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Criterion III: - Research, Innovations and Extension

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2	FEA modeling and prediction of surface roughness of aluminum alloy (LM4)	Mr.P.B.Patole	6

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HEALTH CARE SYSTEM TO BUILT SECURE PAITIENT RECORD BY USING BLOCKCHAIN AND ARTIFICIAL INTELLEGENCE

Ahmed Mohammed Ali, Vijay Ghorpade

🔒 PDF

Abstract

Data is the new fuel. In almost every sector data is maintained for future sector or domain investigation. This data is used for later information gathering, it can be a confidential data, and it is a system responsibility that data should be reliable and secure. knowledge and data needs to be transferred among various devices, this data transfer is a need to generation. There are many challenges in storing and retrieving this data in secure manner, also data should be available for each user according to their role. A system which is centralized is more prone to system halt. To protect this scenario and other potential hacks, block chain can be used. Blockchain uses consensus technology in which all nodes validates the nodes and changes which protect from any changes to the existence data. In case of clinical management is consensus and proof of work can protect the data, along with that in many situation there is a need of data mining so that instead of reliving on current dataset, historical dataset can be used to gain new knowledge and to find hidden pattern, in such scenario data gets exposed to other uses, this kind of data privacy concern and solutions are also addressed in this paper. It is observed that Block chain technology in health care system is not only more secure but also has less time and cost complexity over traditional health care data management system .

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FEA Modeling And Prediction Of Surface Roughness Of Aluminum Alloy (LM4) During Turning Process

Print

P. B. Patole [1], S. G. Bhatwadekar [2], V. V. Kulkarni [2], G. J. Pol [1]

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Different cutting parameters have different influences on the surface finish. A study of effect of some of these parameters on the surface roughness of Aluminum alloy grade LM4 (AlSi5Cu3) is carried out in this work. In the experiment conducted, six values of cutting speed, three values of depth of cut, six values of feed and two values of tool nose radius are used. The experimentation was carried out using a three factor experiment principle from design of experiment. The chemical composition of the work material was tested using arc spectrometer and verified to be of grade LM 4. The values of parameters like cutting speed, feed rate and depth of cut were selected from the recommended ranges from the tool manufacturer catalogue. The test pieces were turned on a center lathe machine under different levels of these parameters. The surface roughness of the machined surface was measured using surface measurement tester. From the analysis of results the relationship between surface roughness and equivalent stress is established.
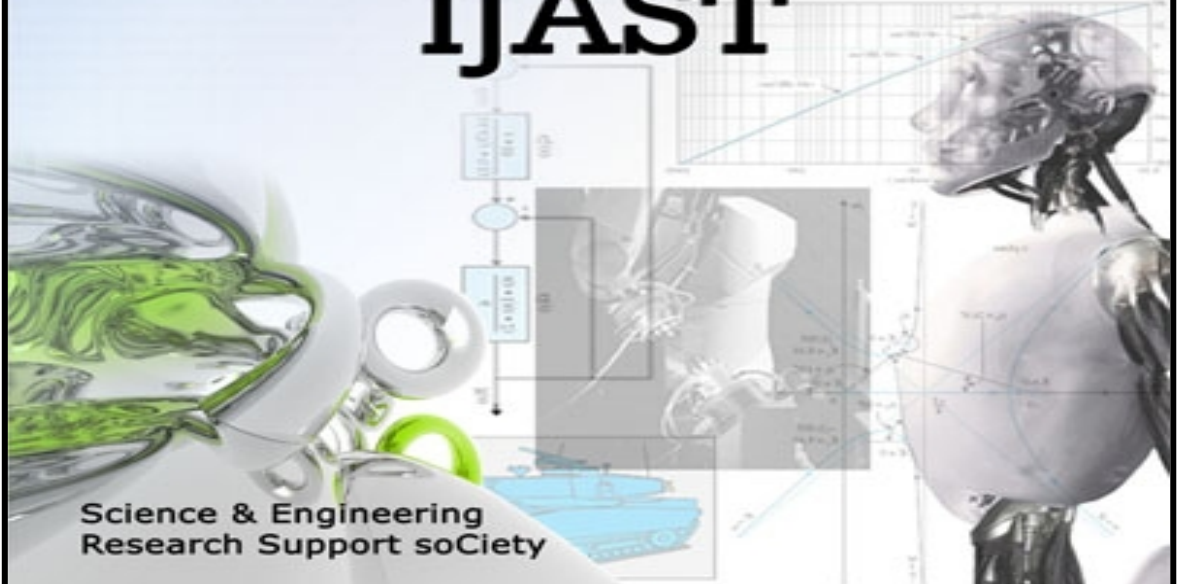
Keywords

Turning, surface Roughness, Equivalent Stress, Cutting Parameters.

