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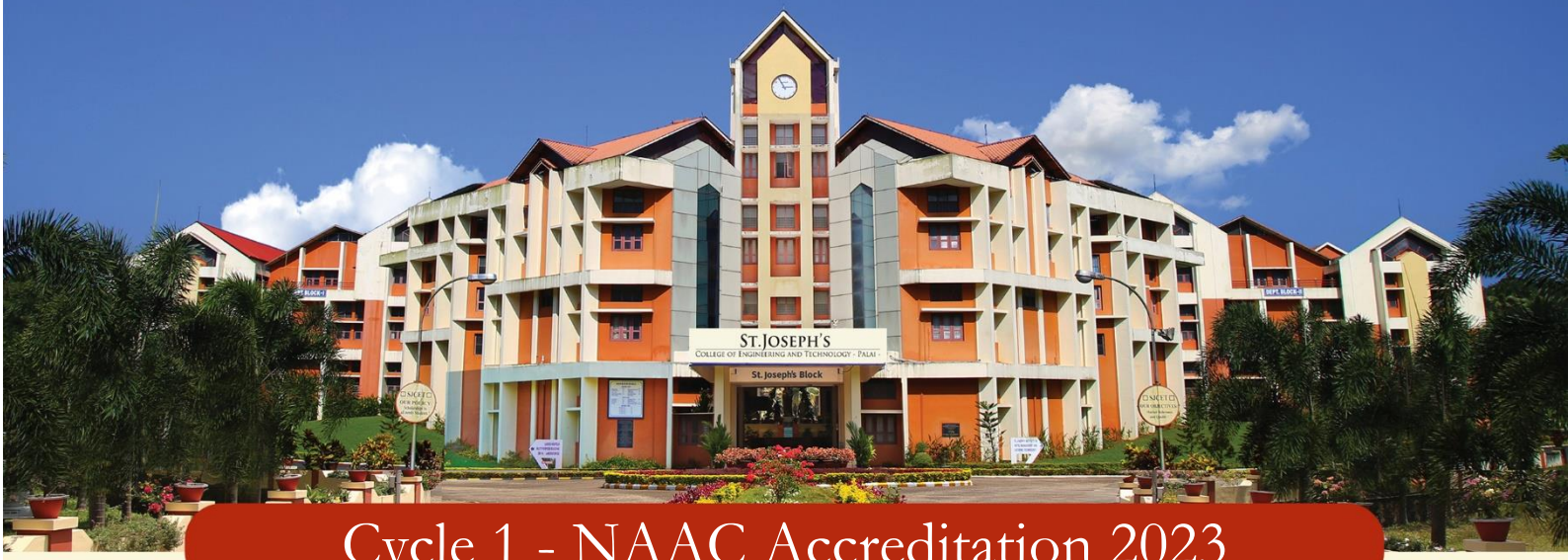

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A STATE-OF-ART-OF REVIEW ON CASTELLATED BEAM

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Abstract - *The researchers were merely looking for the most efficient way to reduce the usage of steel. Castellated beam is an I beam subjected to a longitudinal cut along the web in different patterns. It is considered as a best innovation of steel beam as it is laid to increase the section's depth to induce an increase in the moment of inertia and the section modulus without the slightest increase in the element weigh. It also have superior strength, weight ratio, and aesthetic appeal. Hexagonal opening is considered to be the best web opening provided. Through web openings on the Castellated Steel Beam (CSB) service pipes, electrical wires, and ventilation ducts could pass through buildings and thereby reduce their floor height.*

This paper aims to study all the features of castellated beam to introduce a strengthening method by encasing castellated beam in concrete with lacing. The optimization study on the different parameters like size, angle, shape and loading of the castellated beam were performed using FEA. All the studies concluded that the introduction of castellated beam can increase the strength of the structure.

Keywords: **Castellated beam, I section, strength, optimization, Vierendeel Mechanism, stress.**

1. INTRODUCTION

"Castellated beam" is commonly used as a type of expanded beam. It is prepared by expanding a standard rolled shape into a regular pattern of holes in the web. As the word means "built like a castle, having battlements, or regular holes are made in the walls, like a castle". It is made by separating a standard rolled shape into two halves by cutting the web in a regular pattern. The pattern of holes in the web presents an attractive appearance for beams exposed to view. The web holes are becoming ever more functional with the increase of piping, conduits and ductwork in modern construction. The greatest advantage, however, is the economy effected by the increased load carrying capacity and stiffness.

