good, or as bad, as the quality of the big data it uses. The quality attributes of big data, together with relationships between data, should therefore be defined in a big data model. With a good quality big data model, big data analytics 2

Can accurately identify important business concerns, trend opportunities, and useful business insights, which, in turn, can lead to good business decisions. Yet, no guidelines are available for how to develop a high-quality big data model in a systematic and rational way.

Finally, with the advances in Information Technology (IT), use of software systems increasingly has become prevalent and critical in more efficiently and effectively carrying out the various tasks and activities in the fast changing business domain. However, aligning a software system well with its intended business process has been challenging, due to the difficulty in firstly understanding and precisely modeling a business process and secondly coming up with a requirements specification of a system for supporting the business process. Use of well-known notations helps: BPMN (Business Process Model and Notation) for precise modeling of a business process, and UML use case for modeling software requirements; but the second difficulty still remains. There are several issues: 1) Since there do not exist formal definitions of the models, different interpretations are possible which can lead to transformations that deviate from the original meaning; 2) A business activity can be performed either by people or system functionality; 3) The granularity of a use case is not necessarily the same as that of a business activity or task; and 4) Neither BPMN nor UML use cases consider Non-Functional Requirements (NFRs).

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Convolutional networks have been tremendously successful in practical applications. The name “convolutional neural network” indicates that the network employs a mathematical operation called convolution. Convolution is a specialized kind of linear operation. Convolutional networks are simply neural networks that use convolution in place of general matrix multiplication in at least one of their layers[2].Machine Learning from examples means we have a tendency to attempt to construct an machine (i.e. a PC program) that may be taught to carry out a chore by observant examples. Naturally, the list uses the guidance examples to create a model of the globe that permits reliable predictions[3] Machine learning within the field of technology that offers computers the flexibility to be told while not being specifically programme. The essential premise of machine learning is to build algorithms which will obtain computer file relate degreed use practical math scrutiny to envisage an output worth with an suitable vary.[3]

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A NOVEL APPROACH TO DISCRIMINATE BETWEEN INRUSH AND INTERTURN FAULT CURRENTS OF TRANSFORMER

Ganesh Bonde,* Sudhir Paraskar,* Saurabh Jadhao,* and Dwarakadas Kothari*

Abstract

Transformer protection is an important issue in electrical power system. This article presents a new approach to detect and classify amongst the inter-turn fault current and inrush current in a transformer using the teager energy operator (TEO) and support vector machine (SVM) algorithm. The inrush and inter-turn current signals are captured from the trailer made experimental set-up in the laboratory. The detection and classification algorithms are implemented using PC with MATLAB and Python script. The features are extracted using the TEO threshold-based algorithm. Those are used for training SVM. In this article, the linear kernel, polynomial kernel, radial basis function kernel, and sigmoid kernel are used for classification. All these kernels are compared based on the accuracy of classification with different values of regularization factors and changing the size of training and testing cases. The GridSearchCV optimization algorithm with a support vector classifier is also used to validate the best accuracy kernel. The computation time of TEO and classification of events is less than 10 ms.

Key Words

Teager energy operator (TEO), support vector machine (SVM), signal processing

1. Introduction

The transformer plays the role in electrical power system from generation to distribution stations. So it is important to avoid the miss-operation of the protection system. From the last few decades, primarily differential current-based protection of a transformer has been used for the protection of electrical power systems. The differential relay is used for the classification of internal fault in the transformer.

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Recommended by Dr. Ikhtlaq Hussain
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The disadvantage of the differential protection relays is that it may operate during the energization of a large power transformer. The inrush current consists of a second harmonic component. Many methods of transformer differential protection depend on the second harmonic content in current signal. The classification of inrush and inter-turn fault current is decided based on the ratio of the second harmonic component to the fundamental component of differential currents. It is found that the ratio is greater for inrush current condition than the inter-turn fault current condition [1]. The second harmonic component may also be present in the fault current of transformer, because of CT saturation. As the second harmonic component is greater than the fundamental component the differential protection based on second harmonic restrain fails to discriminate between inrush and inter-turn fault current of the transformer. Therefore, an advanced technique of protection is essential to differentiate between inrush current and inter-turn faults of a transformer [2]. Many methods have been developed to overcome this difficulty of mal-operation of differential relay which mainly includes wavelet transform-based approach. Wavelet transform is a powerful tool for classifying the inrush and inter-turn fault current because both the signals are non-stationary [3]–[7]. The wavelet transform-based approach may have good time–frequency localization. But this method requires large size data windows which get highly affected due to noise. The method discussed in [7] presents wavelet transform-based approach and ANFIS to distinguish between the inrush and inter-turn currents of a transformer. In this article, for the pattern recognition method, the $d5$ level of wavelet details coefficient is used which is too sensitive to noise. Ref. [8] presents a novel method of discrimination of inrush and inter-turn fault. In this method, the differential current is determined, then the normalization of current is done for first cycle after the occurrence of events. Then, normalized current is rearranged into ascending order. The diagnostic criterion is obtained by using the summation of sample values of the first quarter of current signal. The limitation of the method is that it requires more processing time and the first cycle can be taken for processing. Ref. [9] presents the hierarchical ensemble extreme learning machine (HE-ELM) and discrete wavelet transform (DWT)-based new

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Biographies



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Image Processing based Induction Motor Fault Detection using LabVIEW

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Abstract - Stator winding breakdown causes failure of induction motors which results in plant shut down, reduced production, accidents etc. in the production. Early diagnosis improves the safety of the operator and minimizes the maintenance cost. In this paper our aim is fault detection of induction motor based on image processing using particle analysis. This method uses image identification of the stator current Concordia patterns. A feature based recognition of stator pattern current independent of their shape, size and orientation is the goal of the proposed method. A LabVIEW simulation has been carried out to detect the stator faults present in the Induction Motor.

Key Words: Induction Motor, Fault Detection, LabVIEW, Image Processing, Park's Vector Approach, stator current

1. INTRODUCTION

Induction Motors are a critical component of many industrial processes and are frequently integrated in commercially available equipment and industrial processes. Three phase AC induction motors are probably the most common type of three phase load and are used in a variety of equipment including refrigeration, pumps, air conditioning, conveyor drives as well as their more obvious applications. The induction motors are most widely used motors in industrial, commercial and residential sectors. Motor-driven equipment often provide core capabilities essential to business success and to safety of equipment and personnel. Induction motors play a very important role in the safe and efficient running of industrial plants and processes. Early detection of abnormalities in the motors will help avoid expensive failures. There are many published techniques and many commercially available tools to monitor induction motors to insure a high degree of reliability uptime. In spite of these tools, many companies still face unexpected system failures and reduced motor lifetime. This paper deals with fault detection of induction motor based on image processing using LabVIEW. This method is based on the image identification of the stator current Concordia patterns. A feature-based recognition of stator current independent of their shape, size and orientation is the goal of the proposed method. This paper comprises of following sections. Section II represents the Park's Vector Approach technique. Section III gives details of Image Processing in which Image composition, Particle analysis and Feature extraction are further carried out. Section IV presents experimental setup. Section V discusses LabVIEW Simulink model and result. And finally section VI is concluded with conclusion.

2. PARK'S VECTOR APPROACH

In three-phase induction motors, we know that the connection to the mains does not usually use the neutral. Hence to describe induction motor in three phase, we need to represent this phenomenon in two dimension first. This 2D representation works on the current Concordia vector which is known as Park's Vector.

The current Concordia vector components (i_α , i_β) are a function of mains phase variables (i_a , i_b , i_c) as:

$$i_\alpha = \sqrt{\frac{2}{3}} i_a - \frac{1}{\sqrt{6}} i_b - \frac{1}{\sqrt{6}} i_c$$

$$i_\beta = \frac{1}{\sqrt{2}} i_b - \frac{1}{\sqrt{2}} i_c$$

7. CONCLUSION

Through Park's Vector Approach stator current I_d , I_q plot is generated. After calculating various parameters such as Area, Eccentricity, Perimeter and IOC, It is clear that stator turn fault was present. These parameters can be used to identify healthy condition from the Inter turn (20 turn) fault condition. A healthy three-phase induction motor generates a circular pattern. Eccentricity increases with severity of fault. Hence the I_d , I_q plot is elliptical in Inter turn fault condition. Differences can also be seen in the parameters calculated in table 6.4. These parameters are further used to classify the healthy and faulty condition.

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Comparative Analysis of Different UPQC

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Abstract— In the recent year's utility as well as end users are seems to be more concerned about the quality of power. Increased use of sensitive loads and emphasis on energy efficiency resulting into excessive use of nonlinear loads are the major challenges in maintaining good power quality. Power Quality (PQ) problem mostly refers to Voltage sag, voltage swell and harmonics. UPQC can simultaneously mitigate load voltage and source current problems and enhance power quality of the system. In this study the performance of new topology of UPQC namely open UPQC is investigated for the mitigation of balanced and unbalanced voltage sag, voltage swell and source current harmonics. The configurations of open UPQC namely Right Shunt Open UPQC (OUPQC-R) is analyzed with various control techniques. In this paper the capability of the OUPQC-R to enhance the power quality with reference generation and control techniques like Unit Vector Template (UVT) and Instantaneous p-q (PQ) is investigated. Various combinations of these techniques are also analyzed for the configuration of open UPQC. Simulation results carried out by using MATLAB simulink.

Keywords— unified power- quality conditioner (UPQC), pq problems, sensitive load, non linear load.

1. INTRODUCTION

The nature of electric power supply is mostly affected by the wide application of power electronic based equipment. Uninterrupted sinusoidal voltage at desired frequency and magnitude should always be provided to the consumers. On the other hand consumers should draw sinusoidal current. Many researchers are taking effort for the effective improvement of power quality. UPQC is considered as the most powerful custom power device to mitigate the problems arising due to power quality. It is necessary to take care of supply voltage disturbances such as voltage sag/swells, voltage flickers, load reactive power as well as voltage and current harmonics. UPQC is a combination of series and shunt active power filter (APF) connected through a common DC link capacitor. The series APF is connected to the supply line through a series transformer. The series APF prevents the source side voltage disturbances from entering into the load side to make the load voltage at desired magnitude and frequency on the other hand the shunt APF connected in parallel across the load limits the current related problems to the load side to make the current from the source purely sinusoidal. In this paper two different control schemes are used for series and shunt APF.

II. MODELING OF UPQC

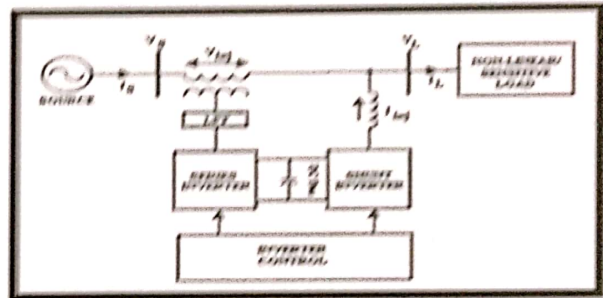


Figure.1. Configuration of UPQC

Shunt active filter

The shunt active filter has a Voltage Source Inverter (VSI), Interfacing Inductor, and ripple filter. The design of VSI includes the DC bus voltage level, the DC capacitance and the rating of IGBTs used. The design of Interfacing Inductors and the Ripple Filter is presented here. The design is carried out considering a right shunt UPQC.

The DC capacitor connected at the DC bus acts as energy buffer and provides dc voltage for the normal operation of the shunt APF. The DC bus voltage V_{DC} , DC a bus capacitance C_{DC} , interfacing inductors (L_f), and voltage and current rating of switches are calculated as below.

Selection of the DC bus voltage

The minimum DC bus voltage of VSC of shunt APF should be greater than twice the peak of phase voltage of the distribution system. The DC bus voltage is calculated as

$$V_{DC} = 2 * \frac{2\sqrt{2} * V_{LL}}{\sqrt{3} * m} \quad (1)$$

Where m is modulation index and considered 1 and V_{LL} is the AC line output voltage of the shunt APF, during transient the energy conservation is applied as

$$\frac{1}{2} * C_{DC} * (V_{DC}^2 - V_{DC1}^2) = K_1 * 3V_{alt} \quad (2)$$

Where V_{dc} is the nominal DC voltage equal to the reference DC voltage and V_{dc1} is the minimum voltage level of the DC

Fig.11 shows simulation result of right shunt open UPQC using instantaneous p-q technique. The distorted load current is shown in Fig.11 (a).The compensating current required to be injected in the system is shown Fig.11 (b) and Fig.11 (c) shows compensated source current. The UPQC is turned ON from the beginning i.e. zero instant and it injects compensating current into system. The compensating current is in phase opposition to the harmonic current present in the source current. This results in harmonic mitigation of source current.

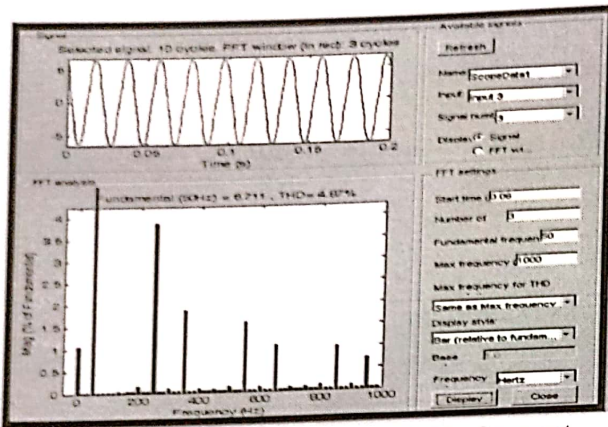


Figure.12 THD Analysis of compensated load current

FFT analysis of the source current is carried and THD of the source current is determined to be 4.87%. It is evident from the result presented in Fig 11 and Fig. 12 that right shunt open UPQC with instantaneous p-q technique for reference current generation can effectively compensate the source current harmonics. The performance of the OUPQC-R for enhancement of current quality is found adequate.

Table.2. Performance Analysis of Right Shunt Open UPQC

Factor for Performance Analysis	Performance of Right Shunt Open UPQC	
	UVT	PQ
Compensation of balanced Voltage Sag	10-30%	--
Compensation unbalanced Voltage Sag	10-30%	--
Compensation of Voltage Swell	10-30%	--
Compensation of Current Harmonics	8.70%	4.87%

CONCLUSION AND FUTURE SCOPE

It is observed from table that the OUPQC-R with the different control techniques (UVT and PQ) satisfactorily compensates the balanced voltage sag, in the range of 10% to 30%. It is also observed that the OUPQC-R with UVT technique can satisfactorily compensate unbalanced voltage sag in the range of 10% to 30%. It can be viewed from the table that

OUPQC-R can effectively compensate voltage swell in the range of 10% to 30% with UVT technique used for series control. Whereas reduction of THD from 30% to 4.87% is obtain, when PQ technique is used for shunt controller. It is also observed that reduction of THD from 8.75 % in UVT technique to 4.87% when PQ technique is used. The effectiveness of OUPQC-R configuration with UVT-PQ technique is required to be investigated experimentally. So in future an experimental study of OUPQC-R can be carried out.

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Implementation of FACTS Device to Improve Power System Stability

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Abstract- The demand for power and non-linear loads is increasing day by day, and thus stability problems arise. A technique that can efficiently afford compensation with growing or reducing load requirement and available transmission network resources are necessary. The FACTS devices are implemented, to increase the power flow capacity in an electric power network. The primary aim is to increase the load capability of the system to maintain stability after a fault occurrence. Here fault is created on system build in MATLAB/Simulink environment and the effect of series FACTS device i.e. TCSC controller is observed.

Key Words: FACTS devices, Stability, TCSC, MATLAB/Simulink.

1. INTRODUCTION

As transmission systems are getting closer to the limits of their stability and thermal limits whereas the main focus on the power quality delivered has increased significantly. Increased demands on transmission, absence of long-term planning, and the need to provide open access to generating companies and customers, all together have created tendencies toward less security and reduced quality of supply [5]. For both operational reliability and economical profitability, the transmission systems framework's utilization is crucial in a more effective and measured way. The FACTS technology is essential to overcome some of these difficulties by enabling utilities to get the most service from their transmission facilities and enhance grid reliability[4]. The ability of FACTS Controllers to control the interrelated parameters that regulate the operation of transmission systems parameter including series impedance, shunt impedance, current, voltage, phase angle, and the damping of oscillations at various frequencies below the rated frequency.[5] The FACTS technology is not a single high-power Controller, but moreover a collection of Controllers, which can be applied individually or in combination with others to control one or more of the interrelated system parameters[1]. In this paper a study of series FACTS device-TCSC (Thyristor control series compensator) is been carried out and its effect on fault compensation on a considered system is been observed.

1.1 Controlling of power system-

In any power system, the generation, transmission, and usage of electrical power can be separated into three areas,

which traditionally determined the way in which electric utility companies had been organized.

These are adorned as:

- Generation
- Transmission
- Distribution.

Although power electronic based equipment is prevalent in each of these three areas, such as with static excitation systems for generators and Custom Power equipment in distribution systems. The rapt of this paper is on transmission network i.e. moving the power from where it is generated to where there is the usage.

1.2 Power system limitations-

The limitations of the transmission system can take many forms and may involve power transfer between areas or within a single area or region and may include one or more of the following characteristics:

- Steady-State Power Transfer Limit
- Voltage Stability Limit
- Dynamic Voltage Limit
- Transient Stability Limit
- Power System Oscillation Damping Limit
- Inadvertent Loop Flow Limit
- Thermal Limit
- Short-Circuit Current Limit

The cue of solving these problems in the most cost-effective and coordinated manner is by rigorous system's engineering analysis. These limitations can overcome by controlling some system parameters by the implementation of FACTS controllers that are capable to oversee these problems.

2. Thyristor Controlled Series Compensators (TCSC)-

Capacitive reactance compensator which consists of a series capacitor bank shunted by a thyristor-controlled reactor (TCR) in order to provide a smoothly variable series capacitive reactance. A TCR is used in parallel with a fixed capacitor to enable continuous control over the series compensation. An actual TCSC system usually comprises a cascaded combination of many such TCSC modules, together with a fixed-series capacitor. This fixed series capacitor is provided primarily to minimize costs.

5. CONCLUSION:

In this paper, software based study of FACTS Device TCSC controller has been carried out From the Simulink in MATLAB system analysis. The power angle (δ) and rotor speed has extracted from system simulation model for generator stability analysis. The line voltage (V_{abc}) and line current (I_{abc}) has also been extracted from model for transmission line stability analysis. The result shows that the stability of the power network and Generator has eminently afflicted by TCSC (capacitive mode). Here LLLG fault is been applied on the considered system, faults other than LLLG can also be applied and studied for power system stability analysis with the compensation technique of TCSC controller.

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Simulation of Unified Series-Shunt Compensator for Power Quality Improvement

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ABSTRACT

This paper is related to the simulation of a Unified series-shunt compensator (USSC) which focuses on testing its ability to improve energy quality in a power distribution system. The USSC simulation model encompasses two 12-pulse inverters which are linked in series and in shunt to the system. A generalized sinusoidal pulse width modulation switching procedure is created in the proposed controller design for quick control activity of the USSC. Simulations were carried out using the MATLAB electromagnetic transient program to validate the performance of the USSC model. Simulation results shows that the capabilities of the USSC in performing voltage sag compensation, voltage unbalance mitigation, flicker reduction, power-flow control, UPS mode, and harmonics elimination. USSC gives a better performance in power-quality mitigation by comparing of the USSC with other custom power devices.

Keywords: Power quality mitigation, unified series-shunt compensator

INTRODUCTION

A growing demand for high quality, reliable electric power, and an increasing number of emerging loads have directed an increasing emphasis of power quality both by consumers and utilities. In the development of power electronic devices such as flexible AC transmission system (FACTS) and custom power devices have introduced an emerging branch of technology providing the power system with versatile control capabilities [1,2]. Generally, FACTS devices are used in transmission control while in distribution system custom power devices are used [3]. For the introduction of custom power concept, devices such as unified power-flow controller (UPFC), dynamic voltage restorer (DVR), synchronous static compensator (STATCOM), solid-state transformer (SST) and solid-state transfer switch (SSTS) are used for improving power quality and reliability of a system.[4,5] For power quality mitigation we used advanced control and improved

semiconductor switching of these devices. Investigations have been carried out to study the effectiveness of these devices in power-quality mitigation such as sag compensation, unbalance compensation, harmonics elimination, reactive power compensation, power-flow control, power factor correction and flicker reduction. These gadgets have been created for mitigating specific power-quality problems. For example, UPFC works admirably for power-flow control. STATCOM, which is a shunt compensator, is used for reactive power and voltage sag compensation, DVR, which acts as a series compensator, is used for voltage sag compensation. The STATCOM and DVR are only useful for compensating a power-quality problem and therefore, it is necessary to develop a new kind of unified series-shunt compensator (USSC) which can mitigate a wider range of power-quality problems. By using a unified approach of series-shunt compensators it is possible to compensate for a variety of power-quality problems in a distribution

by inserting a passive filter into the system. A correlation is made between the USSC and the other custom power devices, for example, D-STATCOM and DVR regarding their abilities in power-quality mitigation. It is shown that the USSC gives a superior presentation in power-quality mitigation, particularly in voltage sag compensation and power flow control, and furthermore give more power quality arrangements when contrasted with the D-STATCOM and DVR.

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APPLICATION OF SWEEP FREQUENCY RESPONNSE ANALYSIS (SFRA) METHOD TO DETECT TRANSFORMER FAULT

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Abstract- Power transformer is the most important device for reliable power system. While working with it, many faults may occur in it. Diagnosis of these faults can be done with lot of techniques. Here in this paper, transformer fault detection by Sweep Frequency Response Analysis (SFRA) technique has been introduced. The SFRA is nothing but monitoring the change occur in the transformer R-L-C network parameter. SFRA measurement can be done by using sweep frequency of the range of 20 Hz to 20 MHz range. These sweep frequencies applied to transformer in healthy and faulty condition. SFRA gives the results in the form of signature curve in both healthy and faulty cases. This obtained signature curve confirms the exact location of fault. This paper presents simulation study of transformer equivalent circuit with implementation of SFRA technique and shows the SFRA results with both healthy and faulty condition.

Keywords- Power transformer, winding deformation, axial and radial deformation, sweep frequency, signature curve, sweep frequency response analysis.

INTRODUCTION

Power transformer is the heart of the electrical power system and it performs a vital role in the area of transmission and distribution [1]. Upon increasing voltage transfer capacity of transformer for transmission, it should have high grade of insulation strength [2]. In general, we generate the power at lower rating and then step up it to higher ratings for transmission by step up transformer. During this action of power transforming, power losses occur.

Number of faults occur in transformer like turn to turn fault, inter turn fault, winding deformation, core deformation, insulation breakdown and short circuit as well. These faults arise due to all day work. Sometimes fault may occur during transportation from manufacturing place to where it has to be installed. During transportation winding and core deforms.

Transformer is the complex structure of resistance, capacitance and inductance networks. When mechanical deformation is occurred inside the transformer, huge force generated in transformer due to current in it. Due to that force winding deforms radially as well as axially. As a result of this deformation, R-L-C parameters get changed with respect to their previous values.