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SOLAR PHOTOVOLTAIC (PV) WITH STATCOM FEATURE TO IMPROVE POWER QUALITY FOR DISTRIBUTION WITH MATLAB TOOL

Chougale Rajkumar Kundlik, Dr. P. Karpagavalli

🔒 PDF

Abstract

This paper demonstrates grid associated solar photovoltaic (PV) system with reactive power control as a STATCOM called as PV Solar STATCOM. A MATLAB tool gives a specific idea about the real and reactive power flow to the power system. A voltage source inverter (VSI) actually provides both real as well as reactive power to the grid as per the load demands. A reactive power flow in an power system defines the Power Quality (PQ), therefore needs to compensate. This is possible by means of PV solar STATCOM which enhances the quality of power and minimizes harmonics. A non-linear load is the principle cause of harmonics, while the PV system establishes power converters which are enormously producing source of harmonics. In this paper, the harmonics are controlled by a photovoltaic system (PV) on a distribution side by utilizing STATCOM feature with the use of MATLAB tool, which further improves power factor and therefore power quality as well.

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Pv Solar Statcom to Improve Power Quality in Distribution System

Chougale Rajkumar Kundlik[1], Dr. P. Karpagavalli[2]

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India

[2] Research Guide, Dept. of Electrical Eng., Sri Satya Sai University of Technology& Medical Science, Bhopal, MP.
India

Abstract

In this study we demonstrates grid-associated solar photovoltaic (PV) system with reactive power control as a STATCOM called as PV solar STATCOM. This research talks about the issues concerned to power quality for dispersed age systems dependent on sustainable power sources like solar energy. The study highlights a complete simulation, balance as well as modeling of grid connected PV module like evaluation of different problems associated with power quality are discussed and concluded. The power quality is substantially impacted by interconnection of unlimited sources of energy to the grid.

Keywords:Pv Solar Statcom, Power Quality, Energy Grid, Grid Modeling.

1. INTRODUCTION

Electrical essentialness is one of the fundamental and significant wellsprings of information that are basic to a country's budgetary development. In India today, around 15-20 percent of the electrical imperativeness created is lost, the voltage profile frequently goes beneath the perceived rate during the top burden. The power electronic innovation assumes a significant job in circulated age and in reconciliation of sustainable power sources into the electrical grid. To interface with RES, power electronics devices are used in converters. At the point when the converters with power electronic devices are utilized it presents a lot of harmonics in the system.

Harmonics causes bending of source voltage, extra misfortunes because of undesirable current streaming in the source and it might prompts breaking down of defensive transfers, mains and other control units. So it is important to lessen the measure of harmonics. Then again, the expanded utilization of delicate electronic circuits by ventures

and family units together with privatization and rivalry in electric energy systems represented the power quality improvement as one of the major problems in power industry.

1.1 Different Sources of Renewable Energy

Renewable energy comes from natural resources like as sunlight (solar), wind, rain, tides and geothermal heat. These renewable resources can be naturally reutilized. In addition to homes and businesses, another important element of our industrialized society generates a considerable demand for electricity based energy. Therefore the, wind power, Solar, power, Small hydropower, Biomass and Geothermal are different source of Renewable Energy.

1.2 Renewable Energy in India: Progress, Vision, Strategy and Capacities

Today, India takes an initiative in systematic programs for renewable energy sources in both research and development.

FEA Modeling And Prediction Of Surface Roughness Of Aluminum Alloy (LM4) During Turning Process

Print

P. B. Patole [1], S. G. Bhatwadekar [2], V. V. Kulkarni [2], G. J. Pol [1]

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Keywords

Turning, surface Roughness, Equivalent Stress, Cutting Parameters.

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Internet of Things Enabled Fire Resilient Building Automation System Using Artificial Intelligence Approaches

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Abstract: In recent years, fire accidents mainly in buildings are considerably increasing around the world. The reasons being due to overheating of pots and pan, improper way of keeping portable heaters, smoking in bedrooms, electrical equipment, candles near to explosive or flammable materials, faulty wiring, congested construction of the building and even due to increasing the number of population as well as improper light fittings. Fire outbreak is the third biggest risk to smart cities in India. According to the Indian Risk Survey (IRS) in 2018, 7.24% of accidents occur due to fire outbreaks [1]. So the demand of automation system to detect fire and take appropriate actions such as giving alerts as well as taking immediate action to reduce the intensity of fire has become obvious. In this zest, mainly two approaches are experimented and explored here. Primarily fire detection using machine learning approaches is achieved and also rule-based approach is employed with other relevant parameters. Different machine learning approaches like Deep Learning Neural Network (DNN), AlexNet, VGG-16, LeNet-5, and ResNet-50 experimented for classification of images and detection of fire based on image dataset. Also for rule-based system input from context-aware sensor system were taken and adjudged the intensity of fire according to different rules so as to initiate appropriate actions.