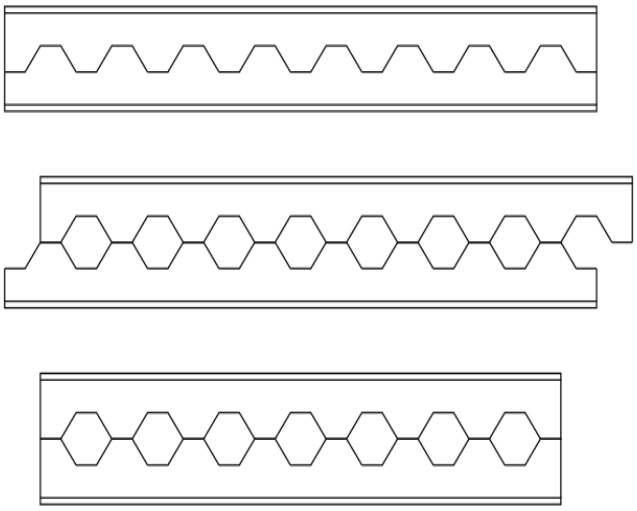

Fig 1: Castellated Beam

Use of steel is gaining greater advantage in the construction industry due to its high strength and ductility. Thus the development of castellated beam has wider advantages over conventional beam. Castellated beam is developed from conventional hot rolled steel beam, by cutting into specific pattern on the web of the WF steel beam profile into 2 pieces, which will later be shifted and welded into one unit, so that it can increase almost 50% of the original profile height. The various advantages includes the beam after creation of holes increases the height of the I section. It creates a T section above and below the opening as shown in (fig.2). Increases the capacity and stiffness of the beam. It provides various applications for the construction techniques.

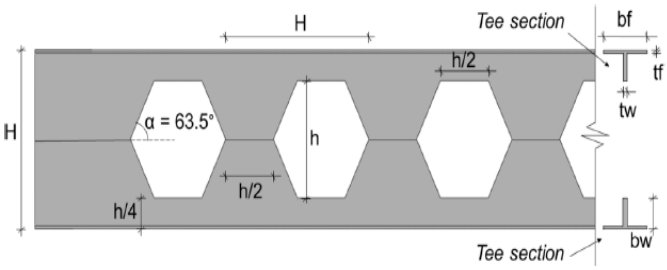

Fig. 2: Tee- section

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A REVIEW ON BEHAVIOR OF CONTINUOUS RC BEAMS HAVING WEB OPENINGS STRENGTHENED WITH FRP

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Abstract - *In recent studies, web opening are small openings which is constructed with continuous reinforced concrete beams (RC) to accommodate utility piping and cables. A web opening reduces the strength and stiffness of the RC beams. To ensure the safety of beams, strengthening system were provided around the web openings. This paper investigates the possibilities of strengthening continuous RC beams having web openings with Fiber Reinforced Polymer (FRP) sheets and they were performed using Finite Element Method. FRP have corrosion resistance, lightweight, and high strength. The use of FRP sheets as external reinforcement leads to improve both the capacity and ductility of the beams. FRP composites not only possess superior mechanical properties, but also easy to install, and maintain. Some Fiber Reinforced polymer types can also used to strengthening the beams having web openings such us Carbon Fibre Reinforced Polymer (CFRP), Glass Fibre Reinforced Polymer (GFRP), Aramid Fibre Reinforced Polymer (AFRP). From all the studies, we can concluded that continuous RC beams having web openings were strengthened using Fiber Reinforced Polymers and improvement of capacity and ductility of beams were takes place.*

***Key Words*: Web opening, FRP, Strengthening, Continuous RC beams, CFRP**

1. INTRODUCTION

For the passage of utility pipes and ducts in new reinforced concrete (RC) structures, web openings in beams have been widely used. Using web openings allows to avoid additional storey heights for ducts and pipes, thereby reducing the overall building height. Web opening tends to reduction of the strength and stiffness of the beam. By the use of FRP composites as external reinforcement lead to improved structural performance and improve both the ultimate capacity and ductility of the beam. The FRP is unidirectional and the FRP material was modeled using a linear elastic isotropic failure after reaching its ultimate tensile strength. Fig 1 shows the web opening in beam and Fig 2 shows the FRP wrapping [1]. Reinforced concrete structures are strengthened by using fiber reinforced polymer (FRP) sheets. FRP have a good non- corrosive characteristics and the advantage of FRP reinforcement are good strength-to-weight ratio, good fatigue resistance etc. FRP sheets helps to prevent the crack around opening. FRP sheets are traditional methods for strengthening the beam [2].