In SFRA technique we can detect that deformation easily by applying sweep frequency inserted in the winding. If SFRA results are not similar like when transformer is in healthy condition, then it is the condition of fault.

II. SHORT CIRCUIT FORCES

Electrical and mechanical failure in transformer generates the force resulting from short circuits which may damage the transformers. Due to these forces, transformer winding deforms radially and axially. Short circuit symmetrical current is 6 to 7 times that of rated current and sometimes is high up to 15 to 18 times the rated current at peak time [3]. The formula for force acting on current carrying conductor during short circuit condition is,

$$F = BIL \text{ Newton}$$

where, B – Flux density in Tesla

I – Current in Ampere.

L- Length of conductor in meters

So, the resulting forces are very high because they will be increasing in square of current. These forces extend the current carrying conductor radially as well as axially. Due to this mechanical change occur in winding and so impedance value changes.

III. DETECTION TECHNIQUE

For the detection of fault in transformer various techniques are available. But most commonly used are,

- i. Dissolve gas analysis
- ii. Partial discharge method
- iii. Sweep frequency response analysis

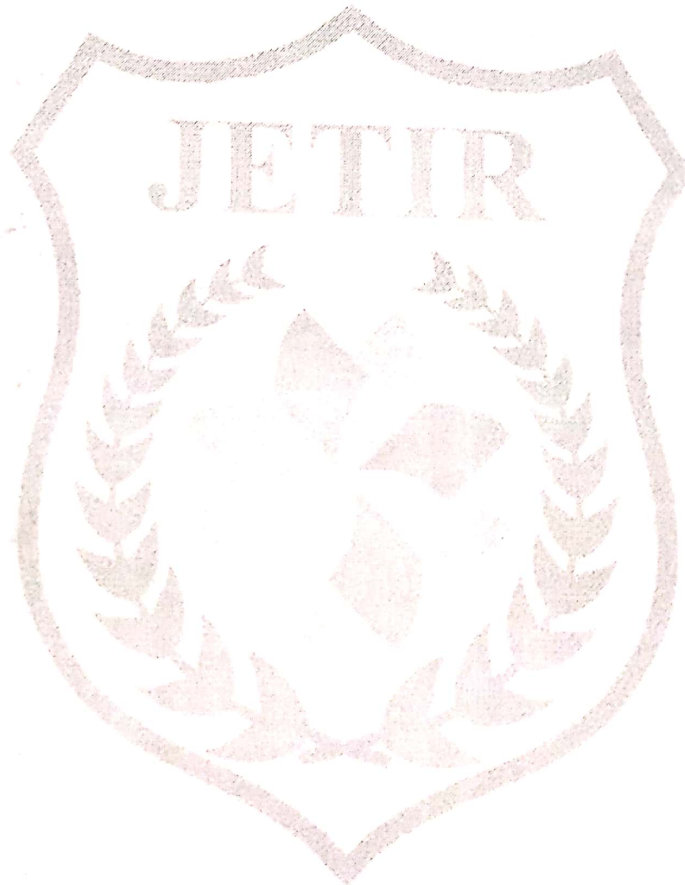
i) Dissolve Gas Analysis

The breakdown of insulating materials within transformers and electrical equipment liberate gases within the unit. The distribution of these gases can be related to the type of electrical fault and the rate of gas generation can indicate the severity of fault. The identity of gases being generated by particular unit can be very useful information about fault. The types of fault depend on what type of gas is extracted from transformer oil.

comparing faulty condition with healthy condition, we notice the change in current value due to change in impedance value of complex network. So this change in current value can detect or diagnose the fault in the transformer winding.

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Implementation of Integral Mathematical Models of Single and Multiple Power Quality Disturbances

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Abstract: Nowadays, renewable energy resources based generation is increasingly used to feed the ever-increasing power demand. The integration of this generation with the grid requires power electronic converters. These power electronic converters, switching operations, non-linear loads, and faults occurring in the network are the major causes of Power Quality Disturbances (PQDs). These PQDs cause severe problems to the sensitive equipment of end-user. Hence, Power Quality (PQ) becomes the main issue, both utility and customers are now concern about it. To mitigate the PQ problem, we need an accurate PQ monitoring system that can detect and classify the PQDs. A lot of research is going in this field. The first step of this research is to get some synthetic data to train and test the detection and classification algorithms. So, the current trend is to generate the single and multiple PQDs using integral mathematical models represented as parametric equations. This paper presents the implementation of integral mathematical models of both single and multiple PQDs such as voltage sag, voltage swell, voltage interruption, harmonics, voltage flicker, voltage notch, impulsive transient, oscillatory transient, voltage sag with harmonics, voltage swell with harmonics, and voltage interruption with harmonics using MATLAB programming. This will provide a fast and automatic way for the generation of PQDs to the researcher working in this area.

Keywords: Power Quality; Power Quality Disturbances, Power Quality Monitoring, Detection and Classification.

I. INTRODUCTION

In the present era of science and technology, the term power quality has gained more importance. Both utilities and customers are now concerned about power quality. The power quality issues are occurring mainly due to the increasing use of non-linear loads, power electronic load/converters, solid-state devices, unbalanced loads, computer systems, and data processing units [1]. The use of renewable energy resources-based distributed generation systems with power electronic converters are also acting as a major source of power quality disturbances [2]. Power quality disturbances such as voltage sag, voltage swell, interruption, harmonics, transients, and flicker are the most commonly occurring disturbances in power systems [3]. Modern types of equipment that are connected to the system may get affected or damaged due to the exposure to the power quality disturbances occurring in the power system due to any cause [5]. Hence, it is necessary to accurately detect the occurrence of power quality disturbance, and classify it. In order to execute the task of detection, classification, and characterization of power quality disturbances, it is essential to understand its properties and characteristics. This paper deals with the generation of eleven power quality disturbances using mathematical models for power quality analysis.

II. POWER QUALITY

There are several definitions of power quality. Different international standard organization define the term power quality in different way. According to IEEE, it is defined as the concept of powering and grounding electronic equipment in a manner that is suitable to the operation of that equipment and compatible with the supply system and other connected equipment. According to IEC, it is defined as the ability of a device, equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

The power quality disturbances may cause malfunctioning of customer equipment. It may lead to the interruption of the manufacturing process which will damage the product and hamper the manufacturing results into loss of money. For





Figure 13 shows the voltage signal with interruption along with harmonics for time duration 0.4 sec generated by controlling the parameters of the parametric equation.

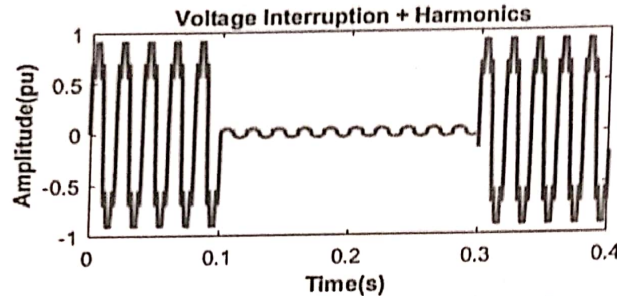


Fig. 13 Voltage Interruption + Harmonics waveform generated using the parametric equation

V. CONCLUSION

In this paper, the implementation of the integral mathematical models of power quality disturbances is done in the form of the parametric equation using the software program developed in MATLAB. Generation of both single and multiple power quality disturbances is done as per the parameters defined by IEEE1159 and IEC61000 standards. The power quality disturbance signals generated using the integral mathematical models will be useful in the research of detection and classification of power quality disturbances. Researchers working in the field of power quality can use mathematical models to generate the synthetic PQ signals and the data set required for training, validation, and testing the algorithms used for detection and classification PQDs. This will help in testing the feasibility of the algorithms, which signifies the importance of implementing the integral mathematical models of power quality disturbances. This work is of special interest in the initial stage of research which will reduce the effort and time spent on algorithm development.

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Condition Monitoring Of Three Phase Induction Motor Based on IOT

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Abstract- Now a days the induction motor has become the most popular type of motor for industrial applications. The condition monitoring have become a growing technology in recent years. The industrial sectors are widely using automation platforms to increase the productivity. The condition monitoring helps to avoid unwanted shutdown of motor and improve the operating efficiency and life of motor. Monitoring is usually done based on IOT which is a system of interconnected device that offers the capabilities of real time data collection, visualizing the collected data in the form of charts, ability to create plug in and apps for collaborating with web services, social network and other APIs. The aim of this paper is to monitor the real time data of three phase induction motor based on Internet of Things for safe and economic data communication in industrial fields. This data monitored is stored on a things speak channel from serial monitor. This monitored data can also be accessed from different location through web page. Also controlling of the three phase induction motor is possible by two ways i.e controlling the three phase motor from motor end and also controlling the three phase motor at remote end.

Keywords— Internet of Things, Parameter Monitoring, Induction Motor, Parameter Controlling.

I. INTRODUCTION

Induction motors are most widely used machines in industrial sector as well as commercial sectors due to its various advantages such as reliability, ruggedness, compactness and the main advantage is its a maintenance free motor [2]. The induction motor is a singly excited machine in which the power is supplied to the rotor winding and the voltage is induced in the stator winding of the motor so this motor is called induction motor. As they have remained the most popular type of machine used in industrial sector such as squirrel cage motor is used in various industrial drives as well as used as fixed speed and variable frequency applications. As all motors generate noise and vibration, analysis of this can help to give information on condition of motor. As 95 percent of motors in industries are three phase induction motors the monitoring of these motor is very essential. So

monitoring and control of induction motor is very essential to increase reliability, maintaining performance. Condition monitoring means monitor the real time data of a machine as well as continuous evaluation of health of machine throughout its serviceable life. Due to this the operating efficiency of the machine will increase and ultimately the electricity bill will reduce, due to continuous monitoring the unexpected failures occurred on machine will reduce and the life of the machine will increase, most important the human efforts will reduce. The various methods of monitoring are model based techniques such as signal processing techniques, fast fourier transform, short time fourier transform, gabor transform, wigner ville distribution and other soft computing techniques such as artificial neural network techniques, fuzzy interference system, adaptive fuzzy neuro interference technique, wavelet transform analysis [8]. Faults and failures of induction machines can lead to excessive downtimes and generate large losses in induction motors. Even small fault can causes increased losses such as reducing efficiency and increasing temperature, which will reduce insulation lifetime, and increasing vibration, in turn may reduce bearing life time. All they are due to the operating environment condition and machine internal factors. The different type faults which are commonly occurred in the induction motor are electrical faults and mechanical faults [13]. Electrical faults include stator and rotor faults such as inter turn faults, line to ground faults whereas mechanical faults includes bearing faults. So with the help of proper knowledge and study of these faults go for condition monitoring of the motor and also control the motor from different faults occurred on it. To achieve both the monitoring and controlling of three phase induction motor Thingspeak (IOT) platform can be used effectively. IOT platform is recently used in industrial automation in order to increase the productivity by monitoring the induction motor. Thingspeak is a open source which provides various services such as offers the capabilities of real time data collection, visualizing the collected data in the form of charts,

II. Results of Abnormal Conditions of Motor on serial Monitor of Arduino Uno.

Fig.17 Shows the Over Voltage Signal obtain on serial Monitor Window of Arduino Uno.

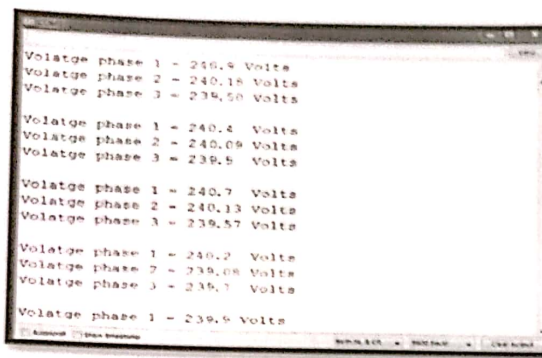


Figure. 17 Over Voltage obtain on Arduino

Fig.18 Shows the Over Current Signal obtain on serial Monitor Window of Arduino Uno.

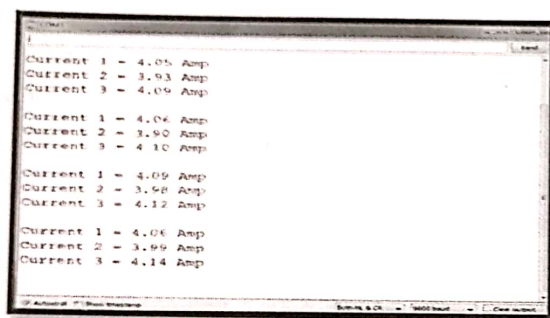


Figure 18 Over Current obtain on Arduino

After making abnormal conditions the test is performed whether the algorithm able to OFF 3 Phase Induction motor from remote location as well as From Motor End. It is observed that systems behave well and our desired output is achieved.

V. CONCLUSION

In this Paper 3 Phase Induction motor is effectively and continuously Monitored by using Different sensors and obtained data is stored in the cloud platform and is accessed from different location using web application. The health of motor is assessed by analyzing the continuous parameter. In addition to continuous condition monitoring, Controlling remote end and as well as motor end is developed.

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Bearing Faults Diagnosis of Induction Motor Using LabVIEW.

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ABSTRACT

Early detection of faults in induction motor are of paramount importance for reliable and economical operation of induction motor in industries. This paper deals with the problem of bearing failure detection and diagnosis of induction motor. Many faults arising in induction motor are due to bearing failures. This paper proposes an experimental study to diagnose the bearing fault with the help of Park's vector approach. Laboratory analysis has been performed on 2 hp three phase induction motor. The bearings used have natural defects due to their continuous operation. NI LabVIEW 8.5 software is used to acquire the signal and is analyzed with Park's vector approach.

Keywords

Bearing faults, Induction motor, NI LabVIEW 8.5

1. INTRODUCTION

Industrial revolution started in the world, especially in Europe in the middle of the 20th century and second decade of the 21st century marks the manufacturing of ultramodern precision machineries. One of crucial machines is Induction motor. Induction motors are widely used in almost every industry and most application area of industry such as railways, conveyers, elevator transport system; material handling plants and utility of companies for mechanical equipment's e.g. machine tools, compressor, pumps, fans, extruders are the examples of the above said fact. Induction motor play very important role in industrial as well as commercial purpose due to its low maintenances, ruggedness and high reliability.

Electrical machines have a common element named "bearings". They are utilized to permit the rotary motion of the shafts. As the modern manufacturing has increased the reliability of bearings, they are often subjected to fail. According to some statistical data, bearing fault causes 41% of all motor failure [1]. Bearing consist of two rings called the inner and outer rings. Equidistance between the balls is assured by a set of balls or rolling elements. Bearing failures are caused by continuous stress on the bearings which causes the fatigue and failure. Small pieces break loose from the bearing called flaking or spalling. These failure cause rough running of the bearing which produces detectable vibrations and increased noise levels. External sources such as dirt, corrosion, contamination, improper lubrication, improper installation and brinelling also cause failures of the bearings. The shaft voltages and the currents are also results of bearing failures. These are the results from flux disturbances such as rotor eccentricities. Another reason for bearing failure is high bearing temperature.

There are many methods for the diagnosis of bearing faults such as temperature monitoring, vibration monitoring, chemical monitoring, current monitoring, acoustic emission monitoring, etc. [3] All these methods need expensive sensors or specialized tools except for current monitoring. The Park's vector approach falls under electric monitoring. A continuous real time tracking of bearing fault of induction motor which operates under continuous stationary conditions is allowed by this method. This method acknowledges the fault signature produced in induction motor and calculate the severity of faults. In this paper, the effects of bearing faults on motor current spectra of an induction motor are investigated using Park's vector approach. If the visualization of motor current Park's vector representation is a perfect circle, then bearing of machine can be considered as healthy and if an elliptical pattern is observed for this representation, the machine is faulty.

2. PARK'S VECTOR APPROACH

A two dimensional portrayal can be used for describing three phase induction motor phenomena, a suitable one being based on the current Park's vector [3] As the connection to the mains does not usually use the neutral in three phase induction motor, the main current has no homopolar component. As the function of mains phase variables (i_a, i_b, i_c) the current Park's vector components (i_d, i_q) are;

$$i_d = \frac{\sqrt{2}}{3} i_a - \frac{1}{\sqrt{6}} i_b - \frac{1}{\sqrt{6}} i_c \quad (1)$$

$$i_q = \frac{1}{\sqrt{2}} i_b - \frac{1}{2} i_c \quad (2)$$

Under ideal conditions, three phase currents lead to a Park's vector with the following components

$$i_d = \frac{\sqrt{6}}{2} I \sin \omega t \quad (3)$$

$$i_q = \frac{\sqrt{6}}{2} I \sin \left(\omega t - \frac{\pi}{2} \right) \quad (4)$$

where;

I – maximum value of the supply phase current

ω_s – supply frequency

t – time variable

The corresponding portrayal of $i_d - i_q$ is a circular locus centered at the origin of coordinates under balanced condition as shown in fig 1. It's a reference figure, which allows the identification of abnormal conditions by observing the deviation of acquired patterns.

pattern the induction motor was initially tested with deteriorated bearings. Fig 5 shows the current pattern for motor with healthy bearing. Fig 6 shows the current pattern for faulty motor. The shape of current pattern in fig 6 is not a perfect circular which shows the bearing fault in the squirrel cage induction motor.

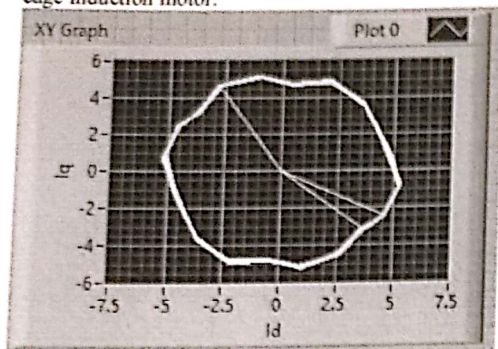


Fig No 5. Current Park's Vector For Healthy Motor Bearing.

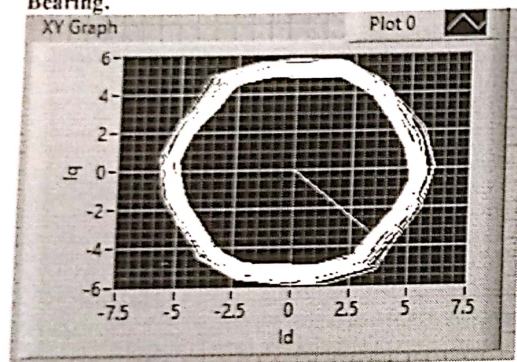


Fig No 6. Current Park's Vector For Fault Motor Bearing

CONCLUSION

A methodology of Park's vector approach is for the detection of fault of induction motor is presented. The result derived from the experiment shows that current Park's vector pattern of healthy motor was a perfect circle while for bearing fault of induction motor it was elliptical in shape. The efficiency and effectiveness of this method is proved by lab. Experiment in area of computer aided condition monitoring of induction motor. New challenges will exist in future for faults detection in case of very large /big size of induction motor. Therefore they can easily avoid the critical emergency shut-down as well as reduce the maintenance costs of induction motor others faults.

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IOT Based Garbage Monitoring System Using Sensors

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Abstract - As the population increases with the growth of the cities, the waste produced also increases. In 21st century there is tremendous increase in garbage including plastic waste of households which is a threat not only for human race but also for earth's environment. In today's scenario many cities are still lacking in the area of waste management, particularly, the collection of garbage within the cities. Because of this there is overflow of garbage bins. To provide a solution to this problem, a smart garbage monitoring system is therefore proposed to tackle the issues faced. Nowadays sanitation & cleanliness are one of the agitated issues by any state all over the world. This is possible only when the network of smart bins which integrates cloud-based techniques to monitor & analyze data collected to provide predictive routes generated through algorithms for garbage bins. The main purpose of this project is to develop an IOT Based project which is cost-effective system that can monitor the everyday garbage in real time by using smart technology.

Key Words: Ultrasonic Sensors, IOT(Internet Of Things), Garbage monitoring system, Solid & liquid waste collection, Wi-Fi Modem.

1.INTRODUCTION

There is tremendous growth population across the world and due to which there is enormous amount of garbage which is generated on a daily basis, that's why the issue of waste management has been a terrible problem in India. During travelling, hundreds of people are passing the same location around one minute. Almost 60-70% of people are carrying food covers, polythene bags, plastic bottles. If they dispose all them at once, the dustbins will be filled in several minutes. With the popularity of IOT growing and the availability of low cost actuators and sensors, the benefits of this technologies can be used to solve the problems faced in the current method of waste management in cities. Also, in present day waste collection system is a time process and it requires huge labour. IOT has many application such as home, health, environment and industry. It can also be applied in the field of waste management that would be instrumental in designing smart cities.

In many areas where people are highly affected by the environmental pollution. This leads to very harmful and poisonous effects on the human health. Certain part of the city or an organization, the overflowing of municipal garbage bins brings daunting and detrimental consequences for

suburbs. To overcome such severe problems, there is a need to develop a smart system that safeguards the environment and reduces the human effort by informing the municipality about the filling of bins so that bins can be clean on time. The system proposed has 3 parts: Part 1 deals with data sensing and acquiring. That can be done when the ultrasonic sensor is placed inside the bin to measure and collect the information such as garbage weight, leftover space in the bins. Part 2 deals with data processing and transmission. Part 3 deals with triggering and alert.

1.1 Motivation

We can keep ourself clean and maintain our environment tidy plays a major role on making our country healthy and wealthy. This project helps to clean the garbage as soon as possible when it is nearing the fulfillment of the garbage bin. This prevents the diseases arise due to waste dumping and increases cleanliness of the city. This makes very miserable for India to become Swach Bharat.

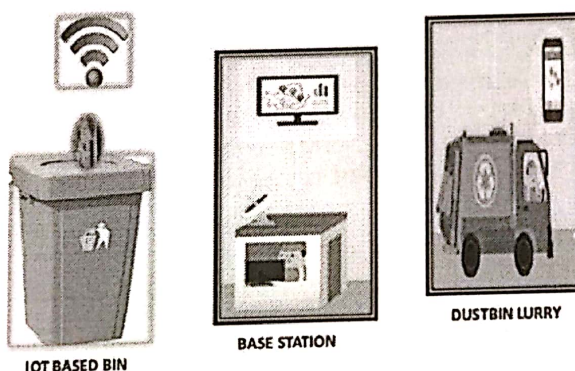


Figure 1.1: Motive of Project

1.2 Aim and Objective

To detect the garbage level and compare it with the garbage bins depth. In this project the system informs about the level of the garbage collected in the garbage bins. Main aim is to stop overflow of garbage in bins to overcome this problem a IOT based garbage monitoring system is designed which measures the level of trash in the bin and remotely triggering the required controls using IOT.

liquid garbage monitoring if the distance is '1' the bin is full then at that it gives alert signal to the controller and then process is continuing.