Index Terms - Machine Learning, Deep Learning, Internet of Things, Rule-based System, fire reorganization, context aware, fire disaster management, Building Automation System.

I. INTRODUCTION

The Internet of Things plays a vital role in the development of nations because it provided with a unique identity to every object which helps to take proper actions without human interaction. In real-world of automation it is the most important technology. Depends upon data given by various sensors and context, it automatically takes action in real-time. The varied potential domains are mainly healthcare, transportation logistics, automated vehicles monitoring, smart payment systems such as banking, smart space, agriculture, wearable computing, construction, real estate and smart home [2] .

Smart building process aims to automatically control building operations. Instrumented sensors are enabled with IoT technologies to communicate and analyze data used to optimize building management systems. In the same zest, Smart home is the premier ranked application in Internet of Things by all channels. Smart home is basically aimed to help concerned people in their everyday activities. The different types of smart home application are Smart electricity meters, Smart home apps, and Smart parking in society buildings, automatic control of electrical appliances such as fans and lights, smart locks, recycling systems in home, security and protection in home [3].

Context-aware system is promising technological path of innovation which is integral part of Ubiquitous computing. It helps IoT to increase parameters and makes system more meaningful. According to system there are different contexts are present such as time, location, id, temperature, humidity, smoke and many more. A key objective of Context-awareness has significantly simplified in Human Computer Interaction (HCI) by deploying all possibilities of IoT devices such as sensors and actuators.

Machine learning is the subset of the Artificial Intelligence. It is a mathematical science that focuses on analyzing as well as interpreting of the patterns which are used for learning, dynamic decision making, reasoning outside of human interaction. ML is also used in various domains such as online fraud detection, product recommendation, social media services, video surveillance, predictions, classifications, object detection as well as Virtual Personal Assistants.

Recently, across the globe, fire accidents in buildings have become larger because lack of real time fire detection on the correct time and hence it has become necessary to build efficient fire management system in the design of smart cities. In the traditional systems, according to the intensity of fire, taking of appropriate actions dynamically is not available. Smart fire management system is important to minimize damage of life and property. Accurate and precise diagnosis of the intensity of fire has been a significant challenge.

The Machine learning object detection algorithm benefits to detect fire faster and in accurate manner. For detection of fire, the Deep Neural Network is promising which is an extension of the Convolution Neural Network. DNN mainly used for two purposes, first is for image classification and second is for object detection [4]. Rule based approach is mainly used to store and utilize knowledge or

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A trust management model based on NSGA-II in mobile grid system

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Abstract: Mobile Grid network connects large number of mobile devices like smartphones, tablets, PDAs, wireless digital medical equipment's etc for the purpose of sharing their resources and performing the task collaboratively and cooperatively. The mobile nodes participating in the mobile grid are autonomous and open in nature making them more vulnerable to data and control attacks made by malicious or selfish nodes. Preventing these malicious or selfish nodes and identifying the trusted nodes to participate in the network is an NP-hard problem. To recognize trusted nodes in the mobile grid system a novel trust management model is proposed in this paper by applying an elitist multi objective optimization algorithm Non-dominated Sorting Genetic Algorithm-II (NSGA-II). The proposed trust management model assesses the trust index of each mobile node in the network using various evaluation factors or attributes and then obtains the non-dominated set of trusted nodes in each front. Comparative analysis of the proposed trust model shows that the proposed model can be a potential candidate for implementing trust management in mobile grid network.