Fig -1: Web opening in beam

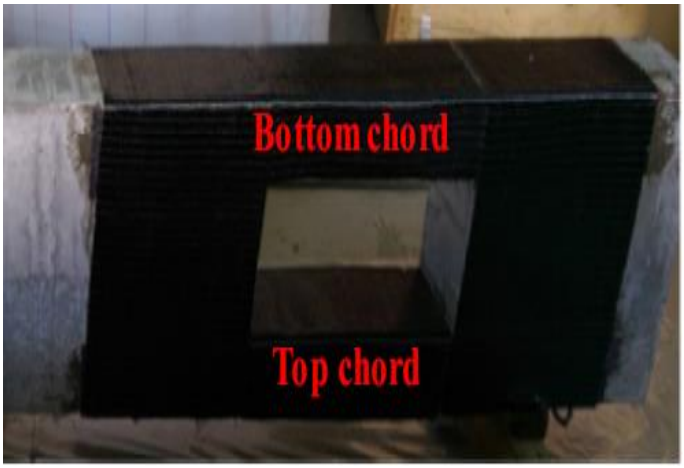

Fig -2: FRP wrapping

2. MATERIAL PROPERTIES

The concrete damage plasticity models (CDPM) were used to modeling concrete element. In compression and tension , CDPM simulate both the elastic and plastic properties of concrete. In tension and compression, the steel reinforcement acts as elastic-perfectly plastic material [1]. Steel reinforcements and stirrups are developed using bilinear isotropic material. Yield stress fy and the ultimate stress fu are shown in table 1. [9] .

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CONCRETE-ENCASED CFST BEAM-COLUMN JOINTS: A REVIEW

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Abstract - *Beam- column joints are the most seismically affected element in a framed structure, hence seismic performance of joint is of great importance for overall structural safety. In order to make appropriate design decisions for joints, it is necessary to know how joints behave.*

Concrete-encased concrete-filled steel tubular (CFST) beam-column joints consist of CFST inside and reinforced concrete outside. Several investigations have been conducted on joints with steel beams and RC columns and with steel beams and CFST columns. This paper reviews the present state of knowledge of properties and performance of concrete-encased CFST beam-column joints.

Key Words: Beam-column joints, CFST, seismic performance.

1. INTRODUCTION

Earthquakes are violent tremors in the earth's crust that generate shock waves in all directions from its point of origin which is caused by a sudden release of energy in the earth's crust that causes seismic waves. The intersections of beams and columns at reinforced concrete structures are called beam-column joints. Beam-column joints are the most seismically affected element in a framed structure, hence seismic performance of joint is of great importance for overall structural safety. The connection between beam and column in a frame structure is most likely to sustain damage during a seismic disaster. In order to make necessary design decisions for joints, you need to know how joints behave.

A composite member is a structural member made up of two or more materials having dissimilar properties. [6] As they are made of multiple materials, they exhibit properties of both and have superior properties to the individual ones. One of the most popularly used composite members in the structural engineering industry is steel-concrete composite. As we all know concrete is good in taking compressive load and weak in taking tensile load. Also, steel is strong in tension loading. By combining both, it utilizes concrete's compressive strength and steel's resistance to tension and making it more efficient in construction. Concrete-filled steel tubular structures are one among these types of concrete-steel composite.