5. CONCLUSIONS

This system which is developed provides better database for garbage collection time and quantity of garbage collection at every place. After implementation of this project, we can avoid over flowing of garbage from the container in the residential area which was earlier done manually. Also, the system will reduce the risk of overfilled garbage bins and unhygienic conditions that are caused due to low awareness that is present in the current collection system. Importantly this system is directed at a city with a high or growing population. The official authorities can use this system to keep a watch on the levels of use of harmful materials developed and use already mentioned ways to reduce these levels.

6. Future Scope

The spread of internet is happening at a fast pace in every part of the world, which can digitized many aspects of day to day life. The scope from the project is that by providing knowledge of internet and its uses from people we can make village smart by providing these features like smart garbage management, digital water supply and intensity controlled street light, etc. The garbage which is collected can be converted into compost using the traditional methods and new techniques.

The proposed design of the smart garbage alert system is very flexible and can be easily installed at more crowded regions like airports, railway station, bus-stands, shopping malls, offices, etc. The government can setup recycling stations and the profit to be gained can be calculated.

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Seven Level Inverter for Multistring Photovoltaic

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Abstract: - In this dissertation report seven level inverter (SLI) is designed for multistring photovoltaic of electrical energy through thermal product is getting exhausted and world is turning towards the solar energy. The efforts are more focused about solar energy and hence, need some apparatus or system which will convert the solar energy efficiently toward the load side and that's why, the paper proposes a system which will convert the solar energy and DC electrical source will be converted to AC by efficient technique of the inverter. In this paper, the "7 level inverter" in which inverter has several advantages over conventional inverter that uses pulse width modulation (PWM). These can generate output voltage with low distortion and lower dv/dt . In this system, we can convert this higher amount of energy into electrical energy to reduce the rectification loss. This system is converting a solar generated DC source to the AC source by using 7 level inverter and hence, for giving the pulses to the 7 level inverter.

Key Words: —Seven level inverter, Non-renewable energy, Pulse width modulation.

I. INTRODUCTION

This paper proposes a new seven level inverter with a solar power generation system, which is composed of a dc-dc power converter and a new seven level inverter. The dc/dc power converter integrates a boost converter and a transformer to convert the output voltage of the solar cell array into independent voltage sources with multiple relationships. The most commonly used solar cell model is introduced and the generalized PV model using Matlab/Simulink is developed. The interface is more important to grid connected solar power generation systems. In this project converts the dc power generated by a solar cell array into ac power and it feeds this ac power into utility. In which inverter is necessary in the power conversion interface, because power conversion convert the dc power into ac power. Since the output, voltage of solar cell

This system generates a sinusoidal output voltage. This circuit not provides PWM signals. This system traces maximum PV module power and provides detection and protection. The output voltage is restricted by duty ratio for high frequency. The solar energy is more important and the cost of fossil fuel is decreasing. The implementation of a PV module with maximum power point tracking (MPPT) raises the input voltage level in which only one MPP (MPP Maximum Power Point) varies to climatic and irradiation. The power characteristics vary with temperature.

Design and Simulation of DC-DC Converters for Photovoltaic System

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Abstract: - The importance of solar energy for future energy supply has been growing vigorously with the growing concerns about the price and availability of fossil fuels. Renewable energy sources such as solar energy has received tremendous demands since it is pollution-free from any poisonous byproducts that can pollute the environment. DC-DC converters are widely used in renewable energy generation systems that is in solar photovoltaic (PV) system. The basic PV system consists of PV panels, electric converter. The output power from the PV module or array depends upon the irradiance and temperature which are constantly varying. Therefore for these purpose we can use the converters. The converters transmits the power from PV to the load should have higher efficiency. The main advantage of the converter is that this are provide a regulated output. And this DC-DC converter are mainly designed to meet specific demand of DC loads. Therefore, a DC-DC converter are used to produce a constant voltage and deliver maximum power from PV panel to the load. We will use the converters based on MOSFETs switches.

The main objective of dissertation is 1) to design and simulate the various DC-DC converters, 2) to obtain the stable voltage of DC-DC converters and to compare their performance and 3) selection of suitable DC-DC converters for Photovoltaic System. This dissertation presents simulation and designing of PV array connected to load through DC-DC converter such as Boost converter, Cascaded Buck-Boost converter, Cuk and Single ended primary inductance converter (SEPIC) etc. are modeled in MATLAB and their results are compared.

Key Words: —PV, MATLAB, DC-DC Converters.

I. INTRODUCTION

The use of Renewable energy especially the solar energy is increasing rapidly due to its various advantages. Modeling, simulation and analysis of solar photovoltaic (PV) generator is a vital phase prior to mount PV system at any location, which helps to understand the behavior and characteristics of the solar cell or panel. The performance of PV system depends upon the sun radiation and temperature. The generalized block diagram of PV system with dc to dc converter is shown below:

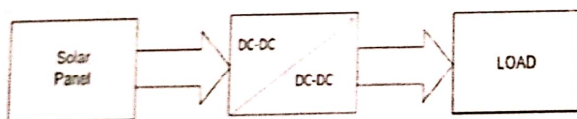


Fig.1. Block diagram of PV system with DC to DC Converter

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In these generalized block diagram the solar panel is connected to the load through DC to DC Converter. A DC-DC converter connected to produce a constant voltage and deliver a maximum power from PV panel to load. The output voltages of dc-dc converters are generally controlled by using a switching concept. Converters based on MOSFETs switches are used.

The purpose of this paper is to present an introduction and functioning of a PV device and write its basic equations as well as Simulation of PV panel and Simulation of the various types of DC to DC Converters used for the PV/Solar system with its comparison.

II. SIMULATION OF PV PANEL

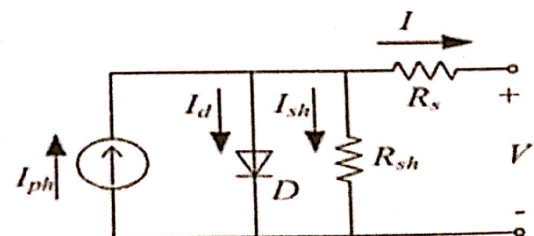


Fig.2. Equivalent circuit of Solar cell

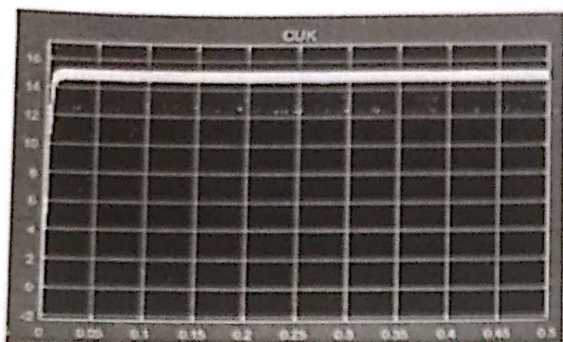


Fig.22. Cuk Converter

Fig.22. shows the simulation results of the Cuk converter. Which in turns give the output voltage of 15V.

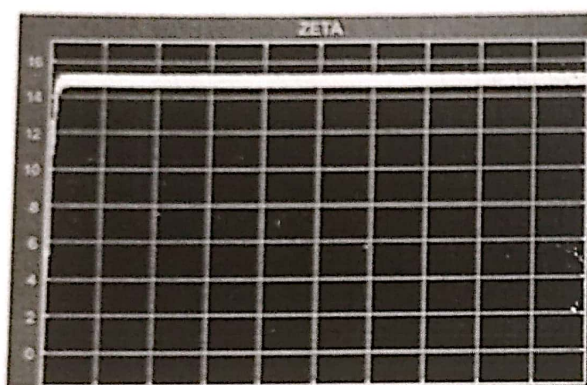


Fig.23. Zeta Converter

The output of zeta converter is shown in Fig.23. Zeta converter

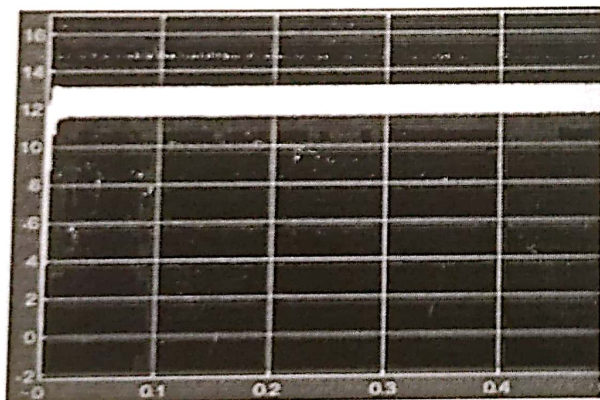


Fig.24. SEPIC Converter

Above graph shows the output of SEPIC converter

VI. CONCLUSION

This paper analyses and studies the performance of a PV system and Various Converters implemented using MATLAB/Simulink. The model including solar panel to converter is tested successfully and hence the analysis is done

for load changes converter to converter. From the proposed converters, we have simulated in these paper and compared those converters on the basis of various parameters. It is found that the converter has their unique advantages over one another. And hence the selection of converter for a particular application is depends on the type of application and the requirements of system.

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- [5]. Mr. S. Sheik Mohammed College of Engineering, Dhofar University, PB. No. 2509alalah, Sultanate of Oman E-mail: ssheikmd@yahoo.co.in Simulation and Analysis of Stand-alone Photovoltaic System with Boost Converter using MATLAB/Simulink.

Voltage Profile Enhancement using Dynamic Voltage Restorer (DVR) Under Three Phase Balance Load

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Abstract - To improve power quality in low voltage electric power distribution network the inadequate operation of the conventional compensation devices to mitigate the poor power quality problems have prompted the use of custom power device such as Dynamic Voltage Restorer (DVR). DVR aimed at improving the voltage profile, enhancing the reliability and good quality of power flows in low voltage electric power distribution networks. The DVR is highly efficient device, the principle is based on the voltage source inverter (VSI) which injects the appropriate missing voltage in series with the system voltage to correct the voltage variations experienced in the distribution feeder lengths. The power scheme in respect of the response to voltage disturbances at normal mode operation of three phase balanced loads is presented using the MATLAB simulation. This dissertation gives recommendations on effective methods for improving the voltage profile and reducing the voltage variation to an allowable standard.

Key Words: Dynamic voltage restorer, voltage source inverter, voltage profile, power quality, distribution networks, distribution feeder

1. INTRODUCTION

The electric power system serves to generate, transport, and distribute electrical energy to consumers in an efficient, economical and reliable manner. Failure operation of electrical equipment cause inadequate power quality and therefore there is power losses in the distribution system [6]. Load voltage variation, three phase voltage unbalance, waveform distortions, voltage sag, voltage swell, these are the various disturbances in the electric power network. Maintaining the voltage and frequency within the statutory limits that is $\pm 5\%$ voltage and $\pm 1\%$ frequency at the end user's terminal is a major challenge for distribution companies. The quality of electrical power, which is given to the end users, can be assessed or estimated in terms of constant voltage magnitude. Different kinds of techniques have been utilized over the years to mitigate voltage variation, voltage unbalance and improve the voltage profile along electric power distribution networks. The earlier stated techniques mostly focus on medium voltage side distribution systems. Hence, it is not enough to obtain the statutory voltage limits of $\pm 5\%$ of the nominal voltage value on the end-user side. Therefore, there is an urgent need to support secondary distribution systems with modern techniques. Hence, the simple, effective, and cheapest device for voltage profile correction in distribution network compared to other custom power devices is the Dynamic Voltage Restorer (DVR). DVR has been effectively used to find a solution to the power quality problems in the distribution network. The DVR has appeared as a promising device not only to provide voltage profile enhancement, but a fast solution to other power quality problems such as flicker suppression, power factor correction and harmonics control [8]. DVR insert a controlled voltage in distribution networks to correct the load voltage [3].

This paper presents a MATLAB/simulink model of DVR for voltage sag, voltage swell, voltage variations and voltage unbalance mitigation in low voltage electric power distribution network for different feeder lengths using control technique of VSI switching method based on sinusoidal pulse width modulation offers simplicity and better response.

2. DYNAMIC VOLTAGE RESTORER

The block diagram of DVR is shown in Fig.1. It consists of three important parts: measuring unit, control unit, and power unit.

A. Series Voltage Injection Transformer

The utmost function of series voltage injection transformer which is employed in secondary distribution system is that to step up the supply voltage from the output of the ac line filter to the desired nominal voltage level required by the customer load For DVR to properly compensate for the missing voltage, the secondary side of the series voltage injection transformer must be equal to the main source voltage and must be properly matched to the power system network [11].

5. CONCLUSION

From the results obtained, it has been concluded that DVR installed in the low voltage electric power distribution networks for the purpose of improving the voltage profile and voltage variation and also compensate voltage sag and voltage swell from the beginning of the distribution feeder line to the end of the feeder gives a better power quality and improve the voltage profile in low voltage electric distribution networks. From the network studies carried out using the proposed DVR model and simulations using MATLAB/Simulink in Sim Power System tool box, show that a dynamic fast response, simple and cost-effective DVR effectively enhance better voltage profile and reduce voltage variation from the beginning to the end of distribution feeder lengths under steady state operation.

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Shunt Active Power Filter for Enhancement of Power Quality

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Abstract

This project deals with the shunt active power filter to enhance the power quality. The performance of shunt active filter is studied through simulation result. MATLAB is the simulation tool used to study the performance of shunt active power filter. The simulation is carried out for non-linear load. The shunt active filter allows compensating harmonic current, reactive power, unbalanced load and zero sequence currents. Compensating any of the above problems always tends to enhancement of power quality

Keywords: *Shunt Active Power Filter (SAPF), p-q problems, non linear load.*

INTRODUCTION

In today's power system power quality improvement is the most focused topic. Nearly two decades ago, passive loads having linear nature were being used by consumers and various industries, with a lesser number of non-linear loads thus having less impact on the quality of power system. With the arrival of semiconductor and power electronic devices and their easier controllability have caused wide use of non-linear loads such as chopper, rectifier, etc.

The use of semiconductor devices is responsible for harmonic and reactive power disturbances. These disturbances causes various problems such as overheating of transformer, excessive neutral current, distortion of feeder voltage, damage to power electronic devices, malfunction of sensitive equipment. Harmonics play major role in disturbing power quality, called harmonic distortion. This problem of Harmonic distortion is increasing day by day in electric distribution system as the use of nonlinear loads is increasing. These harmonics are

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Fast Restoration Technique for Distribution Power System with Multi-Terminal DC Links

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Abstract:

A fast power restoration operational scheme and relevant stabilizing control is proposed for distribution power systems with multi-terminal DC network in replacement of the conventional normal open switches. A nine-feeder benchmark distribution power system is established with a four-terminal medium power DC system injected. The proposed power restoration scheme is based on the coordination among distributed control among relays, load switches, voltage source converters and autonomous operation of multi-terminal DC system. A DC stabilizer is proposed with virtual impedance method to damp out potential oscillation caused by constant power load terminals. The proposed system and controls are validated by frequency domain state-space model and time-domain case study with Matlab/Simulink.

1. INTRODUCTION

Background Due to the development in power electronics industry, the capacity and switching speed of Insulated-Gate Bipolar Transistors (IGBTs) have been improved. IGBTs now meet the requirements of high power industry. The switching of IGBTs is controlled by gate voltage, and does not require external circuit to turn off. This advantage makes the IGBTs a suitable choice to regulate ac and dc networks without any complicated turn-off control circuit like the thyristors. Since the dc voltage of IGBTs is controllable via proper switching on gate, and a capacitor is usually parallel connected at the dc side which makes the dc voltage stable, the converter consists of IGBTs is normally known as Voltage-Source Converters (VSC). The VSC discussed in this dissertation normally consists of six IGBTs, which form a three phase ac to dc converter. Since each IGBT has a reverse parallel diode, the current has the capability to flow back and forth between ac and dc side. Therefore, the VSC could either operate as a rectifier or an inverter without any topology change. Proper control algorithms are needed to be designed to make it possible. Renewable energies such as wind, solar and fuel cell require advanced integration technologies. Unlike traditional energy resources such as gas, coal and oil, the output of renewable energies depends on various factors including wind speed, sunlight irradiance and temperature. Hence, power generated from renewable energies is not constant and varies from time to time, which is a big challenge from a power system operator's view. Moreover, the output of solar and fuel cell energies are normally dc power, which is not compatible with an ac power system.

2. OVERVIEW OF VSC-DC LINK

The development of distributed power generation and advance of electric vehicle (EV) are changing the configuration of the traditional power distribution system. Renewable power, such as wind and solar, are naturally dispersed and compatible for distribution side. Comparing with large renewable generation, Which are normally far away from load centre, power produced by distributed generation (DG) is more likely to be consumed locally and there is no need to build up extra high

voltage corridor to transmit bulk intermittent power to the load centre. However, mismatch between loads and generations is almost inevitable especially when a distribution substation is feeding both household and industrial load feeders at the same time as both load profiles fairly diverse. Serious mismatch at 'last mile' ends of a distribution power system can possibly give rise to severe voltage variations. In some cases, possible overvoltage can reduce their nominal life spans or even damage power equipment, which can be caused by distributed generation power that significantly overweighs local load at the far end from the distribution substation. Such problem is difficult to solve with traditional passive distribution power system. Reactive power control based voltage regulation might play a part to help but with limited performance in a more resistive distribution network. A pre-set renewable generation curtailment scheme may help, however, at a cost of certain amount of renewable energy loss. The potential rising demand from the EV battery charging is also a serious challenge to the conventional distribution network as the charging load can potentially be much larger than traditional household and commercial appliances. With varying charging demand from EV, overloading and consequent contaminated voltage profiles could be the major problems for traditional distribution systems. One possible solution to this problem is to build up centralized charging stations with a predefined energy management scheme and integrate them into the existing power system in a more grid-friendly way. To charge an EV battery array with local renewable generation would be an ideal scenario. To reduce the distribution loss and enhance power supply reliability, the concept of active distribution power system is proposed with load switch spread among certain feeders. Such reconfigurable distribution power system is able to actively redistribute power flow by switching the ties between the feeders, hence the possibility of power flow optimization in terms of distribution losses and voltage profiles. A great variety of smart management methods have been proposed for optimized power flow management based on hard switches. However, the employment of hard tie switches forces the voltages across different feeders to match each other, leading to inflexible power flow control since the real-time power flow is passively determined by the impedance distribution of a certain system configuration

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PI And PR Controller for Grid Connected Voltage Source Inverter

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Abstract: - Over-the year, power converters have found wide application in grid-interfaced systems, including distributed power generation systems with a renewable energy source. In a distributed energy system like a solar hydro or any diesel generation where the output of the system is DC and is expected to be converted in an AC, an inverter is used. There are various mode to have a controlled output of the inverter. We will study the three-phase voltage source inverter control scheme. The different control methods used are PI controller and PR controller. The main advantage of the PI controller is that there will be no remaining control error after the set point change or a process disturbance. In a PI control the stationary reference frame is used to transfer feedback quantities, where the decoupling of components requirements increases the complication, a new proportional reason and control strategy is employed, in which of second order very high gain ideally infinite gain is introduced at a fundamental frequency. The main advantage of the PR controller is to be reduced DC steady state error to a zero by forcing the ideally infinite gain at the resonating frequency. We will compare the PI and PR controllers and simulation in MATLAB.

Key Words: —PI controller; PR controller; alpha beta reference frame; reference tracking.

I. INTRODUCTION

In the last few years, the demand of electricity has increased tremendously and fossil fuels being depleted due to the same so it becomes mandatory to interconnect renewable energy sources with the help of wind turbines, photo voltaic etc. Hence, it is general expectations to increase the electricity generation with the help of renewable energy sources.

The use of RES is getting increased and it can be justified from the table below. Initially the generation of electricity with RES was up to 5% only but now from last few years it has been increased to 17%-25%. In year 2019-20 the use of solar energy has increase drastically from last few decades. Microgrid concept has recently adopted to connect the renewable energy sources more effectively in the system and to cope up with the power quality issues. Microgrid can operate in both grid-connected mode and isolated mode basically microgrid is a combination of RES and loads. All renewable energy sources are parallel provided to an AC common bus via inverters or AC to AC converter.

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The common bus is then provided to the utility or grid and voltage source inverter is the most important functional element of an AC microgrid system the various renewable energy sources within microgrid system can perform independently or interconnected to a common DC link, which supplies constant input to the voltage source inverter.

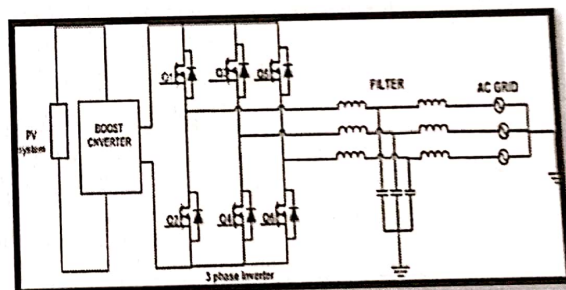


Fig.1. Power circuit of grid connected 3-phase inverter

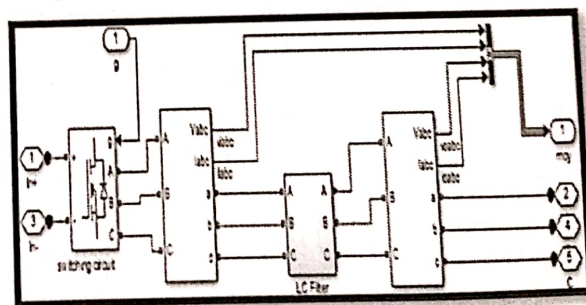


Fig.2. MATLAB simulation of Grid connected 3-phase inverter

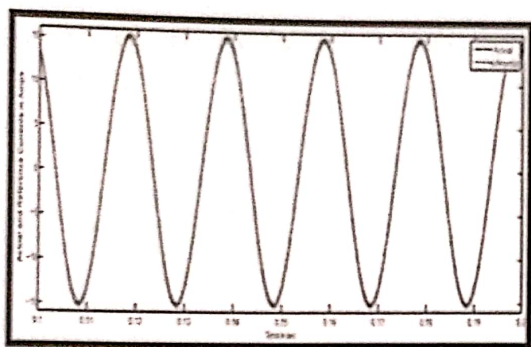


Fig.13. Actual Tracking reference quantity with for PR controller.

The fig.12. And fig.13. Gives the reference tracking of both PI & PR controller. The simulation results tracking is improved with the help of PR controller.

III. CONCLUSION

In this report, the main attempt made for showing the comparison of performance of PI and PR controllers. This report proposes the detail analysis of the various basic control strategies for voltage source inverter and also gives the study of Photovoltaic grid interconnected system. In this report, model of filter is derived in dqo reference frame and hence shown that the problem of three phase decoupling in dqo reference frame. All the sub-models are individually modelled and implemented.

The shortcomings of PI controller as more settling time, inadequate reference tracking system and complicated implementation are overcome in PR controller. Both the PI and PR controller are implemented for grid connected voltage source inverter and for droop controlled parallel inverters. Hence PI and PR controller are compared and it can be concluded that PR controller has a good performance than PI controller, but it requires an extra integrator than PI controller.