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Predication and Analysis of Epileptic Seizure Neurological Disorder using Intracranial Electroencephalography (iEEG)

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Abstract—Epileptic seizure is one of the neurological brain disorder approximately 50 million of world's population is affected. Diagnosis of seizure is done using medical test Electroencephalography. Electroencephalography is a technique to record brain signal by placing electrodes on scalp. Electroencephalography suffers from disadvantage such as low spatial resolution and presence of artifact. Intracranial Electroencephalography is used to record brain electrical activity by mounting strip, grid and depth electrodes on surface of brain by surgery. Online standard Intracranial Electroencephalography data is analyzed by our system for predication and analysis of Epileptic seizure. The pre-processing of Intracranial Electroencephalography signal is done and is further analyzed in wavelet domain by implementation of Daubechies Discrete Wavelet Transform. Features were extracted to classify as preictal and ictal state. Analysis of preictal state was carried out for predication of seizure. Intracranial Electroencephalography signals provide better result and accuracy in seizure detection and predication. Earlier warning can also be issued to control seizure with anti- epileptic drugs.

Keywords—Artifact, Daubechies Discrete Wavelet transform, Epileptic Seizure, Intracranial Electroencephalography, Seizure Classification, Seizure Predication.

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1. Introduction

The status of human whole body is represented by brain function. Central Nervous System (CNS) consists of neurons which transmits information in responses to simulation. Simulation of neuron generates action potential in the voltage range between negative 60 mv to positive 10 mv and the action potential generated remains for 5 Mill second to 10 Mill seconds. Scalp Electroencephalography is used for recording of brain signal to diagnosis many neurological disorders and to detect abnormalities in human body. Electroencephalography signals are used for investigation of Epileptic seizure and testing of drug effect on Epilepsy patients [1]. Scalp Electroencephalography suffers from disadvantage such as low spatial resolution and the signals acquired may be contaminated with noises which are called as artifacts. Presence of artifact affects the performance of seizure detection system and predication of seizure is also difficult in scalp Electroencephalography. Intracranial Electroencephalography (iEEG) is a clinical technique where strip, grid or depth electrodes are implanted on surface of

brain by surgery to monitor brain activities. Intracranial Electroencephalography helps in exact diagnosis of epilepsy syndrome and in planning of drug management for epileptic surgery. Intracranial Electroencephalography confirm region of seizure for planning epilepsy surgery. Development of seizure predication system may enhance quality, safety and life of patient.

Detection of Epileptic seizures using Electroencephalography (EEG) dataset and Intracranial Electroencephalography (iEEG) dataset has attracted many researchers to develop various algorithms with good sensitivity, specificity, accuracy and True predicative value. Automatic seizure detection was carried out using wavelet decomposition in five scales of multi-channel intracranial EEG. Features such as Energy, relative amplitude, coefficient of variation and fluctuation index were extracted and classified using support vector machine for seizure detection [2]. One–class support vector machine novelty detection method was implemented for detecting of seizure using Intracranial Electroencephalography. Short-time, energy-based statistics were computed. Validation of detector was done using leave-

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Classification and Severity Measurement of Epileptic Seizure using Intracranial Electroencephalogram (iEEG)

Sanjay Shamrao Pawar, Sangeeta Rajendra Chougule

Abstract: The Epileptic seizure is one of major neurological brain disorders and about 50 million of world's population is affected by it. Electroencephalography is medical test which records brain signal by mounting electrodes on scalp or brain cortex to diagnosis seizure. Scalp Electroencephalography has low spatial resolution and presence of external artifact as compared to Intracranial Electroencephalography. In Intracranial Electroencephalography strip, grid and depth type of electrodes are implanted on cortex of brain by surgery to measure brain signal. Analysis of brain signal was carried out in past in diagnosis of Epileptic seizure. Seizure classification and Severity measurement of Epileptic Seizure are still challenging areas of research. Seizures are classified as focal seizure, generalized and secondary generalized seizure depending upon the area of brain which it generates and how it spreads. Classification of seizure helps in treatment of seizure and during brain surgery to operate on brain part which is responsible for continuous seizures generation. Developed seizure classification algorithm classifies seizures as focal Seizure, generalized Seizure and secondary generalized seizure depending on the percentage of iEEG electrodes detecting seizure activity. Seizure severity measurement scale is developed by modification in National Hospital Seizure Severity Scale. Seizures are graded as Mild seizure, Moderate seizure and severe seizure depending on its severity. Seizure Classification and Seizure Severity Measurement improves life quality of Epileptic patients by proper drug management.

Keywords: Epileptic Seizure, Intracranial Electroencephalography, Quality of life, Seizure Classification, Seizure Severity Scale

I. INTRODUCTION

The function of brain represents the status of whole human body. The neurons present in Central nervous system (CNS) transmit information in responses to simulation. The action potential is generated in response to simulation, which is in the voltage range between negative 60 millivolt to positive 10 millivolt.

