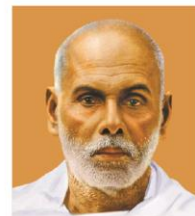


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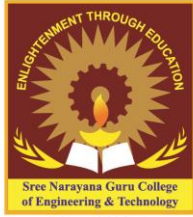
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3.3: Research Publications and Awards

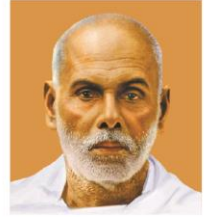
3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five
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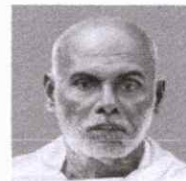


LIST OF PUBLICATIONS



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Est. 2003

Publication of Conferences

Sl.No.	Title of paper	Name of the author/s	Year of publication
1	Wavelet modulated inverter for WECS using permanent magnet synchronous generator	Archana C.P.	2018
2	Fuzzy & PI controller based energy management strategy of battery/ultra capacitor for electric vehicle	Vaishakh.M.Nayanar	2019
3	Robust video watermarking Resilient to inadvertent attacks	Bushra Abdulla N.T.	2020
4	High security water making techniques for digital rights management: A review	Bushra Abdulla N.T.	2020
5	Analysis of mechanical properties and optimization of laser beam welding parameters on dissimilar metal titanium (Ti6Al4V) and aluminium (A6061) by factorial and ANOVA techniques	Sudhin Chandran	2021
6	Multi-response optimization of process parameters for laser beam welding of AA6061-Ti6Al4V by grey relational analysis	Sudhin Chandran	2021
7	Impact of heat treatment on laser beam welded aluminium (A6061)-titanium (Ti6Al4v) dissimilar sheet metals.	Sudhin Chandran	2021
8	Design of gas cleaning unit for biomass gasifier	RAHUL C G	2021
9	Wideband microwave head imaging system to detect subdural hematoma brain injury	Sini Namath	2021
10	Mechanical property and microstructure analysis of Laser beam welded aluminium (A6061)-Titanium(Ti6Al4V)	Sudhin Chandran	2021
11	Text based smart answering system in Agriculture using RNN	Raji Sukumar	2021
12	3D Steel Truss Bridge with GFRC Deck	Saritha Sasindran	2022
13	3D Steel Truss Bridge with GFRC Deck	Pooja K	2022
14	Analysis and Design of Mono Column Building	Shilpa Valsakumar	2022
15	Cyclic performance of cross-slanted corrugated steel plate shear walls with beam only connected infill plates in ABAQUS software	Saritha Sasindran	2022
16	Structural performance of partially precast steel reinforced green concrete columns	Dr.Susan Abraham	2022
17	Structural optimisation of non - seismically detailed	Dr.Susan Abraham	2022

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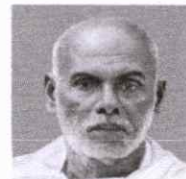
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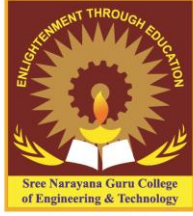
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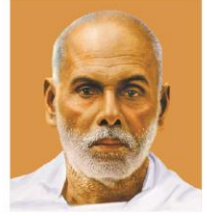
	RC beam column joints using pre-stressed and prefabricated steel encasement		
18	Effect of bracing location in PEB under	Dr.Susan Abraham	2022
19	Emotion recognition methods: A Review	Abhaya.D.K	2022
20	An Exploration on plant disease detection	Chaithanya.K.P	2022
21	Classification of fruits and vegetables using Machine and deep learning approach	Dr.Raji Sukumar	2022
22	Computational prediction of plastic degrading microbes using random forest	Dr.Raji Sukumar	2023
23	Computational yield prediction of rice using KNN regression	Dr.Raji Sukumar	2023
24	Computational model for pepper yield prediction using support vector regression	Dr.Raji Sukumar	2023
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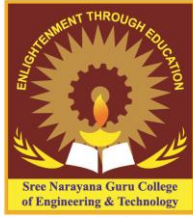


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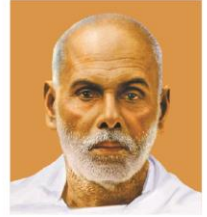


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Conference in 2023-2024

Computational Model for Pepper Yield Prediction Using Support Vector Regression

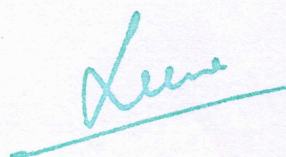
Akhil Wilson¹, RajiSukumar², Hemalatha N³

Lulu Financial Group, India ¹, Techtern Pvt Ltd, Kannur², St Aloysius College of Management and Information Technology, India³

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The yield prediction is the one of the challenging problem in agriculture. Here in this research work we have predicted the yield of Pepper in the state of Kerala, India. With the help of Machine Learning and by considering the soil properties, micro climatic condition and area of the Pepper we have predicted the yield. Here we have used Linear Regression and Support Vector Regression algorithms in order to predict the pepper yield. Experimental results gave best accuracy of 97.685 percent for Support Vector Regression.

Keywords: Agriculture, Pre-processing, Analysis, Regression, prediction.


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2023. In Saroj Hiranwal & Garima Mathur (eds.), *Artificial Intelligence and Communication Technologies*, 779–788. Computing & Intelligent Systems, SCRS, India. <https://doi.org/10.52458/978-81-955020-5-9-73>

Chapter 22

Computational Prediction of Plastic Degrading Microbes Using Random Forest



N. Hemalatha, W. Akhil, Raji Vinod, and T. Akhil

1 Introduction

Plastic is nothing but a polymeric material. Plastic pollution has become one of the most stressing environmental issues, as the rapidly increasing production of disposable plastic products overwhelms the world's ability to deal with them. We cannot think of a life without plastic. Plastics revolutionized medicine with life-saving devices, made space travel possible, lightened cars, and jets saved fuel and pollution, and also saved lives with helmets, incubators, and equipment for clean drinking water but on the other side, it makes a lot of environmental pollution [1]. Practically it is difficult to avoid plastic completely from our daily life. The only solution to control plastic pollution is degrading the plastic products rather than throwing them into the surroundings. Using the proper management, we can reduce the pollution in the environment more than what plastic creates.

Streptococcus, *Micrococcus*, *Staphylococcus*, *Moraxella*, and *Pseudomonas* are some of the plastic-degrading microbes found in Indian mangrove soil [2]. This outcome was a result of Japanese scientists in the year 2016 in which they found that a bacterium can easily break the plastic polyethylene terephthalate (PET) [3]. Further, they also found another bacterium called *Ideonella sakaiensis* obtained from the genus *Ideonella* and from the family Comamonadaceae which can break the plastic polyethylene terephthalate (PET) [4]. Once the bacterium acts, PET gets broken down

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Chapter 23

Computational Yield Prediction of Rice Using KNN Regression



N. Hemalatha, W. Akhil, and Raji Vinod

1 Introduction

Machine learning, a subset of Artificial Intelligence (AI), is a practical method using several features for yield prediction. Machine learning (ML) can be used to find patterns and discover correlations among these data from datasets. In ML, models have to be trained using given datasets, where the outcomes will be characterized based on past experience. Several features are used to build the predictive models and as such, model parameters are calculated using historical data during the training phase [1]. For the testing purpose, historical data that is not used for training is used for the evaluation phase.