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“Power Quality Improvement by using Custom Power Device”

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Abstract— The Power quality requirement is one of the important issue for power system. The main problems of power quality are voltage sag, swell, current harmonics. In this paper it is describes the problem of power quality and its mitigation using UPQC . The unified power- quality conditioner (UPQC) is used to mitigate the current and voltage-related power-quality (PQ) problems simultaneously in power systems. UPQC mainly consists of series and shunt Active Filters, the series active power filter compensates the load voltage on the other hand the shunt active power filter compensates the source current harmonics and also it maintains the dc link voltage unchanged in steady state. In this paper approach to compensate power quality problems using custom power device i.e UPQC based on synchronous reference frame (SRF) and instantaneous PQ technique is discussed. The control scheme is simple to design. Simulation results carried out by using MATLAB simulink.

Keywords— unified power quality conditioner (UPQC), pq problems, sensitive load, non linear load.

Introduction

Both electric utilities and end user equipment are becoming increasingly concerned about the quality of electric power. The power quality is affected by the distortion in the source due to using nonlinear loads. The main cause for distortion is sag ,swell, harmonics. The usage of non linear load is increased day by day, while considering that industries power electronics drives are used for the automation of the industries Sag, swell, harmonics are the main Power quality problems which are mitigated by the various custom power device such as dynamic voltage restorer (DVR), distribution-static synchronous compensator (D-STATCOM), and unified power quality conditioner (UPQC) [1]. In this paper UPQC [2] which the combination of series and shunt active filters is used for the mitigation of the power quality problems. The series active power filter is voltage source converters and shunt active power filter is current source converter which are controlled by the PWM signals which are generated by the controllers.

The Synchronous Reference Frame technique can be employed to generate reference signal for series APF of

UPQC. The source voltage from the system is measured and positive sequence rms magnitude of the voltage is calculated This magnitude can be considered as d-axis component of the voltage. The PLL is used to lock the phase of source voltage and obtain the components $\sin\theta$ and $\cos\theta$. The load reference voltage can be obtained. Similarly Instantaneous p-q technique is used for the control of shunt inverter of UPQC in order achieve mitigation of source current harmonics. The control requires to measure source current and source voltage from the system in order estimate a reference current using instantaneous p-q technique. Source voltage and current are transformed to $\alpha\beta 0$ reference

Basic Configuration of UPQC

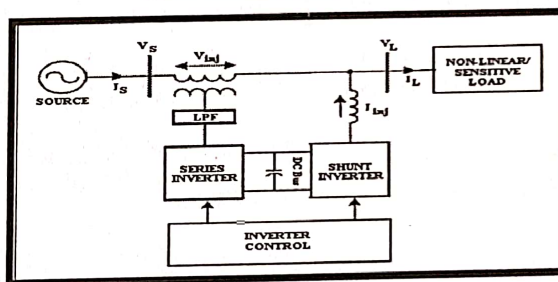


Figure.1. Configuration of UPQC

Shunt active filter

The shunt active filter has a Voltage Source Inverter (VSI), Interfacing Inductor, and ripple filter. The design of VSI includes the DC bus voltage level, the DC capacitance and the rating of IGBTs used. The design of Interfacing Inductors and the Ripple Filter is presented here. The design is carried out considering a right shunt UPQC.

The DC capacitor connected at the DC bus acts as energy buffer and provides dc voltage for the normal operation of the shunt APF. The DC bus voltage V_{DC} , DC a bus capacitance C_{DC} , interfacing inductors (L_f), and voltage and current rating of switches are calculated as below.

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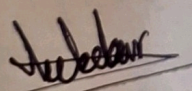
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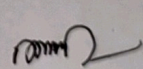
Department of Electronics and Telecommunication Engineering

List of Journals publication (2020-21)

S.No	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal
1	A Review Paper on Human Visualization Diagnosis for Retinal Disease Using Soft Computing Techniques	D. R. Bhatkar, Dr. D. D. Nawgaje	Electronics and Tel. Communication Engineering	International Journal of All Research Education and Scientific Methods (IJARESM)	2021	ISSN: 2455-6211	http://www.ijaresm.com/uploaded_files/document_file/D. R . Bhatkar, Dr . D . D . Nawgaje fU4u.pdf
2	Increased theta activity after Om mantra meditation with Fourier and wavelet transform	Bhavna P. Harne and Anil S. Hiwale	Electronics and Tel. Communication Engineering	International Journal of Intelligent Systems Design and Computing Vol. 3, No. 2	2021	ISSN: 2052-8485	https://www.inderscience.com/info/inarticle.php?artid=115166


Dr. R.S. Dhekekar/Mr. T.P. Marode
Prepared By




Dr. M.N. Tibdewal
HoD EXTC

A Review Paper on Human Visualization Diagnosis for Retinal Disease Using Soft Computing Techniques

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ABSTRACT

Retinopathy when all is said in done, diabetic retinopathy specifically is the significant worries of visual impairment and appearance of hard exudates is one of its initial side effects. In this period, diabetes is the most generally discovered persistent infection present in individuals of different age bunches having lacking insulin creation, which delivers high glucose. Diabetes, when left undiscovered, may prompt the advancement of different infections across the body. Diabetic Retinopathy (DR) is an eye sickness brought about by diabetes, which brings about harmed retinal veins and may prompt vision misfortune. Numerous PC supported diagnostics frameworks have been created previously, which utilized customary strategies where handmade highlights are utilized. With the coming of Deep Learning, particularly in clinical picture examination, more precise and powerful outcomes are created, as it performs highlight extraction task naturally. This paper reviews the different soft Computing techniques that can be utilized for the retinal diagnosis in case of infection.

Keywords: Computer-aided diagnostic systems, Soft Computing, Diabetic retinopathy; exudates; image processing;

INTRODUCTION

Diabetic Retinopathy (DR) is an infirmity of retina brought about by intricacies of diabetes mellitus, which can ultimately prompt visual deficiency in both center and progressed age bunches [1]. Diabetes can cause debilitating in the retina's blood vessels. The veins in the retina are very powerless to this debilitating and can go through a progression of changes. Late exploration has given a superior comprehension of the infection measures and is opening up new roads for counteraction and treatment. Compelling medicines are accessible and are ideally utilized at the point when retinopathy is distinguished early, a long time previously the patient knows about the indications.

For this reason evaluating programs for early identification of retinopathy are a fundamental piece of diabetes care what's more, are in inescapable use [2]. According to the Public Institute of Health (NIH 2009), diabetic retinopathy is the most well known diabetic eye sickness that is brought about by changes in the blood vessels of the retina, where in veins may swell and release liquid, strange fresh blood vessels may develop on the outside of the retina. It is well realized that the entanglements develop gradually set apart by the four phases. The principal stage comprises of blood clumps which show up as little red dabs normally called miniature aneurysms. The second stage includes exudates which are brilliant yellow spots which are essentially concentrate fat stores, third stage is minimal serious with hemorrhages that make blood stains areas moderately over a wide region. The last stage is set apart with cotton fleece whitish yellow areas that are brought about by the harm of nerve fiber [3,4].

Scientists have made endeavors to restrict and cover the vein organization and optic plate for identification of exudates, hemorrhages also, miniature aneurysm. Toward this path a few computational procedures have been proposed also, reported with the plan of robotized identification of retinopathy. It is referred to in the writing that the majority of the examination work have been completed on openly accessible informational indexes which are STARE (Structured Analysis of the Retina), DRIVE (Digital Retinal Images for Vessel), DIARETDB (Diabetic Retinopathy Database)1, DIARETDB0, MESSIDOR (Methods for Assessing Segmentation and Indexing strategies Dedicated to Retinal Ophthalmology), Retinopathy online Challenge, CMIF(Collection of multispectral pictures of the fundus) , REVIEW (Retinal veseel picture set for assessment of width), JRD (Junction goal informational collection, ONHSEG (Optic nerve head division informational collection), RIMONE (Retinal Image information base for Optic Nerve Assessment), ARIA (Automated Retinal Image Investigation), INSPIRE (Iowa Normative Set for Preparing Images of the Retina). This paper is an endeavor to make an intricate review of research in this space.



LITERATURE REVIEW

Author - Manik Sharma, Natalia Romero

The utilization of a cross breed approach coordinating diverse delicate figuring methods should be additionally investigated for analysis of the previously mentioned mental issues. There is an expected degree to utilize and investigate the viability of various arising nature-enlivened figuring strategies like Gray Wolf Optimizer , Crow Search Algorithm , Harris Hawks Optimizer , Artificial Feeding Birds , Ant Lion Optimizer , Garter Snake Optimization , Spotted Hyena Optimizer , Elephant Herding Optimization , Emperor Penguins Colony , Whale Optimization Algorithm in conclusion of various human mental issues. These strategies and their crossover approaches can be utilized to choose ideal informational collection highlights to improve information arrangement rate. The exhibition measurements like exactness, review, F1-score, pace of arrangement, pace of misclassification alongside other factual measures for these methods ought to be profoundly contemplated and analyzed as the quality and by and large execution of the demonstrative framework has been significantly relied on these boundaries. Because of the unbalancing of boundaries and stochastic nature, once in a while the yield of the NIC calculation may stall out in a difficulty called nearby maxima. To conquer these issues, paired and tumultuous variations of the distinctive NIC calculation have been proposed. A tumultuous form of the calculation utilizes diverse turbulent sine, iterative, coordination, circle, tent, Chebyshev, artist and Sinusoidal. More exertion is needed to investigate the utilization of twofold or tumultuous variations of these arising NIC strategies for the determination of these mental issues. The various figures, for example, insecurity the patient, deficient time for gathering analytic information, symptomatic blunder alongside the high volume of information, the multifaceted nature and vulnerability in the illness conclusion measure has been expanded. Rather than the genuine worth, the fluffy rationale procedures like fluffy master framework, fluffy set hypothesis, fluffy grouping, fluffy psychological guide, rule-based fluffy rationale, weighted fluffy principle help alongside versatile neuro-fluffy surmising framework in identifying the level of participation for various mental issues . In basic terms, for taking care of loose and fragmented information, the utilization of fluffy rationale, unpleasant set and stochastic thinking can be an additional benefit. To additionally improve the nature of the demonstrative framework, the profound learning methods like Deep Neural Network (DNN) , Deep Belief Network (DBN), Restricted Boltzmann Machine (RBM) , and Convolutional Neural Network (CNN) ought to be liked to handle the information introduced as pictures, sound and video signals. At long last, the arising profound learning model like variation auto-encoders (VAEs) and generative ill-disposed organizations (GANs) can be successfully utilized in tackling solo learning issues .

Author - H. S. Vijaya Kumar, M. A. Jayaram and Asha Gowda Karegowda

Hard restricting computational Techniques have been utilized to tackle various issues in different spaces since quite a while. They are essentially conventional in nature and established on standards of exactness, assurance, and firmness intrinsic in white and dark rationale. It has been seen that hard registering methods like K-Nearest Neighbor (KNN), the variations of KNN, support vector machine (SVM), Binary trees direct discrete investigation, polynomial bend fitting, emblematic rationale and thinking and so forth, are effective to tackle genuine issues. In this part, utilizations of such hard restricting strategies in acceralated exudates identification techniques have been neglected. Niemeijer et al. have utilized AI based PC calculation to assess and identify exudates and cotton-fleece spots and to separate them from drusen, K Nearest Neighbor was utilized to group the pixels based on channel reaction along with a direct discriminant work. In this work each pixel is arranged and a likelihood map that demonstrate the likelihood of every pixel to be a section of splendid injury has been created. Separation of kinds of pixels or bunches are in view of highlights, for example, pixel tone, bunch territory and so on The calculation so created came about in two yields where splendid sore are available or not and which class every sore as a piece of exudates, cotton fleece spots or drusen. The calculation showed an exhibition of 95% and 86% as for affectability and explicitness in identifying exudates. Wei Lin et al. have consolidated the picture district by KNN diagram. The location of OD and veins are finished by the blend of Gaussian channel coordinating and iterative edge following. The extricated result is taken as contribution to fluffy combination calculation to identify the OD place by deciding the beginning of veins organization. An edge picture is drawn utilizing Kirsch's cover. Division of retinal pictures is finished by a quick agglomerative grouping technique utilizing a KNN chart. Locales are combined to shape a division of the picture as per their homogeneity. Blending is begun with pretty much nothing districts and K-NN diagram is utilized for looking districts that ought to be consolidated. A stack is utilized to predefine a limit, specifically a tone deviation. Mean power of the current locale is refreshed to the stack. After every one of the pixels are appointed an area the calculation is ended. The exhibition accomplishes a normal particularity of 95.42% and normal affectability of 91.08% in location of exudates.

Author - Avinash R. Pinglae , Aparna A. Junnarkar

The engineering of RaajHans is work area based. It very well may be introduced and run on work areas having least prerequisites of P4 framework. As the instrument is going to carry out utilizing java stage, It will be viable with any sort of



frameworks environment. In short we can say that the RaajHans would be a stage autonomous information mining device. This component of RaajHans can make it more famous than some other information mining instrument. After establishment of the RaajHans, it tends to be utilized to enter large measure of information in type of SQL inquiries or Oracle information base. The data set converter to help RaajHans to change over the information base inputted in type of SQL questions or on the other hand prophet data set into the document for example at-recognition reference record. RaajHans on opposite side is a device which stresses the exhibition of information mining task utilizing delicate registering methods. Hereditary calculations, Fuzzy sets and Neural Network inserted in the apparatus will help improve the information mining task. The RaajHans will control the client to pick a most suit-capable design among created ones. Neural organization will help to save the information acquired by past information mining.

Author - Prableen Kaur, Manik Sharma

Diabetes is a relentless human metabolic wellbeing problem. Analysts have utilized diverse information mining (ID3, Random Forest, innocent bayes, SVM, KNN, C4.5) and delicate figuring (GA, ACO, PSO, ABC) procedures to prospect diabetes problem in people. The particular information mining strategies are utilized to get the most encouraging outcomes that address high pace of accomplishment. In most recent long term, the pace of utilization of various information mining and delicate processing strategies has been apparently expanded. The vast majority of the specialists have utilized WEKA and MATLAB for early analysis of diabetes. In most recent 10 years, C4.5 and ID3 were the most and least favored decisions for mining diabetic patients. In delicate processing methods, the standout research has been finished utilizing GA. Nonetheless, not many scientists have carried out ABC for something similar. The pace of exactness of C4.5, SVM, KNN, irregular woods and crossover approaches in diabetes finding lies between 67 - 91%, 77 - 96%, 73% - 80%, 68 - 94% and 74 - 99.2% individually. It appears to be that mixture procedures are more viable and precise to the extent the pace of exactness for diabetes conclusion is concerned. The utilization of information pre-preparing strategies can additionally improve the prescient pace of precision. Almost certainly, critical work for diabetes analysis has been finished. Notwithstanding, still keen and further developed arrangement is required which may naturally gather and screen various exercises of diabetic patients. Hence, a consideration is needed to build up a savvy and half breed diabetic demonstrative framework utilizing Machine Learning, Soft Computing, Internet of Things, Ontologies and Information Theory to conscious and save human masses from broad definitive range of this deadliest human issue. What's more, the framework ought to have the option to decrease the readmission pace of diabetic patients.

Author - Mousa Al-Akhras, Ala' Barakat, Mohammed Alawairdhi, Mohamed Habib

In this work, another philosophy for diagnosing Glaucoma disease was proposed. The procedure joined picture based and illness related highlights. An upgraded technique is proposed to remove picture based highlights. The framework utilized a dataset composed of 106 retina pictures gathered from 3 hospitals. Images were examined and includes were separated, at that point a classification for them was performed utilizing Support Vector Machines (SVM) and a Genetically-Optimized Artificial Neural Networks (ANN) AI techniques. For SVM classifier and when the order depended on both set of highlights without information standardization, the most noteworthy classification exactness of 87.74% and the most noteworthy explicitness of 100% were obtained utilizing Gamma estimation of 0.25. The most noteworthy affectability value of 23.08% was gotten utilizing the Gamma estimation of 1. When information standardization was utilized with both arrangement of features, the most elevated grouping exactness of 80.19% and the highest specificity of 91.40% were acquired utilizing a Gamma estimation of 0.25. The most noteworthy affectability estimation of 30.77 was gotten utilizing a Gamma value of 0.8. For ANN classifier the got precision for the mix of features was 98% with and without information normalization. Further upgrades are as yet accessible in the field of Glaucoma automated analysis in a few territories. First; successful cooperation must be set up between colleges/research focuses and hospitals to assemble a bigger dataset which ought to be gathered from different clinical screening gadgets. Having a bigger dataset for different times of the two sexual orientations will encourage future examination efforts. Automatic conclusion likewise permits a standard check of retina images for early discovery of primary changes in the ONH. Ordinary check scan be directed by the actual patients if an appropriate camera is accessible with legitimate preparing to take the legitimate angle and utilize the finding framework. Other keen methodologies such as deep learning could likewise be applied to order pictures into either Glaucoma or Normal dependent on data accessible at the pixel level.

Soft Computing Techniques

Delicate processing is a consortium of strategies that handles vagueness, in actuality, circumstances. In contrast to hard processing strategies, delicate registering methods are open minded to imprecision, vulnerability just as a guess. When all is said in done, these are streamlining procedures that should tackle genuine issues (NP-hard, NPcomplete) adequately. Fluffy rationale, Artificial Neural Network (ANN), Nature-propelled Computing (NIC) procedures, stochastic thinking and profound learning strategies are a portion of the major delicate figuring draws near:



1. The possibility of fluffy rationale was given by Dr Lotfi Zadeh of the University of California. Fluffy rationale deals with the level of truth instead of the specific value such as obvious or bogus and can successfully handle imprecise or fragmented issues.
2. An Artificial neural organization is an equal computing technique that attempts to mirror the working model of the mind. The neural organization itself isn't an algorithm, rather, it sets a system for many different AI calculations to work together and deal with complex information inputs.
3. NIC techniques are invigorated from various angles of nature like people, birds, bugs, creatures, water etc. There exist in excess of 100 nature-inspired computing calculations.
4. Stochastic thinking helps with retribution the values for the irregular variable.
5. Deep learning depends on learning data representation rather than task-explicit algorithms. In different words, it is an arising fake concept that manages copying the learning approach of people. When contrasted with other AI calculations, profound learning calculations are stacked in a pecking order of expanding intricacy and deliberation.

Applications

Applications of soft Computing techniques are as follows:

Handwritten Script Recognition using Soft Computing

Transcribed Script Recognition is one of the requesting portions of software engineering. It can decipher multilingual records and sort the different contents likewise. It utilizes the idea of "block-level method" where the framework perceives the specific content from various content archives given. It utilizes a Discrete Cosine Transform (DCT), and discrete wavelets Transform (DWT) together, which characterize the contents as per their highlights.

Image Processing and Data Compression using Soft Computing

Picture investigation is perhaps the main pieces of the clinical field. It is an undeniable level handling strategy which incorporates acknowledgment and bifurcation of examples. Utilizing delicate processing tackles the issue of computational intricacy and effectiveness in the grouping. Procedures of delicate processing incorporate Genetic Algorithms, Genetic Programming, Classifier Systems, Evolution Strategies, counterfeit life, and a couple of others, which are utilized here.

Use of Soft Computing in Automotive Systems and Manufacturing

The utilization of delicate processing has addressed a significant misguided judgment that the car business is delayed to adjust. Fluffy rationale is a strategy utilized in vehicles to construct exemplary control strategies. It takes the case of human conduct, which is depicted in the types of rule – "Assuming Then "articulations. The rationale regulator at that point changes over the sensor contributions to fluffy factors that are then characterized by these standards. Fluffy rationale methods are utilized in motor control, programmed transmissions, antiskid guiding, and so forth.

Soft Computing and Decision Support System

Delicate figuring gives a benefit of diminishing the expense of the choice emotionally supportive network. The procedures are utilized to configuration, keep up, and boost the estimation of the choice interaction. The main use of fluffy rationale is to make a choice framework that can anticipate such a danger. The subsequent application is utilizing fluffy data that chooses the zones which need substitution.

CONCLUSION

Momentum research centers on arising strategy of delicate processing in the space of Data Mining. Powerful usage of Soft Computing strategies for mining mass measure of information can make Data mining task incredible. As there are a few devices accessible for information mining in market along with different procedures, one can successfully receive a decent outcome utilizing such tools. Genetic calculations, Fuzzy sets and Neural Network inserted in the apparatus will help improve the information mining task. Neural organization will help to protect the information acquired by past information mining undertakings. Neural network will likewise help the device to improve its exhibition after step by step use.

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Title: Increased theta activity after Om mantra meditation with Fourier and wavelet transform

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Abstract: In our previous study, FFT analysis has been used for spectral analysis of the EEG signal to investigate the effect of Om mantra meditation. It was proved that this mediation plays a role in providing relaxation. In the present study, we continued our work with wavelet analysis to firmly establish this benefit. Two-way repeated measures ANOVA was used on relative power obtained by FFT and DWT. The comparative results of both methods are presented. The same increasing and decreasing pattern of relative power are observed in each band with FFT and DWT. An increase in theta power in all regions of the brain has been observed with both the methods. Raised theta is a sign of deep relaxation. The study confirms that this 30 minutes of Om mediation offers relaxation; then it could be the way to de-stress if adopted as a daily routine.

Keywords: mantra meditation; EEG; Om.

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DEADLINE AWARE OPTIMIZATION IN RESOURCE ALLOCATION FOR REDUCING MIGRATION COST

AMITKUMAR S. MANEKAR¹ AND P. GERA

ABSTRACT. Nowadays, the scheduling of various tasks using the available resources is attaining a larger attention in cloud computing owing to the improved performance in cost optimization. Unluckily, scheduling approaches in traditional distributed computing are not able to work in an effective manner since, it is large-scale and dynamic. With virtualization techniques big data applications surges up to many extend. Compromises of cost and performance are someway achieved by these virtualized cloud computing platforms. One of the enormous challenges above virtualized platforms is managing resources. Reliance on a single cloud provider is a challenging task with respect to services like latency, QoS and non-affordable monetary cost to application providers. Managing distributed data centres and maximizing profit is a current problem. High cost and maintenance charges are leverage by data centres. We propose a multi-objective hybrid model with tight deadline (makespan) condition; for optimizes the execution time objective to meet the deadline constraint when the feasible solution hasn't been obtained. Experimental results and conclusions drew with extensive experiments based on different scales and different cloud resources. Detailed analysis of experimental results, it is shows that the proposed algorithm has a better optimization effect against the fair share policies which are presently available in most of the BDA with deadline constrained.

¹*corresponding author*

2010 *Mathematics Subject Classification.* 94A16, 49N30.

Key words and phrases. Deadline, Cost Optimization, Big Data, Cloud Computing, Data Migration Cost, PSO.



“CREDIT CARD FRAUD DETECTION USING MACHINE LEARNING TECHNIQUE”

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ABSTRACT: This study primarily focused on detecting credit card fraud in the real world. For the qualified data set, we must first collect credit card data sets. Then, based on the user's responses, deliver inquiries to test the data set, use a credit card. Following the random forest algorithm employing a classification approach with a data set that has previously been examined and supplying a current data set. Finally, the data accuracy of the outcomes is improved. After then, a number of attributes will be processed so that fraud detection can be noticed when looking at the graphical model's depiction. Credit Card Fraud Detection is a typical sample of classification. In this process, we have focused on analyzing and pre-processing data sets as well as the deployment of multiple anomaly detection algorithms such as Local Outlier Factor and Isolation Forest algorithm on the PCA transformed Credit Card Transaction data.