The action potential generated remains for time period of 5 Mill second to 10 Mill seconds [1]. Electroencephalography is a medical test used for recording the brain signal by placing electrodes on scalp or implanting electrodes on cortex of brain. The brain signals are used to diagnosis various neurological disorders and to detect abnormalities in human body. Scalp Electroencephalography and Intracranial Electroencephalography (iEEG) are used for diagnosis of Epileptic seizure and testing of anti-epileptic drug effect on Epilepsy patients [2]. Scalp Electroencephalography has low spatial resolution as compared to Intracranial Electroencephalography (iEEG). The brain signals acquired by scalp EEG may be contaminated with presence of artifacts and may affect accuracy during seizure classification and seizure severity. Intracranial Electroencephalography (iEEG) is a clinical technique where strip, grid or depth electrodes are implanted over the cortex of brain by surgery to monitor brain activities. Classification of seizure provides exact region of brain from where the seizures are generated and how it is spread. Classification is helpful in drug management and epileptic surgery. Seizure severity measurement and grading the seizure as Mild seizure, Moderate seizure and severe seizure is helpful in surgical treatment and drug management. Classification of seizure and severity measurement can improve life quality of Epileptic patients by proper drug management. Diagnosis of Epileptic seizures using scalp Electroencephalography (EEG) dataset and Intracranial Electroencephalography (iEEG) dataset has attracted many researchers to develop various algorithms. Seizure classification and seizure severity measurement still remains neglected area of research. Automatic seizure detection was carried out by implementation of wavelet decomposition in five scales of multi-channel intracranial EEG. Features such as Energy, relative amplitude, coefficient of variation and fluctuation index were extracted and classified using support vector machine for seizure detection [3]. One–class support vector machine novelty detection method was implemented for detecting of seizure using Intracranial Electroencephalography. Short-time, energy-based statistics were computed. Validation of detector was done using leave-one-out cross-validation [4]. Seizure detection was carried out using Lacunarity and Bayesian Linear Discriminant Analysis (BLDA) using long-term Freiburg intracranial EEG dataset.

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Production Planning Control of Bottlenecks by Operation Shifting in Workplace

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Assistant Professor, Department of Mechanical Engineering, BVC Engineering, Kolhapur, Maharashtra, India[1]

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ABSTRACT: Manufacturing firms primarily aim at maximizing profit by way of meeting the customer demands with respect to quantity, quality, cost and time through optimum utilization of available resources such as; manpower, inventories, plant and facilities etc. Sometimes, due to various bottlenecks the demand is not fulfilled. This paper concerns the production planning and control of bottlenecks by operations shifting in medium scale industry.. It is possible to improve performance of manufacturing system by improving throughputs, reduction in WIP inventories; improve on time delivers and better utilization of constraint resources. Operation shifting on bottlenecks is applicable to any kind of industry for improving scheduling planning.

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KEYWORDS: Bottlenecks, Production line, Production process, production line layout, workplace.

I. INTRODUCTION

Competing situations in today's manufacturing environment force organizations to adopt a new Production Management System (PMS). In the last three decades, different PMS systems have been developed: MRP II, JIT, and TOC. The traditional approach, MRP, is "passive" in that it plans and controls a production system that it assumes rates and times are fixed. These include, but are not limited to, setup times, processing times, move and queue times, breakdown rates, repair times, and scrap rates. Within the constraints of this fixed environment, it tries to maximize the production output. JIT, on the other hand, is 'active'. It reduces inventory levels, making production plans difficult to execute unless improvements are made in the production system. Typical improvements include reducing setup times, move and queue times, breakdown rates, repair times and scrap rates. JIT tries to achieve two equally important goals maximize production and make improvements [Miltenburg, 1997] [8].Both MRP II and JIT have their own weaknesses to deal with in different conditions [Fogarty et. al., 1991] [2]. MRP ignores improvement of the production system. To be successfully implemented, JIT needs very rigid and restricted conditions.

Operation shifting on bottlenecks can be summarized as a solution for continuous improvement including operations strategy tools, performance measurement systems, and thinking process tools [Cox and Spencer 1998] [1]. The operations strategy tools include the five focusing steps, VAT analysis, and specific applications such as production management (drum-buffer rope, buffer management, batching, and product mix analysis), distribution management, and project management.