An ML model can be descriptive or predictive depending on the research problem. A descriptive model on one side is used to gather knowledge from the collected data, while predictive models are used for future prediction. Lots of challenges are faced in building a high-performance predictive model which involves choosing the right algorithm and also handling the voluminous amount of data. In this paper, we are analyzing the past yield of rice and predicting the future yield with the help of certain agricultural features in the state of Kerala with the help of ML.

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A Wideband Dipole Antenna for Head Imaging System

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Abstract—One of the fundamental aspects of all wireless communication is antenna. Biomedical engineering occupies a prominent position in the academic field of medical treatment and diagnostics. Antenna is implanted in the human body to transmit and receive power. In a microwave head imaging arrangement, EM energy be targeted at the skull, according to an aerial assemblage, and then the dispersed EM signals be analyzed to create an internal image of the human head. The human head's regular and irregular tissues' received electrical characteristics are used to rebuild the image. From microwave skull tomography, dispersed signals are collected from the aerial, the aim is identified using numerical signal methods, and image computing and coding technique are used for information acquisition and carbon copy output. A subdural hematoma, which can be fatal, can develop after a serious head injury and is a gathering of blood outside the brain. Chronic or acute subdural hematomas are also possible. A really bad head injury results in an acute subdural hematoma. Less severe head injuries result in chronic hematomas. A multichannel (dipole) VHF/UHF aerial is meant for broadband wire free application areas is featured in this article. A multichannel (dipole) antenna becomes created for operate in the occurrence band (20 MHz – three GHz). A Genetic Algorithm Optimizer (GA) is being developed to decide the positioning for charging circuits beside an aerial support. Using such an optimizer to construct an antenna maximizes the bandwidth of antenna operation. Antenna dimensions are eminent through a squat voltage standing wave ratio (VSWR) in addition to a strong gain. Aside from VSWR plus gain, supplementary dimension criteria could be assessed to guarantee optimal antenna functioning.

Keywords— Imaging antenna, Wideband antenna, Microwave antenna, Dipole antenna

I. INTRODUCTION (HEADING 1)

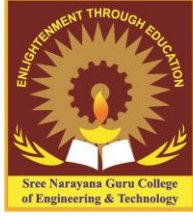
Brain injuries can cause significant and enduring impacts on individuals and their overall welfare. Brain damage caused by trauma and other causes are major contributors to death and disability worldwide. Brain injuries encompass a range of types and can generally be grouped into two main

categories: traumatic brain injuries (TBI) and acquired brain injuries (ABI).

Head impacts and violent shaking can lead to concussions. When there is localized bleeding or bruises within the brain tissue, typically caused by a direct blow to the head, a contusion is considered to have occurred. When a sudden acceleration or deceleration force, such as that experienced in a severe automobile accident, results in diffuse axonal injury (DAI), the brain's white matter is damaged. These are particular examples of Traumatic Brain Injuries (TBI). Examples of Acquired Brain Injuries (ABI) encompass strokes, which transpire when the blood flow to the brain is obstructed by a blood clot (ischemic stroke) or a blood vessel ruptures, resulting in brain bleeding (hemorrhagic stroke). Anoxic Brain Injury represents another form, marked by brain damage and cell demise due to a lack of oxygen. Brain tumors may originate within the brain, giving rise to localized damage and impairments in brain function. Additionally, infections like encephalitis (brain inflammation) or meningitis (inflammation of the membranes surrounding the brain and spinal cord) can induce brain damage and exhibit diverse neurological symptoms.

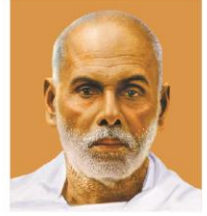
Intracranial hemorrhage (ICH), the most prevalent type of brain injury, is the name for the collection of blood internal to the human head. It occurs during a blood vessel in sudden breaks or ripples caused by body trauma, hemodynamic damage and other venous parasites and failures. When there is limited blood flow, the brain cannot perform efficiently because it cannot receive the necessary oxygen and nutrients from the blood. As a consequence brain cells initiate to deterioration. At the beginning of a brain trauma, millions of brain cells pass on in each second. The mastery connections between different physiological organs are impacted, which results in forgetfulness, speech loss, paralysis, and can be deadly. [1-3].

A thrombus, on the other hand, increases IC deflate, which shrink neighboring tissues and causes lasting head injury. This is anticipated a certain ICH, which encompasses intraparenchymal, intraventricular, subdural, and extradural

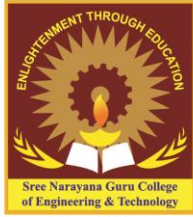


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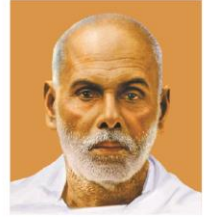


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Conference in 2022-2023

Emotion Recognition Methods: A Review

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Abstract—Emotions play a significant impact in human psychology and physiology. It stems from their daily experiences, the people they contact with, and the environment in which they live. Emotion detection has gotten a lot of attention in today's technology world since it can help with human-machine connection and complete automation. People with social interaction, communication, and developmental difficulties may benefit from emotion identification based on physiological cues. The utilisation of signals like electroencephalogram (EEG), electrocardiogram (ECG), and others has sparked interest in affective computing applications in recent years. The procedure is divided into two stages learning ECG representations and learning how to classify them. In this research different methods for emotion recognition are done.

Index Terms—Convolutional Neural Network, ECG, Emotion Recognition, Support Vector Machines, Physiological signals

I. INTRODUCTION

Emotion recognition via physiological signals [6] emerged as a hotspot and developing trend in fields of affective computing and human-computer interface. Different types of emotions are shown in figure 1. Jiangsu University identified emotions in many people using physiological signals, indicating the potential of user-independent emotion identification utilising ECG signals. The following are the four main steps in the ECG-based emotion recognition process: Affective data collection [1], feature extraction, feature subset selection [1,6] and Classifier construction. If emotions have an impact on the ECG signal, changes in the P-QRS-T wave will be reflected. As a result, the specific location of the P-QRS-T wave is used to extract features. Many studies[3] have proven that using facial expressions from photos and videos, it is feasible to discern human emotions. Aside from object recognition and classification, deep learning improvements have made it possible to train massive neural networks on massive datasets for emotional computing research. In compared to the amount of deep-learning research that has been employed to solve problems, there has been a dearth of study involving images/videos on bio-sensing data.

Fully-supervised learning approaches [4] are used by the bulk of machine learning or deep learning systems for ECG-based emotion identification. There are a number of drawbacks to this method. To begin with, in a fully-supervised learning setup, for each classification or regression task the model must be trained. Furthermore, the learnt representations from fully supervised models that have been trained are frequently task-

specific and are unlikely to generalise effectively to other tasks. Finally, because small datasets can lead to poor performance, fully supervised learning necessitates big human-annotated datasets. We use a deep learning strategy based on self-supervised representation [1] learning to address these issues in the context of ECG-based emotional computing, which was inspired by the success of multi-task self-supervised learning in other areas. Self-supervised learning models are taught using automatically produced labels rather than human-annotated labels. For starters, because this strategy prioritises learning generalised characteristics over task-specific ones, the representations learnt using this method are usually insensitive to inter- and intra-instance fluctuations. As a result, these models can be reused. This characteristic enhances network performance while reducing computation time by not training a model from scratch for each task. It does not require human-annotated labels, allowing for the training of deeper and more complex networks.