Concrete-filled steel tubular (CFST) structures have great structural benefits, including increased strength and resistance to fire attack, high ductility and energy absorption. In some recent buildings, concrete-encased steel-tube columns (CFST) have been used to connect with reinforced concrete (RC) or steel beams. The concrete-encased concrete-filled steel tubular (CFST) beam-column joint is made up of core CFST and reinforced concrete (RC) outside. As the composite column is more fire-resistant and structurally durable than a typical CFST one due to the outer RC part. Fig 1 shows typical cross section of concrete-encased CFST columns. Concrete-encased CFST beam-column joints are stronger, more ductile, and can carry more weight than ordinary RC beam-column joints due to the performance of their embedded steel tube. Moreover, the composite joints demonstrated favourable seismic behaviour and could be used in earthquake-prone areas. Concrete-encased concrete-filled steel tubular (CFST) beam-column joints consist of CFST inside and reinforced concrete outside. This method has certain advantages over conventional reinforced concrete (RC) columns, such as higher ductility due to the contribution of the CFST, and faster construction speed because the CFST can be constructed first to carry the entire construction load by itself and concrete and reinforcing bars for the outer walls can be poured or installed later.

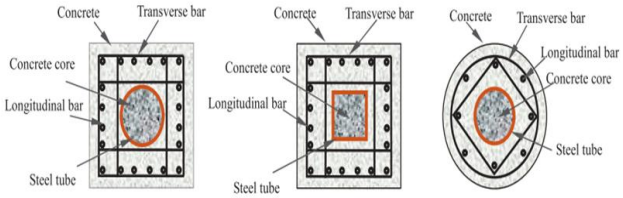

Fig-1: Commonly used cross sections of concrete-encased CFST columns.

2. COMPONENT BEHAVIOUR OF CFST

The widespread application of concrete-filled steel tubes in engineering has led to large-diameter steel tube columns being used in the ground floors of high-rise and super high-rise buildings. By decreasing the cross-sectional dimensions of the upper columns as the number of floors increases, the dead weight of the structure will be reduced and engineering costs will be saved. The column connections where the cross-sectional sizes change become the crucial area that affects the seismic performance of the whole structure. Typical sections of steel used for CFST for filling concrete are circular hollow section (CHS), a square hollow section (SHS) or a rectangular hollow section (RHS). It is found that circular cross sections provide the strongest locked up to the core concrete, whereas

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A REVIEW ON CONCRETE FILLED DOUBLE SKIN STEEL TUBULAR COLUMNS

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Abstract – *Concrete-filled double-skin steel tubular (CFDST) Columns considered as a new type of Concrete Filled Steel Tubular (CFST) Columns. It consists of an inner and outer steel tube with the annulus between the skins filled with concrete. The concrete is properly compacted and filled in between the steel surfaces. CFDST are high performance composite columns that are increasingly being used in bridges and high-rise buildings as well as to reinforce CFST columns. CFDST has many advantages over CFST such as improved stability, section modulus, lighter weight and better damping characteristics. The inner tube increases their strength and ductility as compared to CFST. It is important to control the inner tube thickness to prevent the premature failure. The outer tube wall thickness increases the performance of the column therefore it reduces the susceptibility of the square tube to local buckling.*

The hollow steel tubes can be chosen with any type of cross section, commonly circular and square tubes are preferred. This paper investigates the characteristics of square Concrete-filled double-skin steel tubular (CFDST) columns with circular steel tubes in the interior. Non-linear FE analysis is performed in this paper on CFDST columns with SHS outer and CHS inner tubes under axial compression.

Key Words: **Concrete Filled Double Skin Tubes, CFDST Square Columns, Axial compression, Hollow Ratio.**

1. INTRODUCTION

The concept of CFDST has developed from the use of hollow steel tubes and they were firstly used in offshore and inland construction. Concrete- filled double- skin steel tubular column is a composite construction in which two hollow steel tubes are concentrically positioned and the annulus between each tube is filled with concrete. Due to the presence of inner steel tube, it increase strength-to-weight ratio, bending stiffness, ductility, and seismic performance of the column[1].The inner steel tubes eliminate the use of external formwork during the process of concreting. When it is compared to reinforced concrete and bare steel the strong mechanical characteristics of CFST reduces the cross sectional size of the column [2]. The choice of the cross section and geometry is depending upon the requirements such as the structural efficiency of the column, aesthetic criteria ,material availability, cost and method of construction . Commonly square and circular are preferred. Fig 1 shows different configuration of CFDST column.