II. IDENTIFICATION OF BOTTLENECKS

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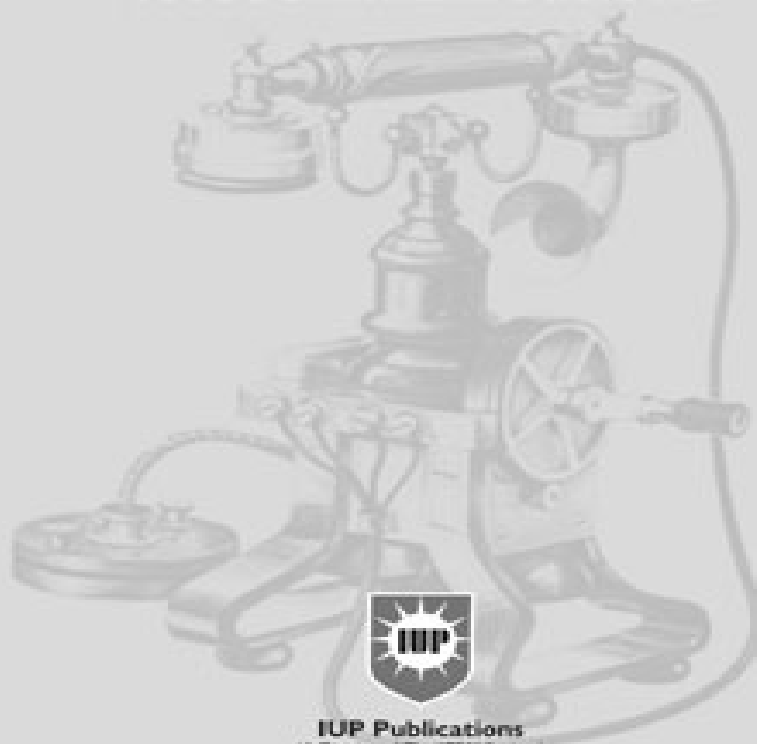
Reconfigurable Filter Design and Testing with ISTS Standard for Proposed Hearing Aid Application

Manik S Sonawane* and S R Chougule**

Digital Hearing Aid (DHA) device selectively filters sound signals in subbands. Gain is added as per hearing loss mentioned in audiogram. DHA uses digital filters and amplifies processed signal, and this signal is transferred to the ear. Multiple DHA manufacturing companies all over world have innovative and miniature DHA devices in their product range. They do rigorous research and development to improve product functionalities. Most of them use design method of digital filters using selective amplification by adding gain to subband where patients have hearing loss. Nowadays, DHAs are more customized to individual patient hearing loss characteristics. Most of the available hearing aid designs use filter banks with fixed subbands. The paper focuses on reducing the complexity of the algorithms improving DHA user experience in changing noise and proposes a single reconfigurable transfer function type of digital Finite Impulse Response (FIR) filter to achieve a best fitting to audiogram as per the specifications with IEC 60118-15 standard, and the processed signals are tested with ITU-T-PESQ standards. The paper uses International Speech Test Signal (ISTS) standard speech audio signal to test designed filter, and the results are found to be very satisfactory compared with the fixed filter banks. The paper discusses combined or reconfigured transfer function approach for use in DHA devices and design of reconfigurable FIR filter bank with adjusting different parameters in terms of requirements of DHA.

Keywords: Hearing loss, Digital Hearing Aid (DHA), Digital filters, Reconfigurable filter, Perceptual Evaluation of Speech Quality (PESQ), International Speech Test Signal (ISTS)

Introduction

Digital Hearing Aid (DHA) is very beneficial for people having hearing loss problems. These patients can get hearing benefit using a DHA device. In real world, only 20% of hearing affected patients purchase a hearing aid and around 25% of them do not use DHA due to irritating noise and unpleasant whistles. Some DHAs have processed signal with other amplified noises due to surrounding background noise

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Production Planning Control of Bottlenecks by Operation Shifting in Workplace

Jitendra G. Shinde[1], Shamuvel V Pandit[2], Raju B Lokapure[3], Sunil J. Kadam[4]

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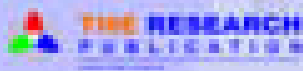
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Keywords: LED, Heat Sink, Orientation

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Qie Shen *et al* [2] carried out experimental as well as numerical study for understanding orientation effect on fluid flow and heat transfer for rectangular fin array under natural convection. Heat sink made up of aluminium alloy 5083 and setup consist revolving frame to achieve the desired orientation. The size of the baseboard is 123mm*157mm and aluminium base thickness is kept 10mm also fin height and fin thickness kept 50mm and 2mm, respectively.