We present an overview of several methods for emotion recognition using physiological signals in the next sections, as well as a description of the datasets utilised in this study, information about emotion recognition, and specifics of the experimental outcomes.

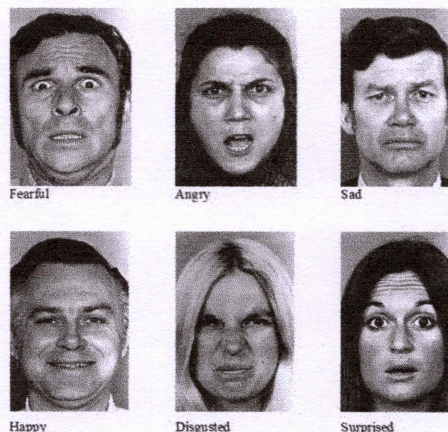


Fig. 1. Different human emotions.

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AN EXPLORATION ON PLANT DISEASE DETECTION

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Abstract - Plant diseases cause significant losses in agricultural productivity, economics, quality, and quantity. To avoid such diseases, plants must be observed from the beginning of their life cycle. Human eye observation is the most common method for this monitoring, but it is time-consuming and demands a high level of competence. As a result, in order to make this operation easier, the disease detection system must be automated. Image processing techniques are used to construct the disease detection system. Many researchers have designed systems depending on multiple image processing approaches. This research examines the possibility of methodologies for detecting plant disease detection systems that contribute in agricultural improvement. It consists of several processes, such as image acquisition, image segmentation, feature extraction, and classification

Keywords— Image processing, Detection, Identification of plant leaf diseases, feature extraction

I. INTRODUCTION

Agriculture is the backbone of every economy on the planet. Crop production is one of the most important variables influencing domestic market conditions in every country. [1]Agriculture has been a part of everyone's life, either directly or indirectly. It is the method of crop production that results in the provision of food, which is the foundation of every human being. Whether a person lives in a city or a countryside, everyone relies on agricultural production in some manner. With the emergence of civilization, mankind began producing crops such as wheat, cotton, and others. Crop production involves monitoring all operations to maximise output across all seasons. It involves a thorough examination of the soil, the seeds used, the key nutritional requirements of the crop, and several other factors. Yields from crops and other sources are being used to fulfil the everyday demands of not only farmers, but also others. However, as with any industry, agriculture or crop production has significant challenges in the form of crop diseases. [2]With such a high demand for food all around the world, crop production must be prioritised. Its goal is to preserve the total yield without loss before it reaches the market. Apart from natural disasters such as draughts and earthquakes, diseases are also responsible for significant crop output losses.

Crop diseases are mostly caused by infections such as insect pests, bacteria, fungi, and viruses.[3]These diseases were identified and have the potential to spread throughout the plant, such as the stem, vegetables, and fruits, and can be

discovered by recognizing the afflicted region, obtaining the contaminated area's feature set, diagnosing and categorising diseases.

The purpose of this research is to assess and analyse several plant disease detection methods in terms of various factors. Several studies have been conducted in the literature for leaf diagnosis as well. The image is collected, preprocessed, and noise-free during the disease detection procedure. The image is then segmented, then feature extraction and classification are performed. Plant diseases are distinguished by the colour, texture, or structure of their leaves. This technique is primarily concerned with pixel numbering schemes based on RGB properties. Genetic algorithms, K-means, HSV, ANN, CCM, RBE, Neural networks, and other studies have been published in peer-reviewed journals. The afflicted region's parameters are identified, disease leaves are discovered, the affected area is quantified, and so on. The detection and diagnosis of leaf diseases is made more efficient by applying computer-based digital image analysis, which has a better capability. The following paper provides a quick overview of image processing techniques

II. LITERATURE SURVEY

Sachin D. Khirade et al [4] describes plant disease diagnosis is crucial for lowering agricultural productivity and quantity losses. It is necessary a significant amount of labour, in addition expertise in plant diseases and an extended response time. Image processing is employed in plant disease detection. Image segmentation, image acquisition, image preprocessing, feature extraction, classification are all processes in the disease detection process. Several approaches for segmenting the plant's disease area were explored in this study. The precise detection and categorization of plant diseases is crucial for crop production performance, and image processing can help with this. Extracting the properties of diseased leaves and to categorise plant diseases, feature extraction and classification techniques are applied. The application of ANN approaches, such as self-organizing feature maps, back propagation algorithms, SVMs, and others, for disease classification in plants. Using image processing tools, we can accurately detect and categorise a wide range of plant diseases.

Classification of Fruits and Vegetables using Machine and Deep Learning Approach

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Abstract— One of the crucial sectors of Indian livelihood is agriculture. The development and stability of the country have been vastly backed by the farming sector. Thus, ultramodern inventions and technologies can support the testing of new approaches and practices in the farming sector. Artificial intelligence (AI) is one of the most important, useful, and current technologies. Due to its capacity to acquire dependable interpretations from images, Deep learning (DL) in particular has numerous uses. The most common DL architecture for image categorization is Convolutional Neural Networks (CNN). Classifying fruits and vegetables using deep learning is the main emphasis of this work. The model is also compared to some ML classifiers like Support Vector Machine (SVM), K Nearest Neighbor (KNN), and Decision Tree (DT) whereas ResNet the Pretrained Model, Convolutional Neural Network (CNN), and Multilayer Perceptron (MLP) in deep literacy. It was derived that SVM and MLP both showed an accuracy of 97.36 on the fruit dataset.

Keywords— Convolutional Neural Networks, Deep Learning, Classification, Multilayer Perceptron Model

I. INTRODUCTION

India is a country of townlets. Agriculture is one of the important factors for a nation. Agriculture provides profitable stability and profitable growth to the country. In India, the livelihood of the many people depends on farming. Fruits and vegetables are the major polish in India. According to statistics, fruits and vegetables were reported for over 3.7 trillion Indian rupees in the Indian livelihood in the time 2018. This area contributed about 28 percent to the GVA of crops at the same time, a growth from 24 percent in the time 2012. Fruits and vegetables were the main contributors to crops [1].

Sorting of fruits and vegetables is one of the crucial challenges in the agrarian field. Lot of money, time and also needs further manpower [2]. Time is one of the factors which affects cataloguing. The fruits or vegetables may get putrefied when kept for long, thus, an automated system to classify fruits and vegetables is needed [3]. With the help of AI, Machine Learning (ML), and Deep Learning (DL), this study has tried developing an automatic fruit sorting system with an information dataset of each fruit.

II. METHODOLOGY

Available different algorithms are used to break the fruit/veg sorting problem. First, a dataset is presented, also different ML and DL algorithms are used.