1. INTRODUCTION

Risk assessment is utilised by banks all over the world. Risk rates are analysed using a number of methodologies since credit risk assessment is so critical. Banks divide their customers into groups based on certain characteristics. Client's financial histories and subjective consumer considerations are assessed throughout the exam Those figures are objective, which reflect the financial statements of the company. Fraud detection includes observing and analyzing the behavior of various users in order to estimate the detection of undesired behaviour. We need to understand the many technologies, algorithms, and types involved in detecting credit card fraud in order to identify it efficiently. There are several algorithms for detecting credit card fraud, each with its own set of benefits and accuracy. The methods include:- K-nearest neighbour, Linear regression, Ada Boost, Naive Bayes, J48, Logistic Regression, Random Forest algorithm etc. The null hypothesis is that the credit card transaction is legitimate. As a result, whether it is a correct and real transaction is a false positive, and hence the system model is predicted to be a fraudulent transaction, and a warning is issued. This signifies regular clients looking to make a purchase would defer faraway from making purchases. False negative is a major problem since the transaction is fraudulent but the system model indicates that it is not. A false negative is significantly more serious in our instance than a false positive, because our system model would be costly if it predicted fraudulent transactions as legitimate.

2. LITERATURE SURVEY

1. ACTUAL SYSTEM

In a review of a contextual investigation, which included the identification of Credit Card misrepresentation where information standardization is applied prior to cluster analysis, as well as results obtained from the use of Cluster Analysis and Artificial Neural Network on the discovery of extortion, has revealed that neuronal data sources may be limited by bundling properties in the existing system. Moreover, good results can be obtained by utilising standardised data, which should be MLP prepared. This exam required independent study. The accuracy of estimates is about 50%. The discovery of an estimate and the reduction of the cost measure were noteworthy aspects of this work. The result was 23%, and the formula they came up with was the Bayesian minimal chance[3]. A collective replacement comparison metric that quantifies gains and losses owing to fraud detection is proposed in this system. A cost-sensitive technique based on the Bayes minimum risk is utilised with the existing cost measure.

Face Recognition and Attendance System

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ABSTRACT: Daily attendance marking is a common and important activity in schools and colleges for checking the performance of students. Manual Attendance maintaining is difficult process, especially for large group of students. Some automated systems developed to overcome these difficulties, have drawbacks like cost, fake attendance, accuracy, intrusiveness. To overcome these drawbacks, there is need of smart and automated attendance system. Traditional face recognition systems employ methods to identify a face from the given input but the results are not usually accurate and precise as desired. The system described in this we aims to deviate from such traditional systems and introduce a new approach to identify a student using a face recognition system, the generation of a facial Model. This describes the working of the face recognition system that will be deployed as an Automated Attendance System in a classroom environment

KEYWORDS: Attendance system ,Simple User Interface , Time saver.

I. INTRODUCTION

Nowadays Attendance is considered as an important factor for both the student as well as the teacher of an educational organization. With the advancement of the deep learning technology the machine automatically detects the attendance performance of the students and maintains a record of those collected data by using some face-recognition library in Python . In general, the attendance system of the student can be maintained in two different forms namely, Manual Attendance System, Automated Attendance System .

Manual attendance may be considered as a time-consuming process or sometimes it happens for the teacher to miss someone or students may answer multiple times on the absence of their friends. So, the problem arises when we think about the traditional process of taking attendance in the classroom. To solve all these issues we go with Automatic Attendance System using face-recognition. Automated Attendance System is a process to automatically estimate the presence or the absence of the student in the classroom by using face recognition technology.

II. RELATED WORK

^[1]Face Detection and Recognition using OpenCV and Python Tejashree Dhawle¹, Urvashi Ukey², Rakshandha Choudante³ 1-3Student, Department of Computer Engineering, Dr. Babasaheb Ambedkar Technological University Raigad, India This research paper gives an ideal way of detecting and recognizing human face using OpenCV, and python which is part of deep learning . This report contained the way in which deep learning an important part of computer science field can be used to determine the face using several libraries in open CV along with python. This report will contain a proposed system which will help in the detecting the human face in real time. This implementation can be used at various platforms in machines and smartphones, and several software application

^[2]Automatic face recognition (AFR) technologies have made many improvements in the changing world. Smart Attendance using Real-Time Face Recognition is a real-world solution which comes with day to day activities of handling student attendance system. Face recognition-based attendance system is a process of recognizing the students face for taking attendance by using face biometrics based on high - definition monitor video and other information



ECG Classification Using Deep Neural Networks

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ABSTRACTION

Electrocardiogram (ECG) is an important diagnostic tool for analysing cardiac tissues and structures. It includes information about the heart structure and the function of its electrical conduction system. Time series classification (TSC) is the area of machine learning interested in learning how to assign labels to time series. Now a days, Deep learning has received enormous attention because of its high scalability. The accuracy of deep learning for TSC has been raised to a competitive level. In our study, we developed different Neural Network which are used in TSC. We used simple CNN, LSTM, GRU and Inception Time out of which Inception Time showed great results. Inception Time uses power of CNN in efficient way With Inception Time we got about 98.89 percent of accuracy. We also cross checked our results with doctor and the results were matching with his diagnosis too.

Keywords: Deep Learning, TSC (Time Series Classification), Imbalanced Data, ECG, DNN

INTRODUCTION

Patients of Cardiovascular disease is increasing day by day. ECG is used to monitor and primarily diagnose cardiovascular disease. An ECG transitioned to digital from analog has gained importance in medical diagnosis. However, limited performance of classical algorithms precludes its usage as a standalone diagnostic tool and relegates them to an ancillary role

Deep Neural Networks are gaining tremendous popularity nowadays because of its subtleness and accuracy. Deep Neural Networks are being used in lots of areas like image processing, processing and in natural language processing[1]. Time Series classification and forecasting is one of the branch which is emerging as newer technologies like DNN are being introduced. It is reaching that part of the data where humans cannot reach for sure. Different DNN are being trained to classify and diagnose different disease like different pulmonary diseases, fractures, but for that we require lots of data[2]. Gathering that data is a big challenge in because of confidentiality and security of personal health information. One of the great feature of DNN is that we do not have pick the feature manually DNN automatically do it for you which provide us more accurate representation of ECG which is more understandable by machine[3]. DNN contains large amount of variables which requires massive amount of data to be trained[4].

We used two types of neural networks CNN and RNN[2]. CNN stands for Convolution Neural Network and RNN for Recurrent Neural Network. In CNN we used simple and a more advanced neural network known as InceptionTime which uses potential of CNN in efficient way[5]. In RNN we used LSTM and GRU which are recurrent neural network with some variation in them[1].

InceptionTime is an ensemble of five deep learning models for TSC, each created by cascading multiple Inception modules, having the same architecture but different initial weight values. Fig. 1 illustrates the details of an Inception module, where multiple filters are applied simultaneously to an input time series. The module includes filters of varying lengths, which as we will show, allows the network to automatically extract relevant features from both long and short time series[5].

In Section II we will have more information about dataset and its authenticity and in Section III we will see methodology how we used different DNN architectures to get the results and in Section IV we will discuss about the results which is good among them. Finally Section V concludes the paper

DATASET

In this experiment we are using PhysioNet MIT-BIH Arrhythmia ECG Databases as data source for labelled ECG records. The MIT-BIH arrhythmia database is publicly available dataset which provides standard investigation material for the detection of heart arrhythmia[6]. MIT-BIH arrhythmia database is mostly used for medical and research purpose of different heart arrhythmia detections and analyses. This database tries to provide a fully automated environment to

Implementing Optical Character Recognition on Android Operating System for Poster - Posterlink

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ABSTRACT

A software tool is developed to extract relevant information from any poster or a paper (date, venue, contact number). Digital image processing methods are being used to pre-process the image. The images may be unclear and have various issues like difficult perspective, intensity related conditions and partial occlusions. There is also complex background which is being dealt with to make it easier to locate the area with the text. After locating the text bounding boxes, the text would be extracted by an optical character recognition (OCR) engine – Google Vision API, and parsed to get the required relevant information like time, date, venue and contact number. The image processing part is done and concatenated text would be pushed back into a text file. This text file will be parsed through time and date parser to extract the date and location and number. More specified information can also be found by developing the above tool. Test results show that the algorithm performs well to locate the text area and extract the key information as required.

Keywords: Information Extraction, perspective distortion, pattern matching, ocr, parsing, Google vision api.

INTRODUCTION

A lot of event's information is posted on the hallway walls, entrance doors and elevators in our surroundings in the form of flyers and posters. It may be a competition, an information leaflet, concert or a seminar; they all have a date, time and venue and contact number on it. Everyone wants to keep a record of interested events when they come across those posters. Since the information on the poster is not present in a digital form and it needs to be remembered or be saved for the viewer's convenience it should be available somewhere in a digital form. Therefore, an OCR based mobile image processing system is developed that can automatically extract event information from flyer pictures. The goal is to design a small tool that enables the user to extract important key points like (time, date, number and location) by snapping a picture on the related flyer/poster. Posters, hoardings or any other image which contains text can be processed with this tool, but the tool is mainly focused on posters, which have more variations and involve more complex image components. Therefore, it would be more challenging to get accurate results of various posters and once this works it can be further implemented to hoarding. Users are allowed to take photos from different angles and illumination conditions and still get quality results. The illumination and perspective distortion errors will all be taken care by this tool and a output with the time, date, location and number present on the poster will be given out as the output. This information then can be saved easily on the phone.

LITRATUE REVIEW

Information extraction is a part of text mining which is used to extract information to make the data structured from unstructured data. Generally, for getting information, the schemas, relations or PDF are easy to find. Identification of each entity is not structured data or by simply identifying an entity is not the chronological way of information extraction rather it must be a part of machine learning through Natural Language process. Text Document Images Approach given by S. Nirmala for extracting text in the complex background color document images, the method used was canny edge detector for detecting edges. Due to the presence of dilation operation on the edges which creates holes in the nearest components which rather creates a character string. The components which are not nearest for the dilation they are eliminated automatically. But here the problem can be only connected sets will be identified if there will be more conditions, based on situation then this method may not provide accuracy. For eliminating other non -text components, the method used was analysis of standard deviation from connected component and computing. Performing segmentation an unsupervised local threshold was reprocessed. At the end text regions are found and reprocessed. The methods like canny edge detector, dilation operation, unsupervised local threshold, connected component analysis are giving 97.12% accuracy in handling degradation as blur or wavy text format. Based on the report by Davod .et.al a dynamic threshold used in the detection of edges from wavelet coefficient. But for further

Use of Asynchronous Methods to Enhance Javascript Code

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Abstract - Since 1996, when JavaScript and its features were first released, there has been no stopping for it. Because of its pace, JavaScript is used to implement some of the language's features in almost all major technologies. Although the development of JavaScript was initially guided solely by implementation, the ECMA standardization process is now gaining traction. The asynchronous function provided by JavaScript is one such feature. Why use Asynchronous JavaScript when you can do whatever you want with standard JavaScript? In this article, we'll look at all of the benefits and enhancements that Asynchronous JavaScript offers over standard JavaScript. We'll look at how to make our web apps load quickly and are easily readable. We will systematically compare the old features such as callbacks, single threading with promises, async await, and error handling.

Key Words: JavaScript, Asynchronous, async, await, promise, Callback

1. INTRODUCTION

When we talk about making websites, the first thing that comes to mind is probably HTML and CSS and we can build a static website with HTML and CSS. For developers developing cloud, web, or IoT applications, JavaScript code running in the Node.js runtime is a big platform. The use of asynchronous callbacks and event loops to provide highly sensitive applications is a fundamental principle in Node.js programming. This programming model, though conceptually simple, contains several subtleties and behaviors that are described implicitly by the current Node.js implementation. We can include graphics, add colors and static content, make animations (2D/3D) but the websites will not be user responsive. User responsive means that the dynamic nature of the website will be absent. We'll not be able to submit form data, respond with different data every time a user clicks on a button. To make all of this possible, we use JavaScript. JavaScript is a fully fledged programming language capable of making websites, apps and games etc. JavaScript abbreviated as JS uses scripts to interact with the webpage.

Asynchronous JavaScript is a part of JavaScript and is considered fairly advanced bit of JS Language. To get a good grasp of Asynchronous JavaScript, we have to first understand the Synchronous section of JavaScript. JS is single threaded language and this means that only one process at a time can be executed by JavaScript. It starts from line one and executes all the lines of code one by one and all

the process are stopped until that line of code is fully executed.

For example:

```
const button = document.querySelector('button');
button.addEventListener("click", () => {
    alert("CLICKED");
    let paragraph = document.createElement("p");
    paragraph.textContent = "New paragraph added.";
    document.body.append(paragraph);
});
```

When we execute this bit of code, we will find that the alert () will be executed first and until and unless we terminate the alert, the paragraph element below the alert () will not run or we can say that the rendering is paused. Browsers allow us to run such operations asynchronously to solve certain issues. Promises allow you to start an operation (for example, fetching an image from the server) and then wait until the result is returned before continuing with another operation. Since the operation is happening somewhere else, the main thread is not blocked while the async operation is being processed. This was the problem that was faced by programmers all around the world and hence Asynchronous JavaScript was introduced. Asynchronous JavaScript has made life easier for programmers who wanted to run some kind of files from external resources such as fetching files from server, using the database, accessing the webcam, etc. Asynchronous means multiple things can be done at the same time or multithreading. In this paper, we will dive into the world of Asynchronous JavaScript and all the advantages it has to the regular way of writing scripts in JS. We will take a look at the traditional methodology of creating scripts and how we can improve them by using asynchronous methodology and how it improves the quality and readability of the code.

2. PROBLEM STATEMENTS

2.1 The Call Stack

Call stack is the mechanism by which the JS interpreter keeps track of its place in the script that calls multiple functions. This is the way JavaScript knows where it currently

E-Commerce Website for KB-Plastotect Company

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Abstract— E-commerce could be a large use within the modern business. E-commerce means electronic commerce. E-commerce includes buying and selling of products and services, or the transmitting of funds or data, over a system, predominantly the net. Rather e-commerce is simple just differently to spice up the prevailing business practices. It's leading to a whole change in the traditional way of doing business. This significant change in business model is witnessing an amazing growth round the globe and India isn't an exception. A large internet penetration has added to growth of E-commerce and more particularly start-ups are increasingly using this selection as a differentiating business model. More E-Commerce has significant influences on the environment. Although the model is very employed in current business scenario but the choice has not been explored at its fullest.

Keywords—E-Commerce, Internet, Self-service, Technology, Internet banking

I. INTRODUCTION

E-commerce means electronic commerce. It means dealing in goods and services through the electronic media and internet. E-commerce involves carrying on a business with the help of the internet and by using the information technology like Electronic Data Interchange (EDI). E-Commerce relates to a website of the vendor on the Internet, who trades products or services directly to the customer from the portal. The portal uses a digital shopping cart or digital shopping basket system and allows payment through credit card, debit card or EFT (Electronic fund transfer) payments. A more complete definition is: E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals (C. Nisha and G. Sangeeta, 2012). The main types of electronic commerce are: business-to-business (B2B); business to- consumer (B2C); business-to-government (B2G); consumer-to-consumer (C2C); and mobile commerce (m-commerce).

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A. E-Commerce Facilitators: Internet

A massive internet penetration has added to growth of E-commerce. Internet and smart phones are becoming an integral part of every life. Internet is no more a source of information but has become an important tool for shopping, learning, communicating and even getting service from plumbers, carpenters, doctors etc. Supply chain is also becoming leaner and smarter as digital platforms are helping to better connect with the customers who significantly reduces the waste and supporting to green businesses. The internet user population was small during the 1980s, experiencing a slow but steady growth until 1994 due to an increasing number of text-based users (e.g., those using email and file transfer functions). Then, with the introduction of the World Wide Web and subsequent multimedia content expansion, the number of net users exploded. In fact, the internet has grown much more quickly than any other medium in history (Strauss et al., 2007). The International Telecommunication Union (ITU), a United Nations body, recently predicted in 2015 that 3.2 billion people will be online. The population in May 2015 stood at 7.2 billion. In the year 2000 there were just 400 million internet users worldwide.

B. Analytics

Analytics is the scientific process of converting data into insight for making superior decisions. Analytics helps businesses to collect, organize, examine, and report on all their customers do. The immense increase in the volume of data has mandated the businesses to focus on analytics to know the behavior of the customer. Etailors must have real time access to information to measure return on online investments and optimize the channel mix. There are basic analytics capabilities readily available with the E-commerce players like average order value, basket size analysis, conversion ratio but deeper analytics solution for actionable insights of the consumer is required.

C. Social Media

Businesses are increasingly using social media in order to market their products. Social media comprises of websites and computer programs that enable people to communicate and share information on the internet using a computer or mobile phone. Social media plays a greater role in brand building and informing various offers to the customers. It is

Potential use of Passive Cooling Technique in Evaporative Cooler

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Abstract—Energy consumption in buildings shares a major chunk of the energy demand pie throughout the globe. The majority of the energy consumption in buildings is contributing to thermal comfort to individuals. Thermal comfort is vital for human life as it related to the health, performing ability of an individual. There is an exponential rise in the use of air conditioners in the last few decades which in turn provided many environmental adversities like an increase in global temperature due to global warming and ozone layer depletion. Thus, it is a timely need to develop a sustainable, eco – friendly, economical, and energy viable solution to satisfy the thermal comfort needs of occupants. An evaporative cooler is one such technology. Although this method has the advantages of being an ideal cooling system it has certain limitations of lower heat transfer rates, uses in specific climatic conditions, and a large amount of water consumption associated with it. To address the issue of lower heat transfer rate Passive cooling method of incorporating surface roughness like dimples and protrusions on the surface where heat transfer takes place can prove a milestone. In the present study, experimental analysis and analytical study using computer simulation software ANSYS are carried out on terracotta tubes of conical shape which are to be used in Evaporative Cooler. These studies are carried out on three kinds of tubes viz. plain tube, dimpled tube, and protrusion tube. The tubes are checked for variation in heat transfer rate, percent temperature drop, Reynolds number, Nusselt number, and pressure drop due to the incorporation of dimples and protrusion on the inner wall of tubes. It is found that heat transfer and percent temperature drop increase with the use of protrusions by about 39.17% and 17.2% respectively. It is also observed that flow characteristics like Reynolds number, Nusselt number increase with the use of dimples and protrusions without any significant pressure drop. It is also concluded that the input air should be administered at lower velocities to get maximum temperature drop. The tubes with protrusion proved more useful in Evaporative cooler application when used with lower input air velocities.

Keywords: *Passive Cooling, Evaporative Coolers, Terracotta Tubes, Dimples, Protrusions, Net temperature drop*

I. INTRODUCTION

The construction sector, which includes domestic buildings, mercantile, civil services, agriculture, etc. attribute for around 35% of the entire global energy requirements [1]. Heating, cooling, air conditioning, and ventilation applications form the major components of energy

consumption in the building sector. It is also argued that globally around 40% of total building energy is consumed for space heating or cooling applications in both residential and commercial sectors [1]. Room air conditioners are mostly used worldwide as air cooling appliances. However, the rise in the use of air conditioners has led to serious environmental issues associated with global warming and ozone layer depletion. Consequently, it becomes necessary to provide environment friendly, energy viable solutions to obtain a proper thermal environment in buildings. Evaporative cooling (Evaporative Coolers) is one such widely employed effective passive cooling technique that can provide a satisfactory degree of comfort [2]. Deki Cooling installation is one such architectural installation at Noida which made an application of evaporative cooling. It is an elaborate arrangement of hundreds of cone-shaped terracotta tubes into a beehive patterned circle. The porous terracotta tubes (baked earthen tubes) absorb water, and as hot air passes through them, it's turned into cool air. It is an innovative solution for cooling workplaces involving heat rejection in the surrounding environment through machinery. The cooling efficiency of this installation can be enhanced with some changes made to the surface structure of terracotta tubes.

The effect of using the passive method of incorporating the surface roughness (like dimples, protrusions) on the inner surface of these terracotta tubes, in increasing heat transfer rate is illustrated in this paper with the help of results obtained through experimental testing and two-dimensional analysis on Ansys software.

II. LITERATURE REVIEW

It is found in the literature that thermal comfort for humans is vital. For a reason, people pass about 80–90% of the day functioning in offices and living in residents, thus it becomes crucial to keep the good indoor environmental quality (IEQ). [3,4]. The report named 'The Future of Cooling' published by IEI in May 2018 depicted an immense need to develop an energy-efficient and environment-friendly cooling technique predicting that effectual measures can increase cooling efficiency averagely by double and bring down energy requirement for cooling by about 45%. The review by et.al Dnyandip K. Bhamare, 2019 shows how passive cooling can be an option to develop such cooling systems. He depicts that passive cooling techniques are capable of maintaining a

comfortable indoor environment and also lower the cooling energy load [5]. Yifan Yang, 2019 establishes Evaporative cooling as a potential energy-saving passive cooling method along with classification, recent developments, and applications of different enhanced evaporative cooling technologies [2]. An air conditioning technology, named Evaporative Cooler uses the water evaporation phenomenon to cool the temperature of air [6]. Evaporative Coolers are categorized into three types viz. direct, indirect, and indirect-direct evaporative coolers [7]. Air conditioning devices of these types are energy-saving [8] and environmentally-sound [9]. Even though such cooling units are energy-efficient and green, there are certain restrictions to their absolute use. Its performance is good only in hot and arid climates. The performance of the device also varies depending on the inlet air conditions. By Performance evaluation of Indirect Evaporative Cooler et al. Aftab Ahamad quoted that “the indirect evaporative cooler is suitable for hot and dry climatic conditions”, as in most of the regions of India [10]. Also, passive technologies mainly consist of surface shape modifications to expand the heat transfer area or to escalate the turbulence of flow [11-13]. This approach involves surface roughening, such as ribs, fins, dimples, and protrusions [14,15]. Ibrahim et al, 2003 stated that “the cooling effect was enhanced by a high porosity of the evaporator, increased water supply pressure [16]”. Hemant Pisal, Avinash Ranaware demonstrated that the heat transfer rate increases for the metal plate with dimple [17]. Also, presented a fact that the rate of heat transfer and drop in pressure inside dimples rise with the increase in flow rate and with increases in Reynold’s number.

From the detailed and sequential literature survey, it is understood that to cope up with the ever-increasing demand for energy for thermal comfort or cooling purpose there is a dire need to develop an energy-efficient, economical, and environment-friendly cooling technology. Passive cooling especially, Indirect Evaporative Cooling can be the best option to provide thermal comfort in dry and arid regions since it provides an advantage of avoiding direct contact with the cooling medium and thus facilitating control over humidity. Also, it is understood that the three-dimensional roughness like dimples and protrusions cause the enhancement in heat transfer and this is ruled by various input factors like input temperature, surface temperature, flow velocity, etc. Thus, Evaporative coolers along with the passive cooling method of surface roughness may prove effective in providing necessary thermal comfort with low energy consumption.