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Design and analysis of single plate clutch by mathematical modelling and simulation

Kedar Kishor Patil, Vinit Randive, Sahil Mulla, Rajkumar Parit, Sagar Mane, Sunil Kadam

Department of Mechanical Engineering, Bharati Vidyapeeth's College of Engineering Kolhapur, Maharashtra, India

Abstract: This paper addresses Modeling and analysis of single plate clutch which is used in Tata Sumo vehicle. Clutch is the most significant component located between engine and gear box in automobiles. The static and dynamic analysis were developed for a clutch plate by using finite element analysis (FEA). The 3D solid model was done using CATIA V5R16 version and imported to ANSYS work bench 19.0 for structural, thermal and modal analysis. The mathematical modelling was also done using six different materials (i.e. Steel, Stainless Steel, Ceramics, Kevlar, Aluminum alloy and Gray Cast iron); then, by observing the results, comparison was carryout for materials to validate better lining material for single plate clutches using ANSYS workbench 19.0 and finally conclusion was made.

1. Introduction

Clutch is the first element of power train used on the transmission shafts. The main function of clutch is to engage and disengage the engine to transmission, when the driver needs or during shifting of gear. When the clutch is in engaged position, the power flows from the engine to the wheel and when it is in disengage position, the power is not transmitted to the wheel. In automobile, a gearbox is required to change the speed and torque of the vehicle. If we change a gear, when the engine is engaged with gearbox or when the gears are in running position then it can cause of wear and tear of gears. To overcome this problem a clutch is used between gearbox and engine. Some friction plates, sometimes known as clutch plates are kept between these two members. The clutch is based on the friction. When two friction surfaces brought in contact and pressed, then they are united due to friction force between them. The friction between these two surfaces depends on the area of surface, pressure applied upon them and the friction material between them. The driving member of a clutch is the flywheel mounted on the engine crankshaft and the driven member is pressure plate mounted driving shaft to the driven shaft so that the driven shaft may be started or stopped at will, without stopping the driving.

The two main types of clutch are: positive clutch and friction clutch. Positive clutches are used when positive drive is required. The simplest type of a positive clutch is a jaw or claw clutch. A friction clutch has its principal application in the transmission of power of shafts and machines which must be started and stopped frequently. The force of friction is used to start the driven shaft from rest and gradually brings it up to the proper speed without excessive slipping of the friction surfaces. In automobiles, friction clutch is used to connect the engine to the drive shaft. The primary aim of this work is to design a rigid drive clutch system that meets multiple objectives such as Structural strength.

Gradual engagement clutches like the friction clutches are widely used in automotive applications for the transmission of torque from the flywheel to the transmission. The three major components of a clutch system are the clutch disc, the flywheel and the pressure plate. Flywheel is directly connected to the engine's crankshaft and hence rotates at the engine rpm. Bolted to the clutch flywheel is the second major component: the clutch pressure plate. The spring-loaded pressure plate has two jobs: to hold the clutch assembly together and to release tension that allows the assembly to rotate freely. Between the flywheel and the pressure plate is the clutch disc. The clutch disc has friction surfaces similar to a brake pad on both sides that make or break contact with the metal flywheel and pressure plate surfaces, allowing for smooth engagement and disengagement. In an automobile clutch is need for torque transmission; gradual engagement; heat dissipation; dynamic balancing; vibration damping; size; inertia and ease of operation of vehicle.

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2. Selection of Material

The following materials used for Friction clutch plate:

2.1. Gray cast iron as Friction material

Gray has a graphitic microstructure. The clutch disc is generally made from grey cast iron this is because it has a good wear resistance with high thermal conductivity and the production cost is low compare to other clutch disc materials.

2.2. Kevlar 49 as friction material

Kevlar was introduced by DuPont in the 1970s. It was the first organic fiber with sufficient tensile strength and modulus to be used in advanced composites. Originally developed as a replacement for steel in radial tires, Kevlar is now used in a wide range of applications.

2.3 Ceramic as friction material

Ceramic clutch plates are, ironically, made with a combination of copper, iron, bronze, and silicon and graphite. Because of their metallic content, these discs can withstand a lot of friction and heat. This makes them ideal for race cars and other high-speed vehicles that need to engage and disengage from fast-moving flywheels.

2.4 Aluminum alloy as friction material

The unique properties of aluminum composites are better comparing to other conventional materials. Aluminum composites can use because of its strong bonding, good corrosion resistance, good wet ability, low density and high flexibility.

2.5 Steel as friction material

Steel is the primary mating surface used in clutches and can be used as the primary heat sink or the means to dissipate the energy into the ambient surroundings. In a "wet" or oil-immersed application, oil molecules are trapped between the steel mating plate and the friction material. The surface roughness of the steel mating plate and the texture of the friction material combine on shear of the oil to deliver a co-efficient of friction of up to 0.15. However, these discs are high-friction. This means that the engagement and disengagement of the clutch won't always be very smooth.