Methodologies followed to classify fruits and vegetables

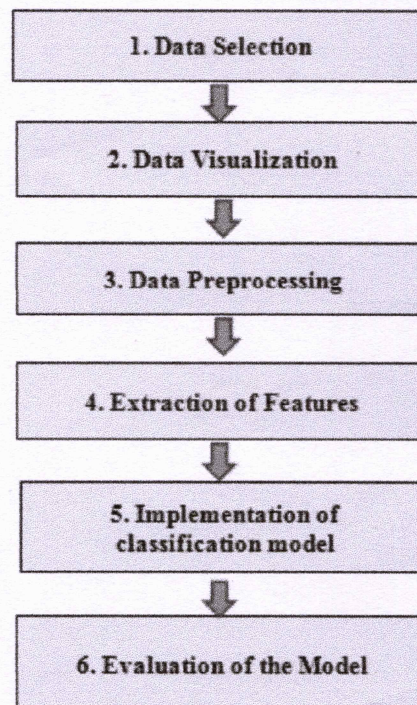


Fig. 1. Workflow Diagram

A. Data Source

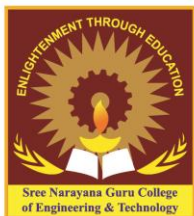
Data is a pivotal element in DL. thus, it's essential to choose the applicable input data agreeing to the objects. For fruit/ veg bracket, we've used a dataset called Fruits360. The dataset includes 90483 different fruit images of 131 orders. Filename format: imageindex100.jpg (e.g.32100.jpg) or rimageindex100.jpg. Colorful types of the same fruit (Banana for illustration) are collected and fitted into separate classes.

B. Data Visualization

The patterns in the data can be identified by data visualization. Some performed EDA are

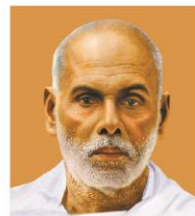
- Sample images on the dataset (Figure 2)
- Data information
- Fruit/ Veg and it's counts.
- Count plot for finding number of samples in each of training dataset class.

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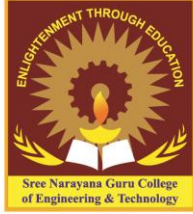


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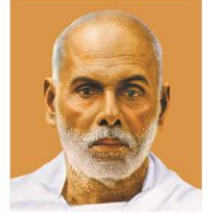


Books and Chapters in Edited Volumes Books Published and Papers



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Conference in 2021-2022

Wideband Microwave Head Imaging System to Detect Subdural Hematoma Brain Injury

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Abstract. An antenna is one of the essential components for all wireless communication. In medical diagnosis and treatment as an academic discipline, Biomedical engineering holds a conspicuous place. For transmitting and receiving power in the human body antenna plays an implanted role. In microwave head imaging system, we use an antenna array to emit a small amount of electromagnetic (EM) energy towards the head; the dispersed EM signals are processed to image the human head inside. Based on the received electrical properties of regular and irregular tissues of the human head the image is reconstructed. In microwave head imaging, backscattered signals are captured using an antenna, the target is located by digital signal processing, for data collection and image output image computation and software engineering is used. By severe head injury a collection of blood outside the brain may occur and is called subdural hematoma, which can be life-threatening. Subdural hematoma is either acute or chronic. An acute subdural hematoma is caused by a severe head injury. A chronic subdural hematoma is caused by a less head injury. This work presents a VHF/UHF dipole antenna for broadband wireless communication applications. A dipole antenna was designed, to work in the range of frequency (20 MHz – 3 GHz). A genetic algorithm (GA) optimizer will be used to determine the location of load circuits alongside an antenna arm. To configure antenna the bandwidth of antenna operation is maximized by using such an optimizer. The configuration of antenna measurements are characterized by a low voltage standing wave ratio (VSWR) and high gain. Other measurement characteristics can also be evaluated to ensure the ideal antenna operation beyond VSWR and gain.

Keywords: Antenna, Imaging, Wideband, Microwave, Dipole antenna.

INTRODUCTION

A foremost reason of disability and mortality in the globe is Traumatic and non-traumatic brain damage. There are different types of brain damages including traumatic and acquired brain damages, inner occurrences like stroke and cancers, by an exterior heaviest impact traumatically injure the brain, such as in vehicle accidents, and some other planned and unplanned fatalities. The gathering of blood inside human head is termed as Intracranial hemorrhage (ICH), is the common form of brain damage. It occurs when a blood vessel inside the IC breaks or is sharply wavering because of hypertensive damage, corporeal shock, and other vein contagions and failures. When blood transports required oxygen and nutrition to brain, inadequacy of suitable blood flow stops the proper brain function. As consequence brain cells begin failing. Lakhs of brain's cells de cease every minute, at the starting of the brain injury, which damages the control associates with diverse body parts which can cause in a lapse of recollection, discourse, and movement, and can prime to demise [1-3].

At the similar period blood bulge raises the IC compression which compresses the neighboring tissues and triggering everlasting brain destruction. It is assessed that ICH (which incorporates intra-parenchymal, subarachnoid,



Mechanical Property and Microstructure Analysis of Laser Beam Welded Aluminium (A6061)-Titanium (Ti6Al4V) Dissimilar Sheet Metals

Sudhin Chandran, R. Rajesh, and M. Dev Anand

Abstract Developing vogue in engineering, such as lightweighting, expanded execution, and usefulness builds the utilization of complex material, crossover fabric, and in this way, the requirement for fastening different metals. Al and Ti compounds are generally utilized in the aviation and automobile industry because of their appealing properties, like small density, intense conductivity, superior strength, and solidness. Nonetheless, the fastening of Al and Ti combinations by conventional welding techniques is troublesome because of the development of bulk intermetallic mixes. Laser beam welding is efficient for titanium–aluminium welding, a bigger pretence in aviation, automobile, electronics, and different sectors. In this research, distinct 2 mm thickness A6061 and Ti6Al4V butt seams were created by moving a laser supply on the Ti sheet's top side. Titanium alloy Ti6Al4V and aluminium amalgam 6061 were effectively joined by laser beam welding. The mechanical and microstructural qualities of the welded joints were assessed. The weld piece displays a blend of fine recrystallized particles of the aluminium compound and titanium compound.

Keywords Laser beam welding • Titanium • Aluminium • Mechanical properties • Microstructure

1 Introduction

Developing production fields like aviation, automobile, and power generation calls for particular items by integrating lightweight and recyclability characteristics. As original material frequently flops to handle those necessities, a blend of at least two materials can fulfill a particular manufacturing sector requirement [1, 2]. Divergent joints can give application-oriented solutions. Specifically, Al–Ti lightweight

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Text Based Smart Answering System in Agriculture using RNN

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Abstract

Agriculture is an important aspect of India's economy, and the country currently has one of the highest rates of farm producers in the world. Farmers need hand holding with support of technology. A chatbot is a tool or assistant that you may communicate with via instant messages. The goal of this project is to create a Chatbot that uses Natural Language Processing with a Deep Learning model. In this project we have tried implementing Multi-Layer Perceptron model and Recurrent Neural Network models on the dataset. The accuracy given by RNN was 97.83%.