III. EXPERIMENTAL WORK

A. Objective

The objective is to check the effect on heat transfer rate by incorporating patterned irregularities (dimples or protrusions) over the inner surface of the terracotta tubes which are to be used in the Evaporative Cooler.



Fig. 1. Test Tubes (a) Plain Tube, (b) Dimpled Tube, (c) Protrusion Tube

B. Materials

To satisfy the objective the Experimental Testing is carried out over three kinds of terracotta tubes at three different velocities.

Plain Tube: Baked conical clay tube open at both end plain on the inner wall

Dimpled Tube: Baked conical clay tube open at both tubes with dimples on the inner wall of the tube and plain outer wall.

Protrusion Tube: Baked conical clay tube open at both ends with protrusions of clay of identical size and shape are attached on the inner surface of the tube and smooth outer surface.

All the tubes are identical in shape, size, and dimensions except for their inner wall surface structure.

Specifications of Tubes:

Inner Diameter of bigger end of Tube (D_1) = 100 mm

Inner Diameter of the smaller end of Tube (D_2) = 50 mm

Length of Tube (L) = 400 mm

Diameter of Dimple (d) = 10 mm

Distance between two consecutive dimples (l) = 8 mm

The material of Tube: Potter’s Clay

Fig. 1 shows the cross-sectional view of different kinds of tubes to be used in the experiment. A well suitable test Rig is developed to ensure the process experimentation under controlled conditions. Fig. 2 presents the diagram of the experimental test rig. All the elements of the test rig are listed in order.

C. Experimentation

In the present work, the three tubes are tested for heat transfer rate at three different velocities. The individual test tubes are placed one by one in a test section i.e., between two steel boxes. The suction fan is turned ON and the air is channelized through the test tube. The air is made to flow from the bigger end to the smaller end of the tube. The velocity of air passing through the test tube is regulated with the aid of a regulator. After the airflow is set at a constant velocity, the pumps in the water reserve are turned ON. These pumps draw the water from the water reservoir to the top tray. The water sprays fall on the clay test tube through perforations made on the top tray. Thus, the test tube gets wet in turn providing constant surface temperature (25 0C). The remaining water gets

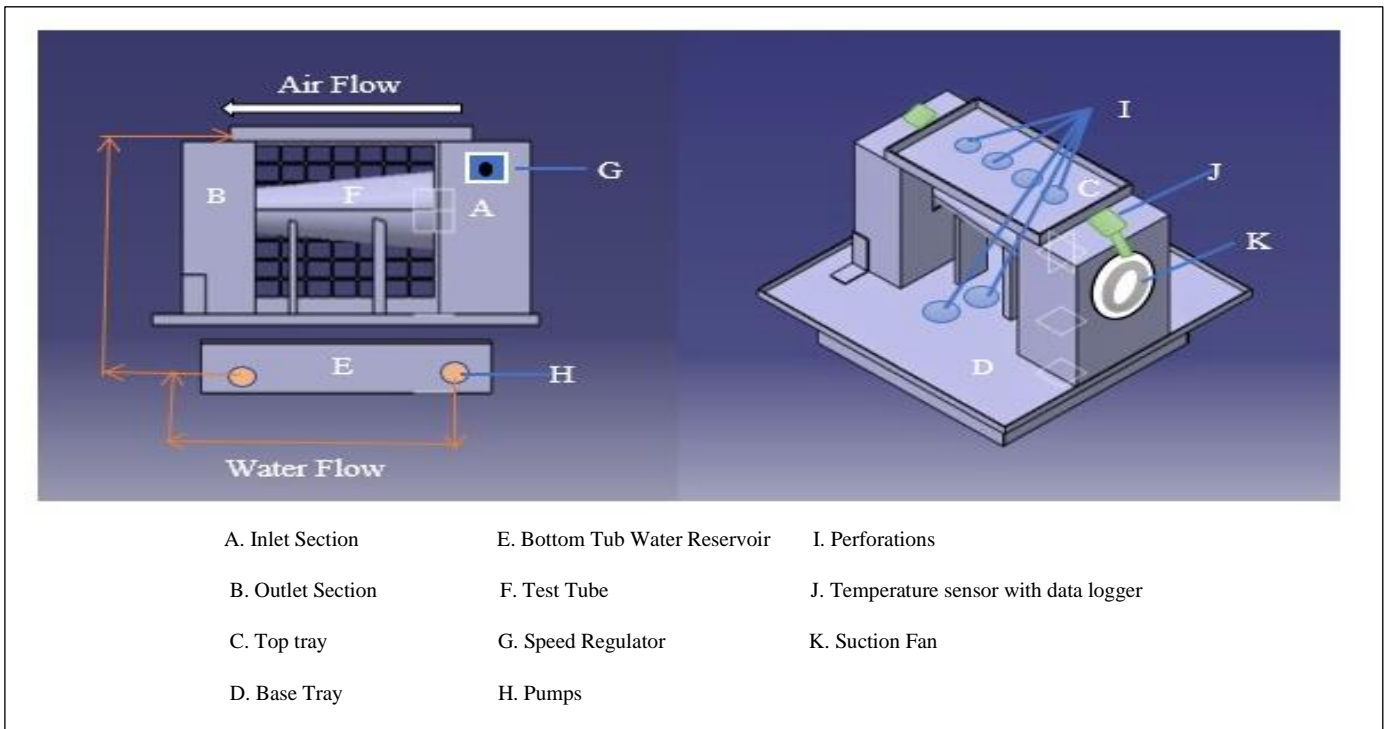


Fig. 2 Diagrammatic view of the experimental test rig.

collected back in the water reservoir through holes made on the base tray. The temperature of the air at the inlet and outlet section is determined at regular intervals with the help of a temperature sensor and data logger. In this way, an individual test tube is tested for three different velocities (constant value until changed with regulator) by altering the velocity with help of a regulator. The velocity of air at the inlet and outlet is measured using an anemometer. The same procedure is adopted for all test specimens.

D. Sample Calculations for experimental test:

Let,

- ρ = Density of air (kg/m³)
- μ = Dynamic Viscosity of air (kg/m.s)
- k = Thermal Conductivity of air (W/m. K)
- Pr = Prandtl Number
- v_1 = Minimum Velocity of air (m/s)
- v_2 = Intermediate Velocity of air (m/s)
- v_3 = Maximum Velocity of air (m/s)
- r_1 = Radius of bigger end of frustum of cone tube (m)
- r_2 = Radius of smaller end of frustum of cone tube (m)
- h = Convective heat transfer coefficient (W/m²K)

Q = Heat transfer rate (W)

t_i = Inlet Temperature (K)

t_o = Outlet temperature (K)

dT = Change in temperature = ($t_i - t_o$)

H = Height of frustum of cone tube

Now, we have

The cross-sectional area of the bigger end,

$$A_1 = \pi r_1^2$$

The cross-sectional area of smaller end,

$$A_2 = \pi r_2^2$$

The average cross-sectional area of flow,

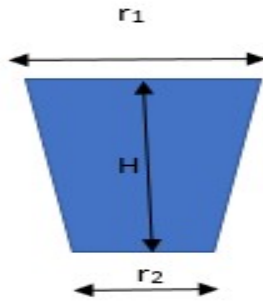
$$A = \frac{A_1 + A_2}{2}$$

Total Surface area,

$$A_s = \pi(r_1 + r_2)\sqrt{(r_1^2 - r_2^2) + H^2}$$

Area of convection or Wetted Perimeter of the cross-section,

$$P = A_s - (A_1 + A_2)$$



Hydraulic Diameter,

$$D_H = 4A/P$$

Now, Reynolds number is given by,

$$Re = \frac{\rho v D_H}{\mu}$$

For forced convection,

i.e., for $Re \geq 10000$, $0.6 \leq Pr \leq 160$ and $L/D \geq 10$

as per the Dittus-Boelter equation,

$$Nu = 0.023 Re^{0.8} Pr^{0.3}$$

Also, Nusselt number is given by,

$$Nu = \frac{h \cdot D_H}{k}$$

Therefore, convective heat transfer coefficient is given by,

$$h = \frac{Nu \cdot k}{D_H}$$

So, the heat transfer rate can be calculated by,

$$Q = h \cdot (\text{Area of convection}) \cdot dT$$

The rate of heat transfer for three tubes at a particular constant velocity is calculated for all three tubes and is compared to the select best tube. Similarly, all three tubes are checked at various values of velocities. Table 1 and Table 2 depict the observations and calculations made for experimentation respectively.

IV.COMPUTER SIMULATION STUDY

A. Details about Analytical study

In the present work along with experimental studies, analytical studies through computer simulation software are also carried out. The software used for the purpose is ANSYS 2020 R1 Student version. For geometry creation Fusion 360 software is used. This study is carried out on 2-dimensional

models of the three terracotta tubes identical to the one used in experimental work. The dimensions and shape of the test tubes are discussed earlier in the experiment section. These models of test tubes are analyzed to get average percentage

temperature drop at outlet against different inlet temperature keeping velocity of air at inlet and wall surface temperature constant for a particular case. It is important to note that air is made to pass from the bigger end to the smaller end of a frustum of the earthen tube. Furthermore, similar to experimentation all three kinds of tubes are analyzed for three different input velocities. Thus, the output temperature drop is studied against input parameters used are various inlet temperatures at various input air velocities.

Input air temperature values used are 40 °C, 41 °C, 42 °C, 43 °C, 44 °C

Input air velocities values used are 2.5 m/s, 5 m/s, 10 m/s

Wall Surface temperature = 25 °C

B. Sample Calculations for Analytical study:

Let,

t_{in} = inlet temperature for the n^{th} case

t_{on} = outlet temperature for the n^{th} case

Percent drop in outlet temperature,

$$\frac{\text{inlet temperature} - \text{outlet temperature}}{\text{inlet temperature}} \times 100$$

Percent drop in outlet temperature,

$$\frac{t_{in} - t_{on}}{t_{in}} \times 100$$

Let,

P_{1n} = percent drop in outlet temperature for plane tube for the n^{th} case,

P_{2n} = percent drop in outlet temperature for a tube with dimples for the n^{th} case,

P_{3n} = percent drop in outlet temperature for a tube with protrusions for n^{th} case

Percent change in temperature drop for a tube with dimples,

$$\frac{P_{2n} - P_{1n}}{P_{1n}} \times 100$$

Percent change in temperature drop for a tube with protrusions,

$$\frac{P_{3n} - P_{1n}}{P_{1n}} \times 100$$

Fig. 3 and Fig. 4 represent the contours of static temperature and static pressure respectively obtained through ANSYS software analysis. Table 3 shows the variations of percent change in temperature drop at an outlet for dimpled and protrusion tube concerning plain tube.

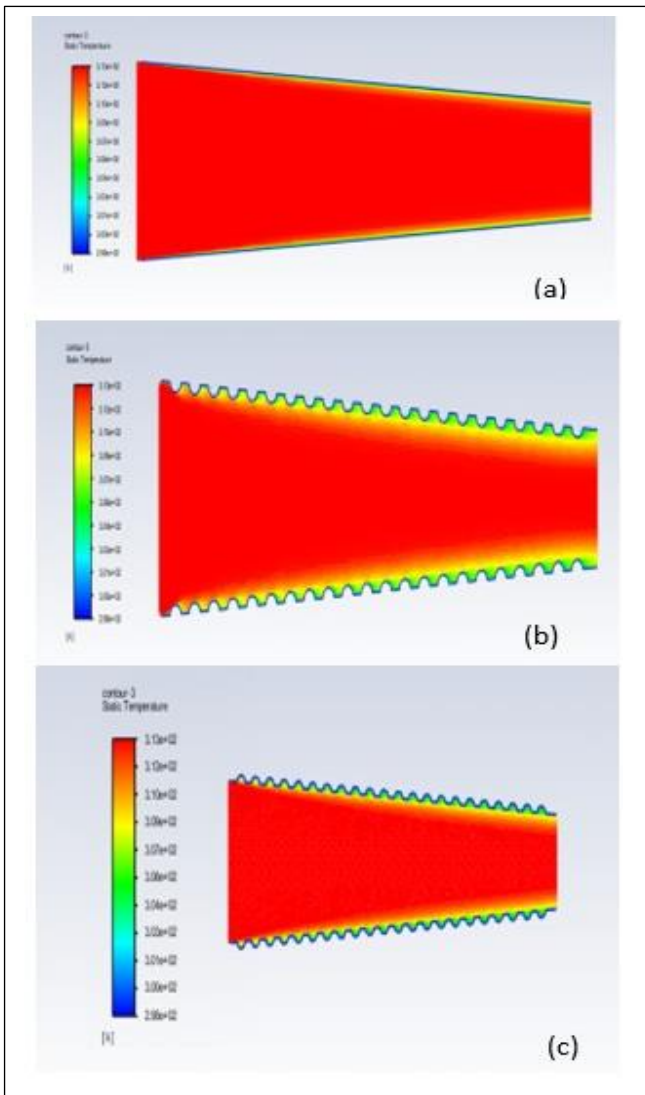


Fig. 3 Counters of Static Temperature for (a) plain tube, (b) protrusion tube, (c) dimpled tube.

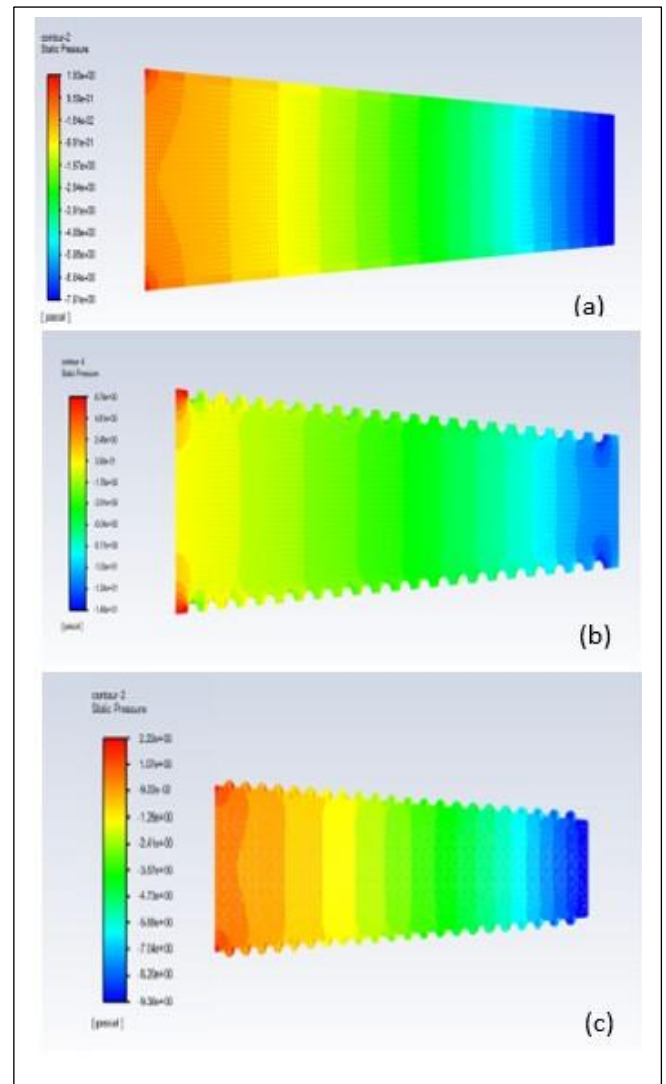


Fig. 4 Contours for static pressure for (a) plain tube, (b) protrusion tube, (c) dimpled tube.

TABLE I. INLET TEMPERATURE, MINIMUM OUTLET TEMPERATURE, AND MAXIMUM CHANGE IN TEMPERATURE FOR EACH TUBE AT EACH VELOCITY OBTAINED THROUGH EXPERIMENTATION

Tubes	Velocities ►	$V_1 = 2.7 \text{ m/s}$			$V_2 = 3.7 \text{ m/s}$			$V_3 = 4.9 \text{ m/s}$		
	Temperatures (°C) ►	T_i	T_o	dT	T_i	T_o	dT	T_i	T_o	dT
Plain Tube		24.33	20.2	4.13	24.33	20.8	3.53	24.33	21.4	2.93
Dimpled Tube		23	20.1	2.9	23	20.2	2.8	23	20.3	2.7
Protrusion Tube		24.3	19.7	4.6	24.3	20.2	4.1	24.3	20.6	3.7

TABLE II. VARIATION OF FLOW CHARACTERISTICS, AND HEAT TRANSFER RATE, Q (W) FOR INPUT VELOCITY $v_1 = 2.7 \text{ m/s}$

Tube	Reynolds Number	Nusselt Number	Heat Transfer Rate, Q1 (W)	% change in Heat Transfer Rate
Plain tube	41238.29	103.01	3.98	...
Dimpled tube	44183.88	108.86	2.95	-25.87
Protrusion tube	47129.47	114.62	4.94	+24.12

TABLE III. VARIATION OF FLOW CHARACTERISTICS, AND HEAT TRANSFER RATE, Q (W) FOR INPUT VELOCITY $v_2 = 3.7 \text{ m/s}$

Tube	Reynolds Number	Nusselt Number	Heat Transfer Rate, Q2 (W)	% change in Heat Transfer Rate
Plain tube	55966.25	131.52	4.18	...
Dimpled tube	58911.84	137.02	3.59	-14.11
Protrusion tube	61857.43	142.48	5.47	+30.86

TABLE IV. VARIATION OF FLOW CHARACTERISTICS AND HEAT TRANSFER RATE, Q (W) FOR INPUT VELOCITY $v_3 = 4.9 \text{ m/s}$

Tube	Reynolds Number	Nusselt Number	Heat Transfer Rate, Q3 (W)	% change in Heat Transfer Rate
Plain tube	73639.80	163.81	4.34	...
Dimpled tube	76585.39	169.63	4.27	-1.61
Protrusion tube	79530.98	174.21	6.04	+39.17

TABLE V. VARIATION OF THE PERCENTAGE CHANGE IN TEMPERATURE DROP FOR DIMPLED TUBE AND PROTRUSION TUBE OBTAINED THROUGH EXPERIMENTAL STUDY

Heat Transfer Rate (W)	Tubes					
	Plain Tube	% change in Heat Transfer Rate	Dimpled Tube	% change in Heat Transfer Rate	Protrusion Tube	% change in Heat Transfer Rate
Q1	3.88	....	2.72	-25.87	4.33	+24.12
Q2	4.10	....	3.37	-14.11	4.95	30.86
Q3	4.28	....	4.07	-1.61	5.59	39.17

TABLE VI. VARIATION OF HEAT TRANSFER RATE FOR ALL THREE TUBES OBTAINED THROUGH COMPUTER SIMULATION

Inlet Temperature	Test Tube	Dimple Tube			Protrusion Tube		
		Percentage Change in temperature drop at the outlet			Percentage Change in temperature drop at the outlet		
	Velocity	2.5m/s	5 m/s	10 m/s	2.5 m/s	5 m/s	10 m/s
40 °C		-10	-5.50	-5.59	10.8	18.92	17.37
41 °C		-9	-5.50	-5.59	10.9	16.47	17.31
42 °C		-9	-5.50	-5.59	10.92	16.45	17.52
43 °C		-10	-5.50	-5.59	11.2	16.51	17.62
44 °C		-9	-5.50	-5.59	11.09	16.6	17.72

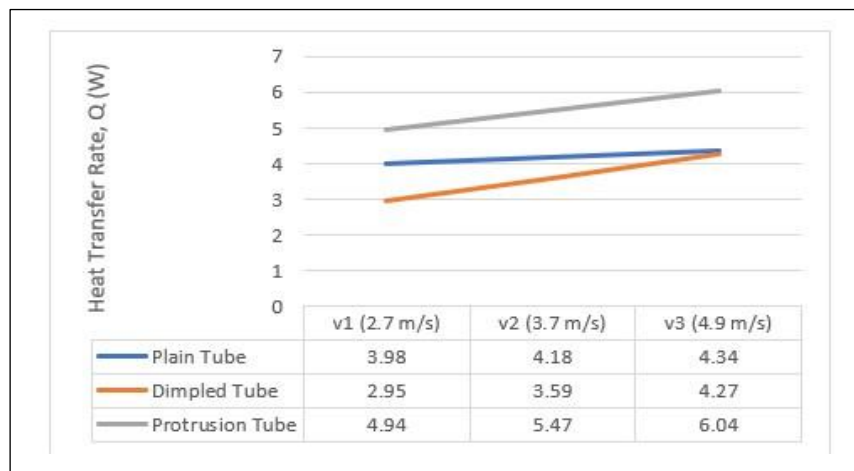


Fig. 5: Rate of Heat Transfer against Velocity

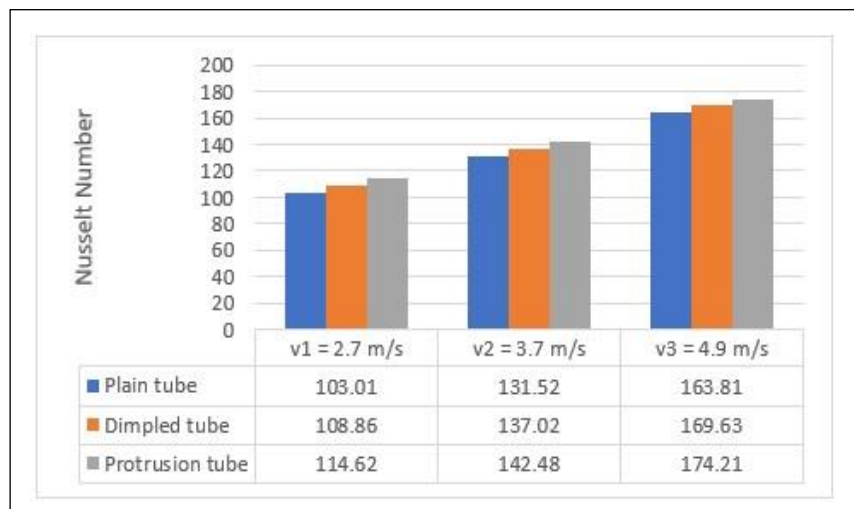


Fig. 6: Variation of Nusselt number

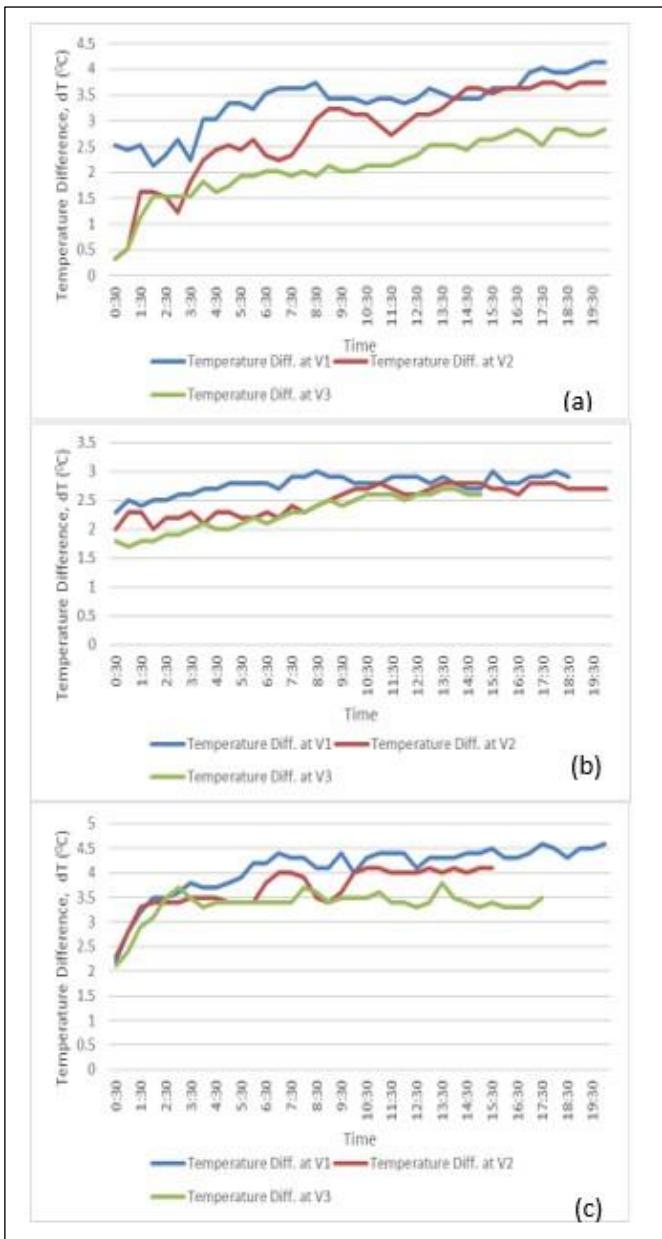


Fig. 7: Variation in Outlet temperature w.r.t. time obtained through Experimental work for (a) Plain Tube, (b) Dimpled Tube, (c) Protusion Tube