Table 1: Comparison of materials based on its Mechanical property

Sr. No.	Material	Specific Strength (kN-m/kg)	Yield Strength (Mpa)	Elastic Modulus (Gpa)	Friction coefficient	Density [kg/m³]
1	Steel	46	420	210	0.42	7861
2	Stainless Steel	65	505	195	0.57	7610
3	Ceramics	6.7	457	33	0.4	3500
4	Kevlar 49	23.8	370	72	0.5	1470
5	Aluminu m alloy 6061	4.5	275	69.7	0.23	2700
6	Gray Cast iron	19.1	720	24.1	0.28	7200

3. Calculations

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Kedar Kishor Patil[1], Vinit Randiv[2], Sahil Mulla[3], Rajkumar Parit[4], Sagar Mane[5], Sunil Kadam[6]

RESEARCH ARTICLE

ABSTRACT: This paper addresses modelling and analysis of single plate clutch which is used in Tata Sumo vehicle. Clutch is the most significant component located between engine and gear box in automobiles. The static and dynamic analysis were developed for a clutch plate by using finite element analysis (FEA). The 3D solid model was done using CATIA V5R16 version and imported to ANSYS work bench 19.0 for structural, thermal and modal analysis. The mathematical modelling was also done using six different materials (i.e. Steel, Stainless Steel, Ceramics, Kevlar, Aluminium alloy and Gray Cast iron); then, by observing the results, comparison was carryout for materials to validate better lining material for single plate clutches using ANSYS workbench 19.0 and finally conclusion was made.

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Production Planning Control of Bottlenecks by Operation Shifting in Workplace

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ABSTRACT: Manufacturing firms primarily aim at maximizing profit by way of meeting the customer demands with respect to quantity, quality, cost and time through optimum utilization of available resources such as; manpower, inventories, plant and facilities etc. Sometimes, due to various bottlenecks the demand is not fulfilled. This paper concerns the production planning and control of bottlenecks by operations shifting in medium scale industry.. It is possible to improve performance of manufacturing system by improving throughputs, reduction in WIP inventories; improve on time delivers and better utilization of constraint resources. Operation shifting on bottlenecks is applicable to any kind of industry for improving scheduling planning.
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KEYWORDS: Bottlenecks, Production line, Production process, production line layout, workplace.

I. INTRODUCTION

Competing situations in today's manufacturing environment force organizations to adopt a new Production Management System (PMS). In the last three decades, different PMS systems have been developed: MRP II, JIT, and TOC. The traditional approach, MRP, is "passive" in that it plans and controls a production system that it assumes rates and times are fixed. These include, but are not limited to, setup times, processing times, move and queue times, breakdown rates, repair times, and scrap rates. Within the constraints of this fixed environment, it tries to maximize the production output. JIT, on the other hand, is 'active'. It reduces inventory levels, making production plans difficult to execute unless improvements are made in the production system. Typical improvements include reducing setup times, move and queue times, breakdown rates, repair times and scrap rates. JIT tries to achieve two equally important goals maximize production and make improvements [Miltenburg, 1997] [8].Both MRP II and JIT have their own weaknesses to deal with in different conditions [Fogarty et. al., 1991] [2]. MRP ignores improvement of the production system. To be successfully implemented, JIT needs very rigid and restricted conditions.

Operation shifting on bottlenecks can be summarized as a solution for continuous improvement including operations strategy tools, performance measurement systems, and thinking process tools [Cox and Spencer 1998] [1]. The operations strategy tools include the five focusing steps, VAT analysis, and specific applications such as production management (drum-buffer rope, buffer management, batching, and product mix analysis), distribution management, and project management.

II. IDENTIFICATION OF BOTTLENECKS

The comparison between available capacity and the required capacity (demand) is very useful to identification of constraint resource (CR). The resource having capacity less than demand is identified constraint resource (CR). The resource having available capacity more than required capacity (demand) is identified as non constraint resource (NCR). When the available capacity matches with demand those resources are identified as capacity constraint resource (CCR). If the capacity constraint resources are not scheduled properly, they will become constraint resources. Hence equal amount of attention is given towards the capacity constraint resources.[4]
Table no.1 shows the comparison between total available capacity of each resource and total required capacity of each resource in the housing production line. Identification of constraint resource by comparing available capacity and demand placed on each resource is shown in table no. 1