1 Introduction

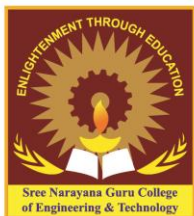
Agriculture contributes around 16 percent of India's GDP and employs about 52 percent of the country's population, making it a significant part of the country's economic growth. According to the Farmers' Portal, agriculture's rapid expansion is necessary not just for self-sufficiency but also for earning vital foreign exchange. One of the reasons for this is that individuals in the farming industry are relatively sluggish to accept emerging innovations. Field officers have traditionally visited farmlands to give training, guidance, and assistance to farmers. The data demonstrates that mobile connection is increasing at an exponential rate, which helps IT services promote agricultural information. The government is having difficulty disseminating important agricultural information. Furthermore, the difficulties are exacerbated by the dissemination of disinformation. These issues exist as a result of the huge linguistic variety and the rural population's lack of trust in contemporary technologies. In such a situation, using mobile devices to disseminate agricultural information looks to be a viable option¹ (K., 2020). Chat-Bot sys-

¹https://en.wikipedia.org/wiki/Agriculture_in_India/

tems are a type of natural language processing that demands the system to be taught in human language in order to meet the user's demands. Agriculture is the most important sector for a country's development. Farmers are now unaware of the most modern technology and methods employed in agriculture. The challenge of extracting meaningful answers using machine learning techniques has been researched by numerous machine learning specialists, and sophisticated machine learning approaches have been created. These methods are used to obtain the correct answer. We may name this an Agriculture Question Answering System, since the farmer can ask the system a question, and the system will answer (Heller et al., 2005; Beaudry et al., 2019; Sutoyo et al., 2019). With the advancement of technology, farmers must study and address the challenges. As a result, the goal is to create a chatbot system that delivers accurate responses to queries. According to a major study in the field of chatbot systems, there is no agriculture-specific system that can provide precise and rapid answers to farmers' questions. To solve this issue, the suggested system uses the RNN (Recurrent Neural Network) deep learning method to offer accurate responses to the queries asked.

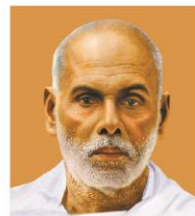
2 Problem Statement

The traceability software from Source Trace gives you complete visibility into the agricultural value chain. It has an influence on farmers' lifestyles, helps an organization adopt data-driven agriculture, and fosters trust and improved interaction with stakeholders. Agriculture employed half of India's workforce and provided 17-18% of the country's GDP. Agriculture and related industries such as animal husbandry, forestry, and fisheries accounted for 15.4% of GDP in 2016 and employed around 31% of the workforce in 2014. The

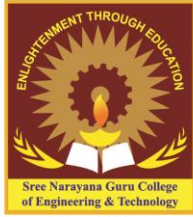


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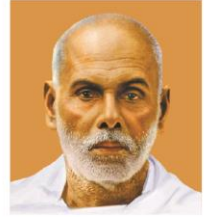


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Conference in 2020-2021

Robust Video Watermarking Resilient To Inadvertent Attacks

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Abstract—The security of information contents exists as a problem for researchers about various techniques discussed in the reviews for protecting digital rights and copyright authentication. The method for providing secureness to right-owners is digital watermarking; i. e, the method of embedding secret text message in the file. The availability of online contents of audio clip, images and videos are rapidly growing. The efficiency of watermarking algorithm mainly follows on the properties of robust and also imperceptibility.

Modern watermarking methods are capable of successfully attacking older watermarking methods. That arises the importance of designing recent and robust watermarking methods for resisting the attacks of watermarked videos. We developed in this project, relating new video watermarking technique based on combination of Discrete Wavelet Transform(DWT) and Singular Value Decomposition (SVD). To understand the robustness of watermarking algorithm, the watermarked video is subjected to inadvertent attacks. Performance analysis were done using evaluation metrics like NCC, PSNR and BER. The lower entropy frames are used for text watermark embedding. Compared the performance with existing methods in presence and absence of unintentional attacks like cropping, blurring, and adding noises like salt and pepper noise, speckle noise.

Index Terms—Digital Rights Management, watermarking, attacks, DWT, entropy, NCC, PSNR.

I. INTRODUCTION

Due to the popularity of techniques by Digital Rights Management, the capabilities like re-modifying, adding contents, and re-transmission of original data in absence of consent of the right holder are developed. The watermarking technique is sophisticated technology to prevent the usage and establish resilient software activates the owner to focus inexpensive and illegal modification of data to certain limit [1]. This method access permission to legal user for viewing the file.

Digital watermarking are process of inserting text messages into an original data like picture, voice and video), such that that modification of files are not permitted to the hackers. The watermarking technique consist of embedding and extraction processes[2]. Embedding process of watermark is given as shown in form of block diagram in Figure 1.

Extracting text watermark from watermarked files are shown in Figure 2.

Watermarking techniques can be categorized depending on factors like domain (spatial or frequency domain), watermark category (text, image), application mode(Robustness and

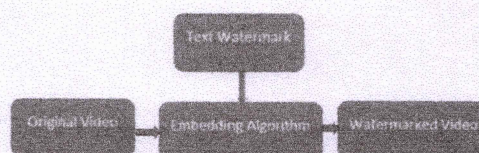


Fig. 1. Text watermark embedding in video

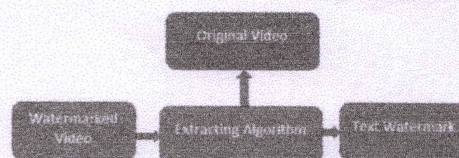


Fig. 2. Text watermark extraction from watermarked video

fragile), visual perception (perceptible or imperceptible) [3]. Recent watermarking methods are shown in Figure 3.

The literature survey reveals that spatial domain watermarking techniques are more imperceptible, low computation cost, more embedding capacity, less computational complexity and less robust to attacks. The frequency domain watermarking techniques were found to be more robust, more computational complexity and resilient to most of the attacks. The following

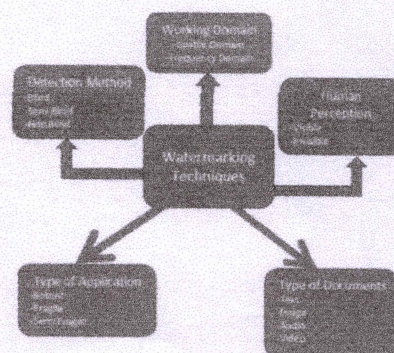


Fig. 3. Watermarking Techniques

High Security Watermarking Techniques for Digital Rights Management: A Review

Bushra Abdulla N. T and K. A. Navas

Abstract—Protection of data still remains as an anxiety to the researchers in spite of large number of techniques have been proposed in the literature to protect digital rights and authentication of documents. One of the methods to provide security to the right-holders is digital watermarking; the technique of hiding secret message in the document to ensure authentication. Effectiveness of Watermarking depends on the robustness, imperceptibility and security. Presence of online data including audio, images, videos and diagrams in binary representation is fast increasing. New digitization techniques are capable of successfully attacking earlier watermarking techniques. This demands the need of developing new watermarking techniques to prevent the attacks on water-marked images. We attempted in this work to examine recently reported watermarking techniques in the literature which are claimed to be meritorious by the authors. In this paper we discuss the merits and inefficiencies of the recently reported techniques which claim many merits. Identification of the room for research will be helpful to the researches to attempt on the development of new techniques.

Index Terms—Image processing, watermarking, attacks, digital rights management, copyright.

I. INTRODUCTION

DIGITAL Rights Management includes development of techniques to prevent the reprocessing, editing, and transmission of original criteria without permission of the owner. Accessing and replicating restriction software enables the owner to review on costless and illegal editing of content to certain extent [1]. These techniques give permission for paid users to access the product.