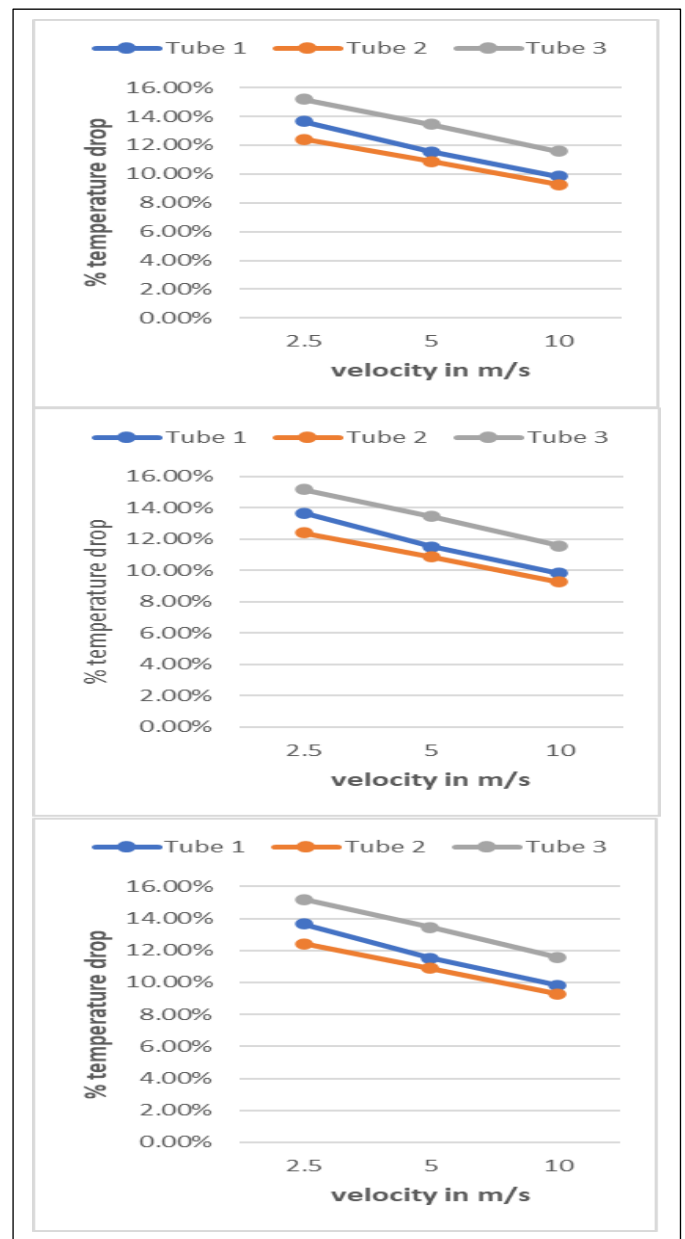


Fig. 8: Variation in percent drop in outlet temperature obtained through Computer Simulation for input temperature (a) 40 °C, (b) 42 °C, (c) 44 °C

V. RESULTS AND DISCUSSION

A. Results from Experimental work

The experimental data is used to tabulate the flow characteristics like Reynolds number and Nusselt number along with heat transfer rate as shown in table 2,3 and 4 for different test tubes at different velocities. Further, it is used to plot various thermal and flow characteristics. Fig. 3 shows the contours of static temperature for all three tubes and depicted that as the air flows from the bigger end to the smaller end of the tube it gets cooled along the boundary of tubes. It is clear from Fig. 4 that static pressure drops at a minimum in the case of dimpled tube and protusion tube as compared to plain tube. Thus, tubes with dimples and protusions offered no significant drop in pressure. Fig. 7 shows the variation in the temperature

at outlet concerning the time at three different velocities. It shows that temperature difference increases with time but decreases with an increase in velocity. It is seen from Tables 2, 3, and 4 that the heat transfer rate increases with an increase in velocity due to an increase in Reynolds number. But it is seen earlier that we get the maximum cooling effect for the lower velocity of incoming air despite increased heat transfer rate. This might be because as the velocity of air increases turbulence increases resulting in more molecular friction between air molecules. This friction between air molecules rises the temperature of the air. Also, contact of air with tube wall for more duration due to lower velocity increases the cooling effect. Thus, the resultant temperature coming out of the tube decreases. It means the lower the input velocity higher the cooling effect. Fig. 5 is a plot for heat transfer rate against

velocity for all three tubes. It is clear from the plot that the heat transfer rate is maximum (6.04 W) for a tube with protrusion followed by plain tube (4.34 W) and lastly by dimpled tube (4.27 W). The percent change in heat transfer for dimpled and protrusion tube is depicted in table 5. The negative value in the case of the dimpled tube shows that for dimpled tube heat transfer rate is less than the plain tube of identical dimensions. The positive percent change in heat transfer rate denotes the superiority of the protrusion tube over the plain tube in heat transfer. Therefore, a protrusion tube with air administered at a lower velocity is the best option to obtain the optimum cooling effect. Also, it is seen from Fig. 5 that the graph for the plain tube is flatter than steeper graphs of dimple and protrusion tube indicating that for plain tube there is not much effect of velocity on heat transfer in case of the plain tube. Fig. 6 shows the flow characteristic for all three tubes.

B. Result and Discussion for Computer Simulation

The data obtained through computer simulation on Ansys software is used to tabulate table 6 which shows the variation of the percentage change in temperature drop for dimpled tube and protrusion tube. Further, it is used to plot a graph as shown in Fig. 8. From Fig. 8 it is clear that a drop in temperature at the outlet is maximum for protrusion tube followed by plain tube and lastly by dimpled tube. It is also seen that when input air is administered at lower velocity temperature drop is maximum in terms of giving more cooling. The causes of this phenomenon are already discussed in results and discussion of experimental work.

VI. CONCLUSIONS:

The study concludes that protrusion tube is more suitable for evaporative coolers followed by plain tube and lastly by dimpled tube. It is found that heat transfer and percent temperature drop increase with the use of protrusions by about 39.17 % and 17.2 % respectively as compared to plain tube. It is also observed that flow characteristics like Reynolds number, Nusselt number increase with the use of dimples and protrusions without any significant pressure drop. Reynolds number increases in case of dimpled tube and protrusion tube primarily because of irregularities present on the inner surface of the tube and further due to conical shape of a tube. Reynolds number increase in the case of plain tube primarily because of the conical shape of a tube. The rate of heat transfer increases with an escalated Reynolds number and input temperature of the inlet flow of air. Though, higher input velocities increase the heat transfer it also led to more intermolecular frictions between air molecules and offer less contact with the wall surface of the wet tube resulting in a lower net temperature drop at the outlet. Thus, it is also concluded that the input air should be administered at lower velocities to get maximum temperature drop. Thus, to get maximum cooling effect protrusion tubes are to be used with lower input air velocities for Evaporative cooler applications like Deki cooling installations. Also, it is clear that simulation results support the experimental results and are in line with each other.

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Hydrothermal Synthesis, Characterization and Gas Sensitivity of Nb₂O₅

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Abstract

Nanocrystalline Nb₂O₅ based thin film sensors of smaller crystallite size were prepared by modified hydrothermal method. The samples were characterized by X-ray diffraction, XPS, SEM and TEM analysis. The gas sensing performance of Nb₂O₅ sensors was demonstrated for the gases like acetone, ammonia and LPG. It was found that, Nb-450 thin films show the fast and optimum response towards 400 ppm ammonia gas at 250°C. For the recovery process, the sample indicated slow recovery performance under most sensing situations. However, a comparatively better performance is observed over most of the reported Nb₂O₅ based sensors. These results provide new insights into the capabilities and limitations of Nb₂O₅ sensors.

Keywords: Nb₂O₅: Niobium Oxide: Gas Sensor: H₂S Sensors:

1. Introduction

Niobium Pentoxide (Nb₂O₅) is an n-type semiconductor with a band gap of about 3.4 eV, low in comparison to other oxides. The interest in studying the Nb₂O₅ is due to its remarkable physicochemical properties and structural isotropy suitable for a wide range of applications in the construction of gas sensing, electrochromics display and photoelectrodes, as well as in field-emission displays and microelectronics [1-6]. Studies were conducted in the past on the use of Nb₂O₅ nanoparticles for environmental remediation in water through of photocatalytic processes because of its stability in an aqueous medium, its surface acidity, redox and photocatalytic properties, which are intrinsically linked to its structure [7-9]. Band gap of Nb₂O₅ has been reported to vary from semiconducting (3.1 eV) to insulating (5.3 eV) range and can be adjusted through doping, changes in crystallinity and stoichiometry and heat treatment to obtain different phases. The most stable phases of Nb₂O₅ are the orthorhombic (*o*), tetragonal (*t*) and monoclinic (*m*), usually activated *via* thermal treatment at 800, 1000 and 1100°C respectively with typically an amorphous polymorphs below 500°C.

Sensor devices based on Nb₂O₅ for gas, humidity, biological and chemical sensing as well as photodetection have been successfully demonstrated. Generally, the main parameters for good sensing device performance are the size, morphology, aspect ratio, intergranular connectivity, porosity, surface energy, stoichiometry and surface area to volume ratio of the incorporated sensing material [10, 11]. Depending on the type of gas species, reducing or oxidizing, the interaction between the gas molecules and the Nb₂O₅ films changes the charge carrier concentration and the potential barrier of the Nb₂O₅ films. These affect the physio-chemical property of the films corresponding to the gas constituents exposed to the sensor. So far, the investigated gases that have been examined using Nb₂O₅ are O₂, hydrogen (H₂), dissolved O₂, carbon monoxide (CO), ammonia (NH₃) and a number of hydrocarbons (HCs) [12-24]. The detection principle of this material is based on the reversible modulation of the electrical conductance in the presence of oxidizing or reducing gases.

In this research, Nb₂O₅ nanosize powders were prepared by modified hydrothermal method using different sintering temperatures (400-550°C). The powders obtained were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and Transmission electron microscopy (TEM). Also by the BET method in order to obtain measurements of surface area, the UV-vis diffuse reflectance spectroscopy (DRS) to identify the band gap energy and the Raman spectroscopy to perform a vibrational characterization.

2 Experimental Details

2.1 Synthesis of Nb₂O₅ Powders

Niobium pentachloride (NbCl₅), Liquid ammonia (NH₃), Potassium permanganate (KMnO₄), Sodium nitrate (NaNO₃) and hydrogen peroxide (H₂O₂) were purchased from Merck Chemicals. Double distilled water was used throughout the synthesis procedure. All chemicals were used as received without any further purification.

In a typical synthesis, 5 g Niobium pentachloride was mixed with 20% ammonia solution and 20% H₂O₂ to give a sol. To the sol, the mixture of 1 M Ethylene glycol and 0.2 M NaOH solution was added and the mixture was stirred for 1 h at 50°C. The prepared solution was transferred into a Teflon-lined stainless steel autoclave of 100 mL capacity and sealed. The reaction was performed at 300°C for 10 h followed by the cooling to room temperature. Further, the obtained white precipitate was centrifuged for the separation of the powder from liquid. It was then washed 3-4 times with deionized water and ethanol and dried at 50°C for 4 h in air. Finally, the Nb₂O₅ modified materials were obtained by the calcination of obtained precipitate in air atmosphere at 400, 450, 500 and 550°C for 4 h and samples were coded as Nb-400, Nb-450, Nb-500 and Nb-550 respectively.

2.2 Preparation of Nb₂O₅ Thin Films

For the screen printing technique, the paste of as synthesized Nb₂O₅ powder was prepared by dissolving it in appropriate quantity of terpineol. Further, the paste was screened on the glass substrate with the dimension of 8 x 12 mm², and then the films were dried and heated in a box furnace in the air at the temperature of 500°C for 30 min. The films obtained were then examined to study their physical and gas sensing properties.

2.3 Characterization

Crystal structures of the commercial and synthesized Nb₂O₅ samples were studied by XPS and X-ray diffraction (XRD) techniques. Powder XRD patterns were recorded on a Philips diffractometer (PW1800, CuKα radiation, graphite monochromator). Particle shape and product morphology were characterized by scanning electron microscope. Measurements of the surface area of the dry powder were done by nitrogen adsorption–desorption isothermal analysis. Mean diameter of particles was determined by counting the particles shown in TEM images.

3. Results and Discussion

3.1 X-ray Diffraction Analysis

Figure 3.1 XRD patterns peak analysis verifies that those Nb₂O₅ samples obtained by the modified hydrothermal method heated at 450°C have the orthorhombic crystalline structure due to the existence of dominant diffraction peaks according to PDF cards No. 30-0873 (contained in the Power Diffraction File) for the T-Nb₂O₅ phase, ($a = 6.168 \text{ \AA}$, $b = 29.312 \text{ \AA}$, $c = 3.936 \text{ \AA}$). The XRD patterns of the samples calcined at 400°C also displayed the existence of the T-Nb₂O₅ phase although with less crystallinity.

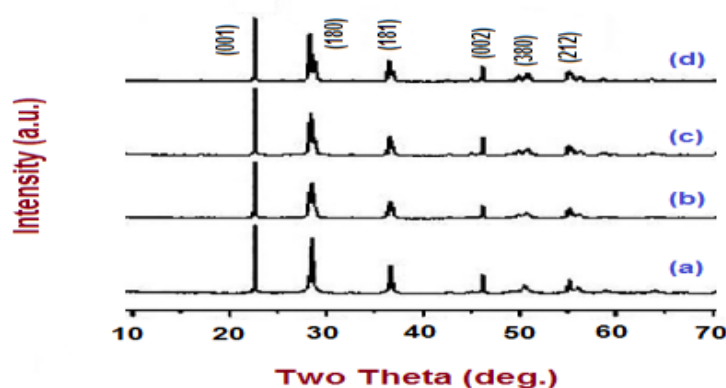


Figure 3.1 XRD pattern of as synthesized Nb₂O₅ samples calcined at (a) 400°C, (b) 450°C, (c) 500°C and (d) 550°C.

To analyze the crystallite growth, the crystallite size (d) of the Nb₂O₅ nanoparticles was calculated by the Scherrer's equation:

$$d = \frac{K\lambda}{\beta \cos\theta}$$

where, K is the shape correction factor, the value 0.9 is taken as the volume-averaged crystallite dimension perpendicular to the hkl diffraction plane; λ is the wavelength used, θ is the Bragg diffraction angle measured hkl peak and β represents the $FWHM$ (Full width at half maximum) measured in radians on the 2θ scale [22]. The broadening lines chosen for the d estimate correspond to (001), (180), (181), (002), (380), and (212) crystalline planes according to PDF No. 01-071-0336 reported in Inorganic Crystal Structure Database (ICSD) [23]. The crystallite size of nanoparticles on the $T-Nb_2O_5$ phase increases in the range of 20 to 50 nm with an increase in calcination temperature, as shown Table 3.1.

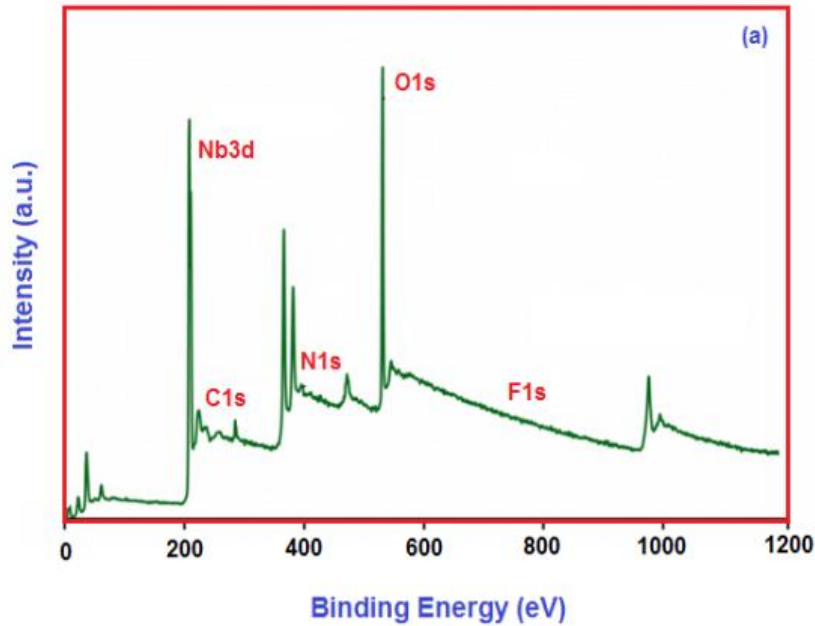


Figure 3.2(a) The XPS scan of the Nb_2O_5 calcined at $450^\circ C$.

Table 3.1 Calcination temperature, crystallite size (obtained from (001) & (180) planes of XRD) and specific surface area of as synthesized Nb_2O_5 samples.

Samples	Calcination Temperature ($^\circ C$)	Crystallite Size (nm)		Specific Surface Area (S_{BET}) (m^2/g)
		(001)	(180)	
Nb-400	400	36.3	37.6	11.54
Nb-450	450	11.7	12.6	75.42
Nb-500	500	22.5	24.3	22.14
Nb-550	550	35.6	36.3	13.23

Table 3.1 also shows the results of specific surface area, S_{BET} determined by taking data at relative pressures between 0.02 and 0.15. The method had accuracy constraints during the measurement process. This fact was observed because the values of S_{BET} were less than $10m^2/g$. The S_{BET} data show that the increase in the calcination temperature from $450^\circ C$ to $550^\circ C$ resulted in the progressive decrease of specific surface area of the Nb_2O_5 nanosized powders. This is mainly because a more high calcination temperature can lead to a greater proportion of the pore coalescence due to the further crystallization of walls separating mesopores in their structure which be established through measurement of pore size.

3.2 XPS Analysis

An XPS analysis was employed to determine the chemical composition and valencies of the Nb_2O_5 . Figure 3.2(a) shows the spectrum of the Nb_2O_5 sample calcined at $450^\circ C$. The signals of Nb and O are visible, confirming the

presence of niobium and oxygen elements. As shown in Figure 3.2(b), the high-resolution spectrum for the Nb region exhibits the Nb3d_{3/2} peak at 210.08 eV and Nb3d_{5/2} at 207.28 eV. The spectra obtained indicate that the film is composed of Nb₂O₅, which is consistent with a previous report [43]. The existence of low peak of C1s in the survey spectrum is expected due to CO₂ adsorption or contamination carbon from the environment. Unlike other metal oxides such as anodized TiO₂ [44], the XPS pattern shows that there is no fluoride doping effect after the anodization process, which is beneficial for reducing the internal electron scattering during the passage of electrical current in Nb₂O₅ [31].

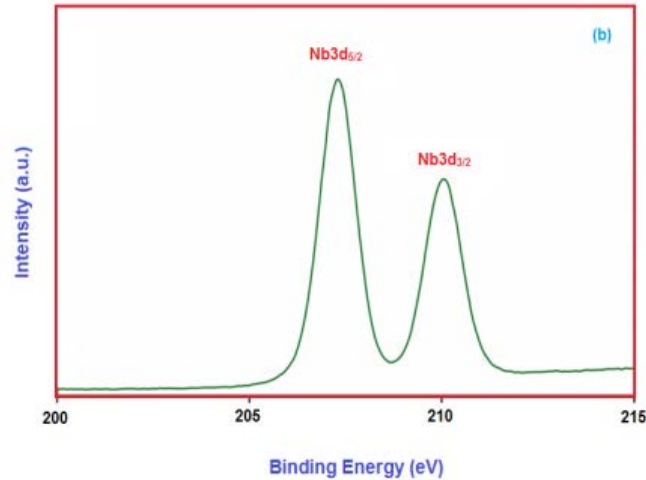


Figure 3.2(b) The XPS spectrum of Nb3d peaks of the Nb₂O₅ calcined at 450°C.

3.3 Raman Spectra

Figure 3.3 shows the Raman spectra of sample Nb₂O₅ obtained by modified hydrothermal method and calcined at 450°C. The spectra in Figure 3.3, corresponds to a well-developed crystalline structure of Nb₂O₅. For Irena *et al.* [29] the bands in the 400-800 cm⁻¹ wavenumber region are assigned to the symmetric and antisymmetric stretching mode of the Nb-O-Nb linkage. While the Raman band at 235 cm⁻¹ becomes the bending mode of Nb-O-Nb. The figure shows that the calcination temperature of 450°C is ideal for obtaining the crystalline Nb₂O₅. In general the Raman study shows that an increase of the synthesis temperature causes an increase in the material crystallinity because an increase in the synthesis temperature led to a sharp peak, this fact is verified with the values of the crystallite size that were estimated by the Scherrer equation (Table 3.1).

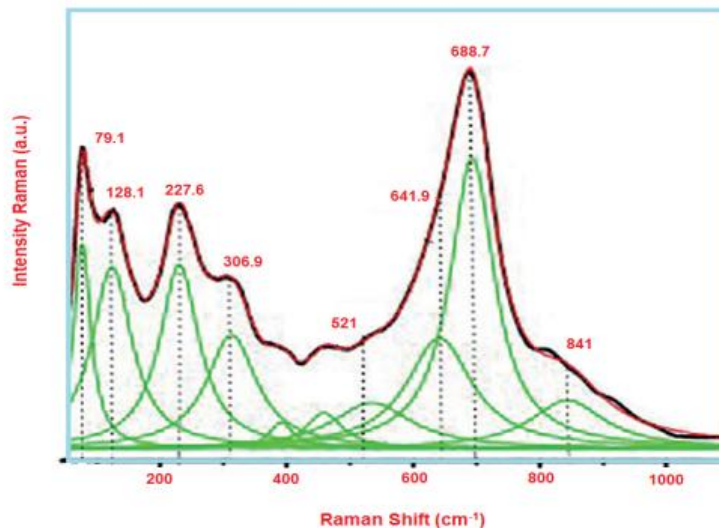


Figure 3.3 Raman spectra for sample Nb-450 calcined at 450°C.