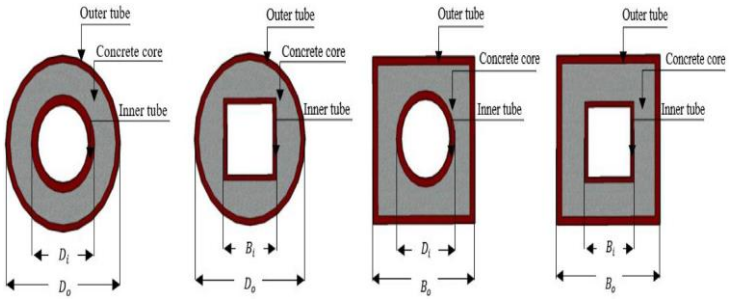

Fig-1: Different configuration of CFDST column

CFDST columns widely used in the construction of high-rise buildings, factories and bridges over past times. There have been several investigations are conducted on CFDST columns to understand the strength and behavior of CFDST columns. As a result of these studies found that double skin tubes have an improved ductility and strength due to the "composite action" between the steel tubes and sandwiched concrete.

2. STRENGTH OF CFDST COLUMN

A Series of test were conducted on concrete-filled double skin steel tubes (CFDST) columns under long-term sustained loads. The test was conducted by 2 stages , ie. Long-term service test and ultimate strength test. In the study there are six specimens such as two circular CFDST specimens, two square CFDST specimens and two reference conventional CFST specimens under concentrically long-term sustained loads. Also for comparing prepares ten CFDST and CFST reference specimens were tested. The test is conducted to measure the ultimate loads without long-term sustained loadings. It reduces the ultimate strength of the CFDST column and improves its deformation [3]. The structural characteristics of short CFDST columns under compression with circular inner and outer steel tubes with the use of finite element modeling. Due to the confinement provided by the steel tubes, circular concrete-filled double-skin tubular columns (CFDST) greatly increases the displacement ductility and peak strength of sandwiched concrete [4] . Tests was conducted on concrete filled double- skin steel tube (CFDST) under axially partial compression. Test were conducted on fourteen specimens with outer and inner steel tubes of circular hollow section (CHS) and fifteen specimens

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A REVIEW ON HONEYCOMB SANDWICH STRUCTURES AND HYBRID STRUCTURES

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Abstract - A honeycomb structure is a natural or manmade structures with the geometry of a honeycomb which allow minimal use of material to achieve a reasonable weight and cost. The honeycomb structure which is inspired by bees, is widely used in variety of fields like architecture, transportation, mechanical engineering, chemical engineering, nanotechnology, and more recently in biomedicine. In a honeycomb sandwich structure there were two face plates and in between them the core should be placed and it looks like a sandwich. In this study different analysis like buckling analysis, bending analysis, and dynamic analysis are to be done in the corrugated sandwich structures and hybrid structures. By this study we can predict the behaviour of honeycomb structure and hybrid structure and also a comparative study is done between the in-plane and out of-plane compression.

Key Words: **Honeycomb structures , Hybrid structures, Corrugated sandwich structures,**

1.INTRODUCTION

A honey comb core sandwich panel is constructed by adhering two highly rigid thin-face sheets with a low-density honeycomb core, which has less strength and stiffness[5]. The face sheets are of typically thin composite laminates like steel plates, aluminium, glass, carbon or aramid and the honey comb core is made mostly by aluminium. In this between the two face sheets the honeycomb core is placed like a sandwich shape. It is mainly used to achieve high stiffness-to-weight and strength-to-weight ratios A higher thickness of the face sheet affects the frequency of sandwich panels in a complicated way, since it increases exponentially for the first three values of thickness before coinciding to a fixed frequency for a higher value of thickness[1]. An important study is to be done for the dynamic response of the composite honeycomb structures subjected blast loads. According to the traditional honeycombs the auxetic honeycomb sandwich plate, which has meta material property, have better vibration absorptions[7]. In the honeycomb sandwich structure by varying the core the thickness and material of the face sheet, it is possible to obtain various properties and desired performance[5][12] . Several types of core shapes and core material have been applied to the construction of sandwich structures [1] [2]. The basic principle of honeycomb sandwich structure is that the core carries the shear stresses and the face plate carries bending stresses[8]. There were many applications of engineering structure included the using of composite and sandwich structure as beam, plate and shell are used in a mechanical engineering field from many researchers. Where, the papers presented investigations of its application by various techniques as experimental, numerical (by using finite element method) and analytical solution of problem (by derive and solution of general equation of structure) and showed the effect of reinforcement types and volume fraction, in addition to, showing the effect of sandwich honeycomb size[15]. In this study the modelling of corrugated sandwich structure and hybrid structure (I strut + honeycomb , Corrugated + honeycomb) are to be modelled and analyzed. The modal testing and analysis of a honeycomb sandwich plate can be done and on the results, a FEM updation is done so as to efficiently estimate the accurate equivalent properties of the honeycomb core[2]. Due to the use of hybrid structures it give comprehensive thermal and mechanical advantages and also have high strength and specific energy absorption[13]. In addition, the presence of the honeycomb core has a significant contribution on the ballistic impact response of the sandwich structure by reducing the residual velocity, kinetic energy and damage area [9].