Digital watermarking technique is a method of embedding one or more signature in original content (image, audio, video, text etc.) so that accessing of data is difficult to the attacker. Reversible watermarking systems are more meaningful.

Embedding of watermark in image data is shown with help of a block diagram in Fig. 1. Extraction of watermark from the watermarked image is shown in Fig. 2.

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Watermarking techniques are classified in regarding factors like types of domain (spatial domain or transform domain), document types of watermark (text or multimedia), types of application (Robust, fragile, semi-fragile), perceptual quality (visible or imperceptible) [2]. Major watermarking techniques are depicted in Fig. 3.

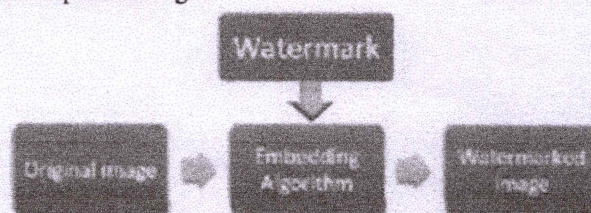


Fig. 1. Embedding of watermark in image.

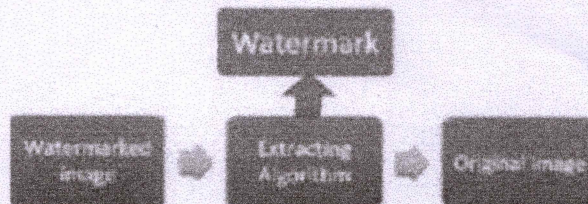


Fig. 2. Extraction of watermark from watermarked image.

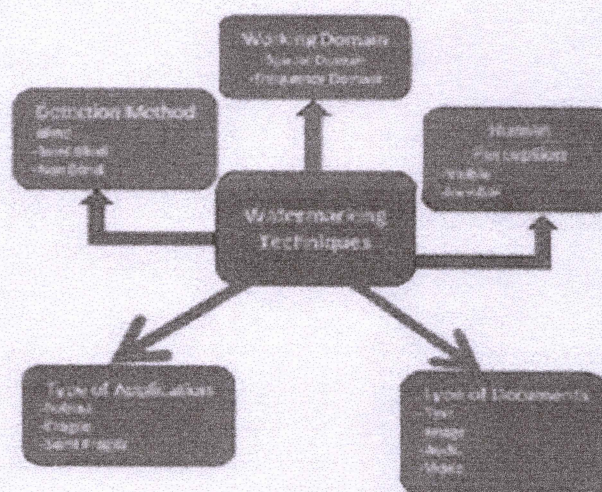
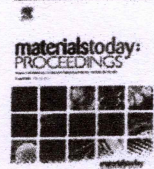


Fig. 3. Watermarking Techniques.



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Analysis of mechanical properties and optimization of laser beam welding parameters on dissimilar metal titanium (Ti6Al4V) and aluminium (A6061) by factorial and ANOVA techniques

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ABSTRACT

The Laser Beam Welding (LBW) is done among the two different materials titanium (Ti6Al4V) and aluminium 6061. The welding is done toward twenty-seven samples to improve and approve the mechanical and metallurgical properties. This welding is completed through three sets of process parameters and three sets of values. The mechanical properties like hardness and tensile strength are estimated for the workpiece, and the ultimate value is said to 290 HV and 205 MPa, separately. The factorial structure of the examination quantifies the reaction of each conceivable blend of factors and factor levels. ANOVA technique is used to advance the procedure boundaries to achieve the ideal joint quality and nature of joints in the welded tests. Likewise, it is utilized to distinguish the utmost prevailing process parameter in this welding procedure. The three process parameters with three sets of values are welding power (1600–2000 W), welding speed (2–2.4 m/min), and offset (0.2–0.4 mm). It is evident from the SEM micrographs demonstrated that there is no fastening imperfection in the interface.

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1. Introduction

The utilization of lightweight structures is developing altogether in several manufacturing divisions like aviation, defence, and automotive industries demand great solidarity to weight proportion is accomplished in the fastening procedure among titanium and aluminium amalgams. The investigation has been done in these divisions in creating different welding strategies to deliver prominent strength and minimal weight parts. The thermal welding of Ti/Al unique composites is a confront on account of considerable distinctions in physical–chemical properties among Ti and Al [1–3].

Be that as it may, the utilization of lightweight materials becomes challenging when two various types should be incorporated and associated. The association of different materials like Al (A6061) and Ti (Ti6Al4V) can be acknowledged by riveting, press-joining, and screwing. These are as yet generally utilized methods in the automobile and aviation businesses. An option for fastening titanium and aluminium is the utilization of laser

frameworks like Nd: YAG or CO₂ to acknowledge welds with superb properties. Be that as it may, the fundamental viewpoint during the fastening of aluminium to titanium is the development of intermetallic stages, which rely upon process associated temperature–time cycles. The butt joint procedure utilizes a brazing procedure in blend with a welding procedure to understand an association between unique materials. The laser should be situated in the titanium–aluminium process, ideally on the titanium sheet [4,5].

In this examination, the two unique materials, for example, titanium (Ti6Al4V) and aluminium 6061, have been welded through the Laser beam welding process. Altogether, twenty-seven samples are set up according to the detail for this welding procedure. The mechanical properties like hardness value and tensile strength are estimated for all the welded specimens to assess the ideal seam quality and nature of the weld seams. In this LBW procedure, three process parameters have taken, for example, Laser power (W), welding speed (m/min), and offset (mm). Three levels of values have been given during the procedure. Factorial (DOE) strategy is utilized to recognize conceivable factors and factor levels. ANOVA is utilized to look at the most affecting process parameter in acquiring the highest tensile and hardness value and get the whole

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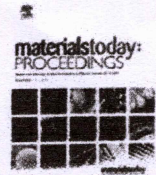
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Multi-response optimization of process parameters for laser beam welding of AA6061-Ti6Al4V by grey relational analysis

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ABSTRACT

Laser beam welding (LBW) is employed for consolidating distinct materials, aluminium (AA6061) and titanium (Ti6Al4V). LBW, attributable to appealing highlights, to be specific, low heat input, high heat focus, high-power density, and low contortion, is a more useful technique for welding and fixing airplane and turbine motor components built from superalloy. This investigation concentrates on optimizing process parameters for laser beam welding of AA6061-Ti6Al4V utilizing factorial-based grey relational analysis. The welding input parameters assume a fundamental part in optimized preferred weld quality. The input parameter picked were laser power, welding speed, and offset. The welding is done for 27 specimens to elevate and endorse the mechanical and metallurgical properties. This welding is completed with three sets of process parameters with three levels of values. The three-process parameter with three sets of values are welding power (1600–2000 W), welding speed (2–2.4 m/min), and offset (0.2–0.4 mm). ANOVA technique was utilized to evaluate the centrality of variables on the finest quality of the weldment. ANOVA results demonstrated that laser power assumed a significant part of the quality targets (Tensile strength and hardness) of the weldments trailed by welding speed and offset. Grey relational analysis is implemented to optimize the input parameters at the same time considering multiple output variables.