3.4 FTIR Analysis

Figure 3.4 displays the FTIR spectra of the samples Nb-400, Nb-450 and Nb-500. After calcination at 400°C, an intense broad band centered around 659 cm⁻¹ and a shoulder-like band near 988 cm⁻¹ are observed. The increase of the calcination temperature brings about an increase in intensity of the bands. The intensity of Nb-400 sample is lower as compared to that of Nb-450 and Nb-500 samples that was due to the amorphous nature at that temperature, and was

in agreement with the XRD pattern. While increasing calcination temperature leads to an increase in the intensity of bands. This is probably because of the greater asymmetry in the unit cell and the possible interaction between the Nb–O groups. The band near 988 cm^{-1} appears in all the spectra, which has been assigned to a highly distorted octahedral NbO_6 containing Nb=O bond. An increase in the calcination temperature leads to an increase in the intensity of the Nb=O bonds [30]. Also, the relative intensity of the band at the lower frequency of near 649 cm^{-1} , which is assigned to the Nb–O bond of the slightly distorted NbO_6 octahedra, is increased with an increase in the temperature. The increase in the intensity of the bands at 659 and 988 cm^{-1} in high calcination temperatures may be due to the existence of more Nb–O and Nb=O bonds in the structure adopted at 450°C , respectively.

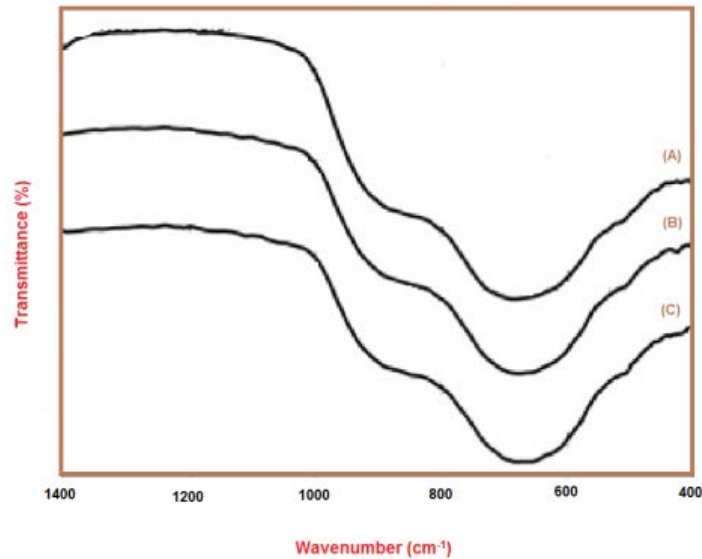


Figure 3.4 FTIR spectra of (A) Nb-400, (B) Nb-450 and (C) Nb-500 samples.

3.5 Scanning Electron Microscopy (SEM)

Figure 3.5 shows the SEM images, displaying the morphologies of the Nb_2O_5 particles obtained by calcination at 450°C . As shown in Figure, the Nb_2O_5 sample has a spongy tissue with small particles ($<10\text{ nm}$). This tissue possesses the highest surface area ($75.42\text{ m}^2/\text{g}$) and a uniform distribution of pores. However, it was observed that with increasing the calcination temperature leads to a strongly agglomeration in case of Nb-500 and Nb-550 samples (SEM images are not presented here).

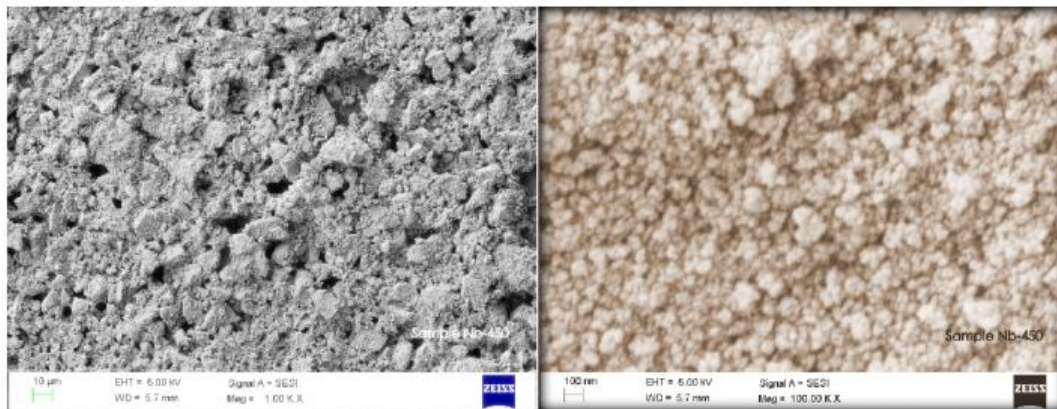


Figure 3.5 SEM images of sample Nb-450 calcined at 450°C .

3.6 Determination of Film Thickness

To measure the effect of film thickness, the screen printing of the sample Nb-450 was done in three different cycles (Table 3.2). The film thickness was measured by a weight difference method [15] in which weight of the sample, area and densities were considered. In order to measure the thickness of the thin films by using weight difference method, error and accuracy was found to be $\pm 5\%$. The relation of the film thickness (t) with sample weight (M (in g)), density of material (ρ (in g cm^{-3})) and sample area (A (in cm^2)) is presented in the following equation:

$$t = \frac{M}{A\rho}$$

The thickness of the film was in the range of 100-130 nm. The values of the film thickness with printing cycle are given in Table 3.2.

Table 3.2 Details of samples with film thickness and activation energy.

Sample	Screen Printing Cycle	Film Thickness (nm)	Activation Energy (ΔE)	
			At 30°C	At 100°C
Nb-450-I	05	100	0.42 eV	0.57 eV
Nb-450-II	10	122	0.34 eV	0.41 eV
Nb-450-III	15	130	0.22 eV	0.31 eV

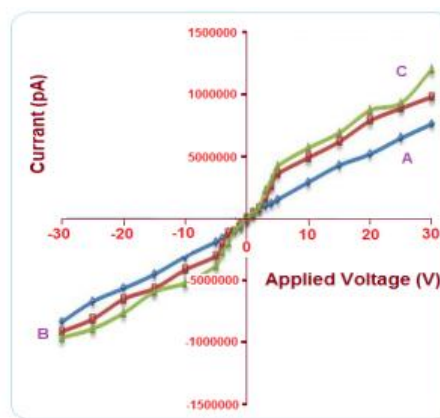


Figure 3.6 I-V characteristics of thin films (A) Nb-450-I, (B) Nb-450-II and (C) Nb-450-III.

3.7 I-V Characteristics

The sensor films were prepared in dimension as: 1.5 cm × 1 cm. The contacts were made by silver paste on thin film surface. Figure 3.6 shows the I-V characteristics of samples Nb-450-I, Nb-450-II and Nb-450-III observed to be nearly symmetrical in nature indicating ohmic contacts. The non-linear I-V characteristics may be due to semiconducting nature of the films. Sample Nb-450-I, Nb-450-II and Nb-450-III are the films obtained by screen printing cycle intervals of: 5, 10 and 15 respectively. Therefore, the thickness of the films goes on increasing in the sequence of Nb-450-I > Nb-450-II > Nb-450-III.

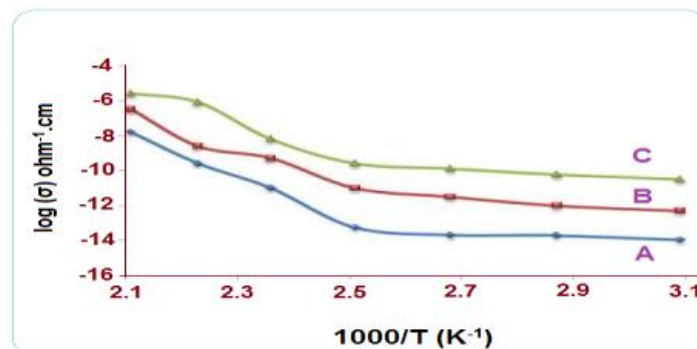


Figure 3.7 Variation of log (σ) with operating temperature (°C) thin films (A) Nb-450-I, (B) Nb-450-II and (C) Nb-450-III.

3.8 Electrical Conductivity

Figure 3.7 show the variation of log (σ) with operating temperature. The conductivity of each sample is observed to be increasing with an increase in temperature range between 50°C and 150°C. The increase in conductivity with increase in temperature could be attributed to negative temperature coefficient of resistance and semiconducting

nature of nanostructured Nb₂O₅. For the metal oxide semiconductor thin films it is reported that, when thickness of the film increases activation energy goes on decreases [16, 17]. The activation energy calculated from slopes of line for sample Nb-450-I, Nb-450-II and Nb-450-III are given in Table 3.2. It is clear from Table 3.2 that, as film thickness of the sample goes on increasing; while the activation energy goes on decreasing. The decrease in activation energy with increasing film thickness may be due to the change in structural parameters, improvement in crystallite and grain size [18].

3.9 Gas Sensitivity Measurements

To investigate the gas sensing properties of the synthesized Nb₂O₅ thin films, various gases acetone, ammonia and LPG were selected. We also have repeated testing for at least two sensors for each nanostructure and sensing test condition, which makes the results more reliable and repeatable. All the gas sensing measurements were done at the temperature range from 50 to 300°C.

3.9.1 Effect of Operating Temperature

Figure 3.8 shows the variation in response with the operating temperature to 400 ppm of acetone, ammonia and LPG gases for Nb-450-II thin films for 10 min. For all the gases, the response increases with increase in operating temperature and reach maximum at 250°C for NH₃ gas. Gas sensitivity depends on two factors, namely: the speed of chemical reaction on the surface of the grains and the speed of the diffusion of gas molecules to that surface. At low temperatures the sensor response is restricted by the speed of chemical reactions. At higher temperature the sensor response is restricted by the speed of the diffusion of gas molecules to the sensor surface.

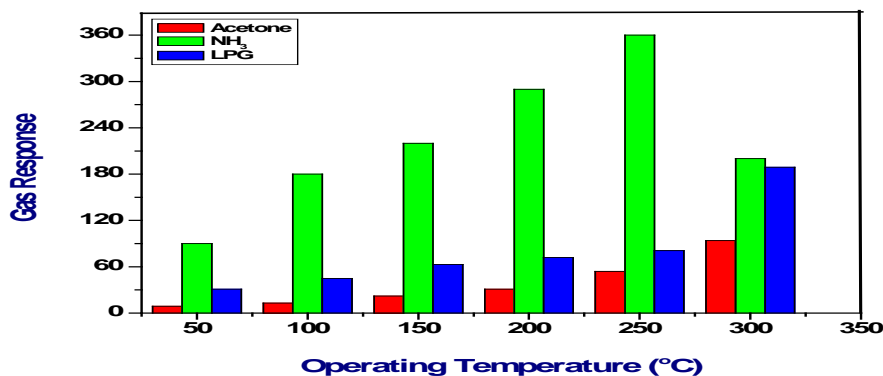


Figure 3.8 Gas response of Nb-450-II for 400 ppm of various gases.

[Gas Concentration: 400 ppm, Gas Exposure time: 10 min.]

At some intermediate temperature the rate of two processes; the chemical reaction on the surface of the grains and the diffusion of gas molecules on sensor surface become equal, at that point the sensor response reaches its maximum. According to this mechanism for every gas there is a specific temperature at which the sensor response attains its highest value which depends upon the nature of sensor and interacting gas. A 40-min response time is not long enough to obtain a stable response at low temperature 250°C. Nevertheless, any bulk effect is unlikely because of the rapid desorption observed. For many oxides, such as SnO₂, TiO₂ and Nb₂O₅, bulk properties are thermodynamically equilibrated with oxygen partial pressure only at the working temperature above 700°C [7].

At lower temperatures, the conductivity variation is associated to a surface conductivity variation. Heiland reported that, in *n*-type semiconductor, chemisorption of oxidizing or reducing gases induces the creation of acceptor or donor surface states, respectively [8]. The presence of a reducing gas creates surface states located above the Fermi level and sets up a charge enhancement zone at the grain surface. This phenomenon is the more important as the concentration of the reducing gas NH₃ increases [9].

3.9.2 Effect of Gas Concentration

Figure 3.9 shows the relation between gas response and concentration of various test gas for Nb-450-II sample at 250°C. From the graph, it was observed that the sensitivity of thin films for all test gas increases linearly with increase in gas concentration up to 1000 ppm. Beyond 400 ppm the increase in sensitivity is slow and it almost

saturates at 1000 ppm. At a low concentration of gas, when exposed on a fixed surface area of a sample, there is a less coverage by gas molecules on the surface and hence slow surface reaction occurs. An increase in gas concentration increases the surface reaction due to a larger surface coverage. A further increase in surface reaction will be gradual when the saturation point on the coverage by molecules is reached.

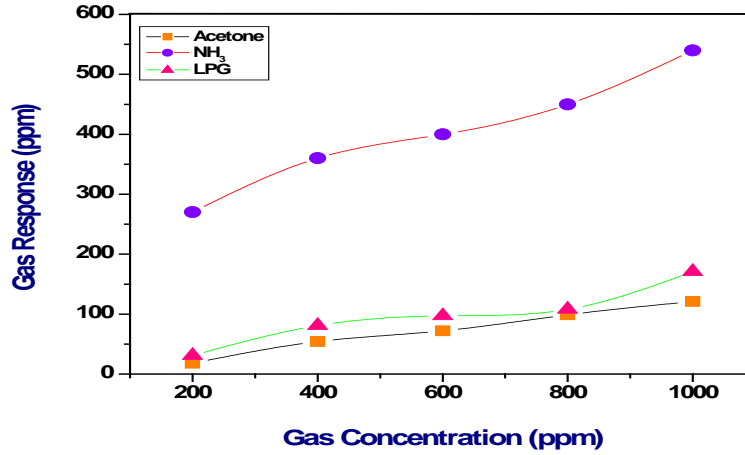


Figure 3.9 Gas response of Nb-450-II for various gases. [Operation Temperature: 250°C, Gas Exposure time: 10 min.].

3.9.3 Effect of Calcination Temperature

The effect of calcination temperature on gas sensing property of screen printed Nb₂O₅ thin film sensors as investigated and results are presented in Figure 3.10. Figure 3.10 depicts that, the Nb₂O₅ ample obtained at 450°C showed maximum sensitivity for 400 ppm of ammonia at 250°C. This is because of the smaller crystallite size (11.7 nm) and the large specific surface area (75.42m²/g) of the Nb-450-II. From Table 3.1, it is clear that, the crystallite size of as synthesized Nb₂O₅ sensors increases with calcination temperature. Moreover, the specific surface area decreases on calcination of the samples above 450°C. Decreased specific surface area (in Nb-500-II and Nb-550-II thin films) provides less number of available sites for adsorption of target gas that in turn decreases the sensing activity of the sensors.

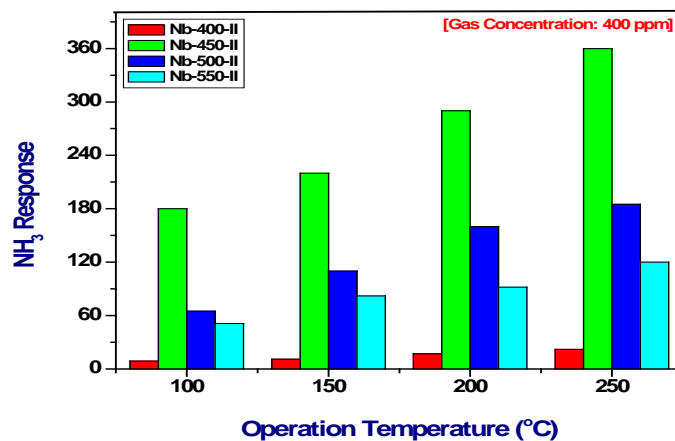


Figure 3.10 Effect of calcination temperature on ammonia (400 ppm) sensing efficiency of screen printed Nb₂O₅ thin films.

3.9.4 Response and Recovery Time

The transient response characteristics of Nb-450-I, Nb-450-II and Nb-450-III exposed to 1000 ppm towards ammonia are shown in Figure 3.11. From figure it is observed that, the films exhibited enhanced sensitivity towards Nb-450-II and is mainly attributed to the change in morphology of the sample with increase in thickness of the film

significantly. The adsorption of oxygen on the surface increases the resistance of the sensor material due to transport of electrons from conduction band to adsorbed oxygen which results in increase in gas response. The response and recovery time values for the samples are given in Table 3.3. Fast response of 90 sec was observed in case of Nb-450-II, which is attributed to small crystallite size and subsequently large surface area. From the results, we concluded that for Nb-450 thin films thickness of 122 nm is an appropriate value for its use in gas sensing applications. The Nb-450-II thin film sensor attains its initial value within 220 sec. which indicates that its surface rejuvenates after refreshing with air. The short response and recovery times are the merit of the Nb-450-II sample.

Table 3.3 Response and recovery time for Nb-450 thin film sensors.

Time (sec)	Nb-450-I	Nb-450-II	Nb-450-III
$t_{(response)}$	120	90	135
$t_{(recovery)}$	435	220	558

3.9.5 Stability

The sensor reliability was strongly dependent on the stability exhibited by the sensor material. It was well known that oxide based sensor possess common drawback of decrease in response due to ageing induced effects. Stability is the consistence of the response of a sensor under continuous testing. The responses of the Nb-450-II thin film sensor towards ammonia were measured on 20th, 40th and 60th days after the first measurement and are shown in Figure 3.12. It was found that after two months, the material performs 92% of it was earlier performance confirming the stability.

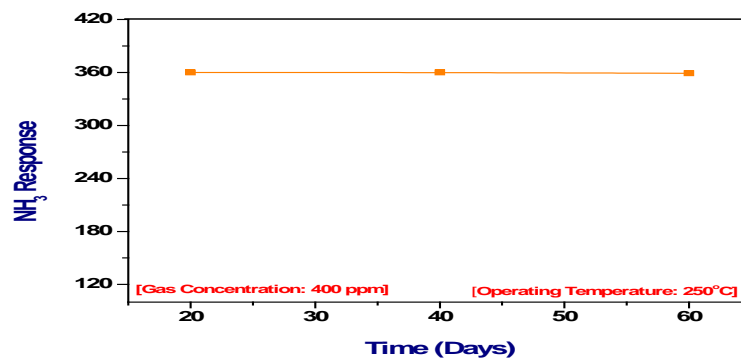


Figure 3.11 Plot of stability for Nb-450-II sample.

4. Conclusion

The nanocrystalline Nb₂O₅ sensors with high surface area (up to 75.42m²/g) and smaller crystallite size were prepared by modified hydrothermal method. The gas sensing performance of Nb₂O₅ sensors was demonstrated for acetone, ammonia and LPG. It was found that, Nb-450 thin films show the fast and optimum response towards 400 ppm ammonia gas at 250°C. For the recovery process, the sample indicated slow recovery performance under most sensing situations. However, a comparatively better performance is observed over most of the reported Nb₂O₅ based sensors. To further improve the performance and to find better selectivity for other gases such as H₂S, the Nb₂O₅ samples are further modifications are in progress.

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Sr. No.	Authors	Title of Papers
1	I-Bilal Husain,II-Dr. S.g.chapke	A STUDY ON AWARENESS OF RISKS AND RISK MANAGEMENT PRACTICES AMONG CONTRACTORS IN AKOLA DISTRICT
2	Hari Mohan Jha Bidyarthi, Ashish Kumar Srivastava, Mayur Anilrao Dande, Pavan Mahadeo Kuchar and Satya Mohan Mishra	Iron Man of Silver World – An Enquiry into Alchemy of Shri Viswakarma Silver House
3	H.M. Jha Bidyarthi, Mayur A. Dande, Pawan M. Kuchar, Satya Mohan Mishra and Ashish K. Shrivastava,	Delighted niche driven entrepreneurial odyssey: a case study of Maharaja Masala Udyog,

A STUDY ON AWARENESS OF RISKS AND RISK MANAGEMENT PRACTICES AMONG CONTRACTORS IN AKOLA DISTRICT

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¹Asst. Professor, SSGMCE, Shegaon, ²Principal, L.R.T College, Akola

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SSGMCE- Shegaon, India

Abstract : The centre part of this study is to study different risks associated with construction projects and rank them on their significance values and to study the awareness level of risk management practices amongst the contractors in Akola District. The analysis is based on theoretical framework of risk obtained from secondary research and its relevance is tested amongst the contractors by collecting primary information through submission of questionnaires.

IndexTerms - Risk management, Risk identification, Risk assessment, Risk response.

I. INTRODUCTION

A lot of public sector funds are involved in construction of roads, bridges and other civil projects in India. The development of a nation depends widely on the spending of civil projects. In India the road and other construction projects are contracted by offering bids through tendering process. Major players involved in this often subcontract the projects by dividing it into set of different contractual projects. The whole process of tendering and subcontracting creates a systematic risk on the ground level where most of the execution is done by civil contractors. Hence a civil contractor risk management capability is of immense

Iron Man of Silver World – An Enquiry into Alchemy of Shri Vishwakarma Silver House

**Iron Man of Silver World – An Enquiry into Alchemy of
Shri Vishwakarma Silver House**

H. M. Jha Bidyarthi*, A. K. Srivastava**, Mayur A. Dande***,
P. M. Kuchar**** & S. M. Mishra*****

Abstract

One hundred and thirty-five years ago, Keshavramji Jangid, one of the three sons of Shoramji Jangid and a native of Ramgad village under Churu district of Rajasthan relocated to a small town Khamgaon in the neighboring State of Maharashtra and resumed with his family business of making silver articles. He was a great artisan and trailblazer who had crafted a pure silver made small moving train attached with bogies carrying edibles kept on the round dining table of the then king of Ramgad. This lasting invaluable legacy was entrusted to his adopted son Jawaharmalji Jangid with unbending stiff directions. "Work with integrity evaporates scarcity. Generations may perish as an aftermath of ill and filthy ways of earning. Customers come willingly and gladly where righteousness resides." The lighthouse suggestions were practiced in letter and spirit by Jawaharmalji and he succeeded in expanding the silver business manifold. In 1937, his son Chiranjilalji Jangid augmented the business



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Delighted niche driven entrepreneurial odyssey: a case study of Maharaja Masala Udyog

H.M. Jha Bidyarthi, Mayur A. Dande, Pawan M. Kuchar, Satya Mohan Mishra and Ashish K. Shrivastava

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Abstract

Santosh Satyanarayanji Didwaniya, the entrepreneur of Maharaja Masala Udyog, Khamgaon led his Udyog from mere 15-