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1. Introduction

The welding of dissimilar metals is joining at least two metals that can be attempted at specific requirements. It is hard to unite distinct materials due to their disparities in chemical configuration, physical and chemical properties [1]. The hard and fragile intermetallic mixes of Al alloy and Ti composite can be developed at a welding interface utilizing a regular welding process [2]. Laser beam welding (LBW) is a striking technique for consolidating unique materials due to its low, confined energy input prompting low distortion, high strength of the joint, and high processing speeds [3].

Aluminium composites have lower density and lower cost, and titanium alloys could recommend a favourable position compared to ordinary materials because of their high strength, stiffness, and corrosion resistance. Crossbreed frames of aluminium and titanium combination materials have been generally utilized. With

light-weight construction strategies and monetarily accessible and suitable materials, they can accomplish the appropriate balance between execution and cost [4]. For instance, it is notable that the cooling fin utilized in airplane cabins comprises an aluminium blade and a titanium pipe. The honeycomb frame of the plane's wings is frequently a composite structure in which a titanium skin is linked to an aluminium honeycomb. The benefit of uniting different materials is a lower weight, high solidarity to-weight proportion, high fatigue resistance, and higher anti-vibration limitation and solidness that can be acquired [2,3,5]. Crossbreed structures and segments built of aluminium and titanium metals have been utilized in aerospace applications, particularly airplanes. The trial NASA YF-12 fighter wings were comprised of a honeycomb composite plate of Al/Ti. The plane will highlight titanium plates and a composite structure of aluminium ribs in the airplane seat rails and in zones especially subject to corrosion to increase the corrosion resistance, decrease the weight, and diminish the assembling expenses [2,6].

In this examination, the two materials, titanium (Ti6Al4V) and aluminium (A6061), have been welded through the Laser beam

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Impact of Heat Treatment on Laser Beam Welded Aluminium (A6061)-Titanium (Ti6Al4V) Dissimilar Sheet Metals

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Abstract. Manufacturers request innovative materials to connect their need for that better innovation is adopted to discover a solution through research. One such exertion is laser beam welding to fasten the Ti/Al compound for the aviation and different purposes. It is as yet a test to fabricate an agreeable bond among these distinct composites. This article exhibits the impacts of the post welding heat treatments (PWHT) on the mechanical properties and microstructure development of Ti6Al4V and A6061 different laser welds. The welded joints exposed to two heat treatment processes ($550^{\circ}\text{C} * 15\text{ min}$ quenching, $550^{\circ}\text{C} * 15\text{ min}$ quenching + $200^{\circ}\text{C} * 15\text{ min}$ aging), and the outcomes compared with weld joints before PWHT. Test outcomes show that age heat treatment promotes strength for the fabric over 29%, and laser welding is reasonable for distinct alloy joining.

Keywords: Laser beam welding (LBW), post-weld heat treatment (PWHT), mechanical properties, microstructure

INTRODUCTION

During the most recent years, due to natural and financial prerequisites, the manufacturers are mentioned to develop new innovative arrangements and tweaked materials to advance cost decrease and protection of assets. Multi materials complex assemblies consolidate the fundamental points of interest of every part helpfully into an advanced material, fit for working in different conditions, saving misuse of material, and decreasing the heaviness of the entire structure [1][2]. Manufacturers, for example, aviation, automotive, power generation, and clinical call for superior items, consolidate an expanded number of direction and properties like lightweight, adaptability, recyclability, and warrant productivity. As single material frequently fails to link up those necessities, a blend of at least two materials can fulfil a particular requirement for those businesses [3].

Specifically, Al-Ti lightweight compound fabric has a broad scope of uses and potential possibilities in aviation, airplane, and automobile businesses, for which a decrease of weight and fuel utilization speaks to a fundamental requirement [1][4]. Titanium combinations, as Ti6Al4V, are in expanding interest for aviation applications because of their high explicit quality, erosion obstruction, harm resilience, and compatibility with graphite fiber composite materials [5]. The mix of an Al-composite with Ti6Al4V for airplane seat tracks, appeared in Figure 1, is such use while decreasing weight (Aluminium) and refine quality and erosion obstruction (Ti) [6].

Design of gas cleaning unit for biomass gasifier

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Abstract. Biomass is considered as renewable energy and its energy potential is promising due to the reason that biomass is a more evenly dispersed source over the earth and thus available nearly worldwide. The challenge is to remove the biomass-derived contaminants such as tar, particulates, H₂S and HCl, alkali compounds from the product gas, and then use it for other applications. The objective is to design a proposed gas cleaning unit using ANSYS for the downdraft biomass gasifier and thereby remove the contaminants. From the simulation it was concluded that, the outlet temperature of the downdraft gasifier found from the simulation is 1285.7 K. From the simulation of the proposed cleaning unit, the outlet temperature of 1264.6 K is formed.

1. Introduction

With the continuously increasing demand for energy, our current primary energy source, fossil fuels are getting depleted, which are used to support economic growth. The gasification process can be used as a backup plan for the production of electricity; but is necessary to remove impurities produced such as particulates, sulphur oxides, CO₂ and others. Alessandro Vulpio et. al [2] discussed mainly the 2D ANSYS simulation of the downdraft gasifier using the wooden pellets. This journal has been used for the validation of the simulation that has been modelled in this report. Here the gasification of the wooden pellets has been done and these results have been used for the validation purpose. Here a test case taken from literature has been simulated with an alternative set of reactions. George Yaw Obeng et. al [3] discusses mainly about the gasification process with the help of the coconut husks. The results indicate that 62–65% of the whole coconut fruit can be generated as wastes in the form of husks and shells. It also found out that as the water evaporated gradually from the raw un-charred coconut wastes during the combustion process, charred coconut wastes would likely produce less CO pollutant emissions than the raw un-charred coconut wastes.

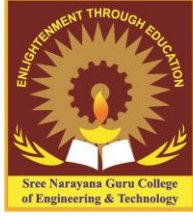
2. Geometric modelling of biomass gasifier and cleaning unit.

The geometric modelling of the downdraft gasifier is made in the ANSYS. The schematic diagram of the downdraft gasifier system is shown in Figure 1. The dimensions of the system are 481mm in height and 178mm in diameter to do the simulation. The proposed geometric model is also designed and modelled in ANSYS. The length of the model is 101mm. it has a width of 8mm. It has a negligible thickness. The simulation work is done in 3D.

The cleaning unit consists of 3 main parts. First is the outer sheet of the metal cover. The metal sheet cover is made of stainless steel. The next part is ceramic wool. It is inside the metal cover. The final part is the perforated tube which is also made of steel. The hot air from the gasifier is made to pass through the gas cleaning unit. Shown below is the schematic diagram of the proposed cleaning unit (Figure 2). Grid independence study is performed to eliminate/reduce the influence of the number of grids/grid size on the computational results. If any changes in geometry, meshing grids definitely

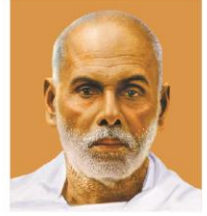


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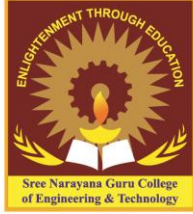


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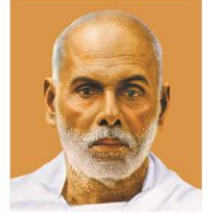


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Conference in 2019-2020

Fuzzy & PI Controller Based Energy Management Strategy of Battery/ Ultracapacitor For Electric Vehicle

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Abstract— Electric vehicles have gained more attraction throughout the world due to its advantage of green technology and decreased emission. Moreover, they are being powered by battery would be the best option of replacing current petrol or gas dependent vehicles. There are some drawbacks associated with battery; it has limited lifetime and cost is very high. Hence, it is hybridized with other energy storage systems such as Ultracapacitor/Supercapacitor. This work uses a fuzzy and Pi control for Energy management system for Electric Vehicle and Simulation environment chosen is Matlab/Simulink.

Keywords—Ultracapacitor-Fuzzy controller-Energy Management system-Unidirectional and Bidirectional Converter-Battery

I.INTRODUCTION

In recent years, global warming and other climate change issues are raised many problems in many developed countries. So we have to decrease fuel consumption. Particularly focusing on vehicle technology to reduce the effect of global warming and other energy issues we have to adopt new technologies. Few well-known technologies are hybrid electric vehicles (HEV) and full electric vehicle (FEV). Other researchers are working to improve the fuel efficient transport technology which provides internal combustion engines with power supply, power recovery systems, and ultracapacitors. One of the key issues regarding the design of electric vehicle is requirement of an energy management strategy. Primary aim of this work is to design a fuzzy and PI controller based energy management for electric vehicle.

Deceleration of a vehicle with a traditional braking system will convert kinetic and potential energy of the vehicle into thermal energy or heat through the action of friction. With regenerative braking in electric vehicles, this kinetic energy can be converted back into electrical energy that can be stored

in ultracapacitor for reuse to propel the vehicle during the driving cycle.

II.ELECTRIC VEHICLE CONFIGURATION

The Electric Vehicle allows electric motor (EM) to deliver power to drive the wheels. Electric vehicles are vehicles whose wheels are turned by electric motors rather than by a gasoline-powered drivetrain. EVs have been long touted as saviors of the environment due to their apparently zero emissions of pollutants, but have been also been criticized as limited in range and of less environmental benefit than claimed. It mainly consist of electric motor which is driven from a battery energy storage system which is assisted by an ultracapacitor.

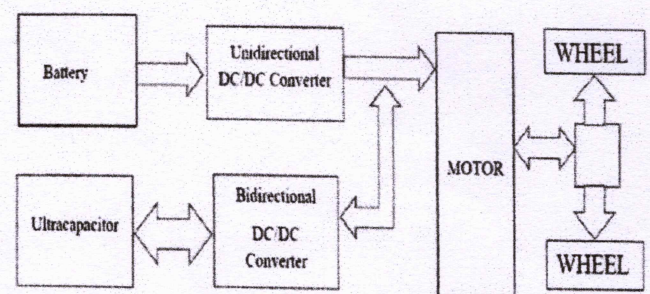
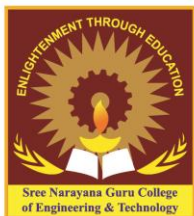
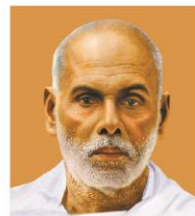


Fig.1 Electric Vehicle Configuration

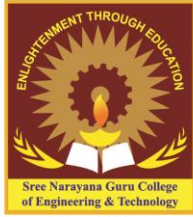


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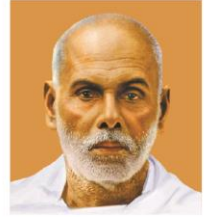


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Conference in 2018-2019

Wavelet Modulated Inverter for WECS using Permanent Magnet Synchronous Generator

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Abstract— In this paper, a better control techniques known as wavelet modulation is proposed at the inverter side of wind energy conversion system. Permanent magnet synchronous generator is one of the generator used for integration of wind energy into power electronic topologies due to its simple construction & it provide direct coupling & number of poles can be change easily. A back to back converter topology is the most commonly used one, consist of rectifier on rotor side and inverter on grid side. Several modulation techniques are there for the control of inverter connected to load side in a wind energy conversion system. Switching pulses for inverter is generated using dSPACE1104 controller. The overall system is modelled and performance is verified in MATLAB Simulink & in hardware and obtained Low harmonic content and magnitude of fundamental component is high as compared to conventional techniques.

Keywords—Wind energy conversion system (WECS), Total harmonic distortion (THD), Wavelet modulation (WM).

I. INTRODUCTION

As the wind power generation has been increasing day by day, it is important to design and select proper generator and converters for WECS. Various types of generators and power electronic topologies are used for integration of wind energy to grid or isolated load. Squirrel cage induction generator is a simple, small size, low cost machine having stable performance, but it is a geared turbine with fixed speed [1]. In a doubly fed induction generator stator is directly connected to grid and rotor is connected to load side using rotor side converter and grid side converter. Active and reactive power can be effectively controlled using this system [2]. But it is a geared system having brush and slip rings, hence entire cost of the system and failure rate is high [3]. Permanent Magnet Synchronous Generator (PMSG) does not have brush, slip ring and gear box [4]-[5]. It is simple in structure and can be directly connected to wind turbine. Stator of generator is connected to load using rotor side converter and load side converter [6]. Better control techniques are needed to reduce harmonic distortion in the output side of inverters.

Pulse width modulation (PWM) is the most widely used techniques for the control of inverter, by increasing switching frequency, THD decreases, however this increases the switching losses [7]. Third harmonic injection technique adds third harmonic to each phase of a three phase inverter. This technique provide inverter output voltage as sinusoidal, approximately same as that of AC supply. But it does not provide any information about the amount of third harmonics to be injected [8]. Space vector modulation and selective harmonic elimination are the alternative concepts. In space vector modulation space vector concept is used for the computation of duty cycle of the switches [9]. Opposite harmonic elimination is the technique used in selective harmonic elimination [10]. Both these are very difficult to implement [11].

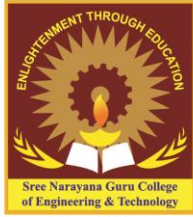
In this paper a new techniques, known as Wavelet Modulation scheme is applied to inverter of a WECS. It's a sample based techniques [12]-[15]. Wavelet is like a wave that first begin to zero and reaches to maximum amplitude and decreases to zero amplitude again. The overall system is modelled and performance is verified using simulation & hardware results.

II. PROPOSED WECS WITH WAVELET MODULATED INVERTER

The proposed system consists of a wind turbine coupled to a PMSG, a diode rectifier used at the machine side and a wavelet modulated inverter used at the load side which gives a high quality voltage at the output. Fig.1 shows the circuit diagram of proposed wind energy conversion system.

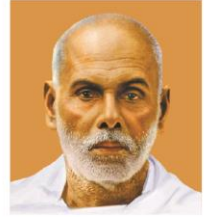
A. Wavelet Modulation Scheme [12]

Wavelet modulation is a sampling based technique can be done by creating two time instants at first. These time instants are boundaries of rectangular pulses and these are interpolated into rectangular pulses in the second step. The sampling instant

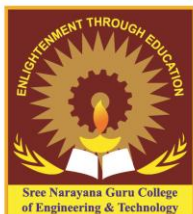


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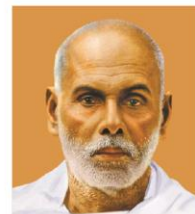


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