1.1 Honeycomb Sandwich Structures

The honeycomb sandwich structures are structures which are in the shape of a sandwich which consist of two face sheets and in between the sheets there were a honeycomb core. One type of honeycomb sandwich structure consist of three components like glass fibre UD, carbon fibre UD and Aluminium 5052 [1] [20]. Metal and non metal materials are used as the upper and lower sheet plate and the honeycomb sandwich structure can be made from various type of materials like metal, ceramic and composite materials etc. [4]. At the present time the sandwich structure is made of two rigid metallic thin face sheets and also with a low density soft core. For the manufacturing of honeycomb core there are of five basic ways they are adhesive bonding, resistance welding, brazing, diffusion bonding and thermal fusion.Among these methods, most common manufacturing method is adhesive bonding. Resistance welding, brazing and diffusion bonding are only used for cores to be used at very high temperatures. There are two basic methods of manufacturing honeycomb core by adhesive bonding.

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COLD FORMED CORRUGATED STEEL PLATE SHEAR WALL: A REVIEW

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Abstract - *Shear walls are used in high rise framed structures to resist monotonic load in high rise framed structures. Here this study focuses on cold formed steel plate shear wall with different corrugations such as trapezoidal and rectangular. These two types that is corrugated steel plate shear wall and simple steel plate shear wall construction method is widely used to resist the lateral forces. Steel plate shear wall have large initial stiffness, high level of energy absorption and ability to openings. Here conducted a rare approach of analysis that is analysis of corrugated steel plate shear wall with openings. Parametric study includes plate thickness, angle of corrugation, opening size, and effect of dimensions. On completing this project, a detailed comparative study on seismic analysis of cold formed corrugated steel plate shear wall and simple steel plate shear wall can be determined.*

Key Words: *Steel plate shear wall, Corrugated steel plate shear walls, seismic analysis*

1.INTRODUCTION

[1] Shear walls are the most important structural component in construction. When compared with other lateral force resisting structures, steel plate shear wall has high stiffness, energy absorption capacity and attractive stiffness and when compared to standard reinforced concrete shear wall, steel plate shear wall have better ductility and superior seismic stability, light weight and also reusable.

Due to lack of knowledge about the response of corrugated steel plate shear wall, elastic and inelastic behaviour, and design requirements of corrugated steel plate shear walls construction industry was stuck on the standard shear walls and later a new construction based on the steel plate shear wall is made that is corrugated steel plate shear wall. Corrugated steel plates have the same properties of flat steel plates, in addition to their superior in-plane stiffness and out-of-plane stiffness[2].

Fig -1: Cold formed steel

Today cold formed steels are getting popularized all over the world because it introduces a better solution to demand for low-cost high-performance houses. Cold formed members are produced by cold rolling, pressing, bending steel sheets and stamping. Cold rolling process helps to provide lightness of systems, high quality of final products, helps to limit the production environment and flexibility[3]. and [4] also cold formed structures are more beneficial under seismic actions. channels like simple, hat, zeds are mainly used in roofs and walls and other residential applications and now these sections are commonly used in portal frames and floor systems. By using more complex stiffeners, more different shapes are being constructed if the sections become thinner in greater strength [5].Different experiments have been conducted on thin Steel plate shear wall. Steel Plate Shear Walls (SPSWs) have high stiffness, excellent energy absorption capacity and attractive stiffness when compared with other lateral force resistance structures. In areas with significant earthquakes, Steel Plate Shear Walls (SPSW) are known to be effective monotonic load resistance systems [6]. In comparison with the standard reinforced concrete shear wall, the SPSW has better ductility, superior seismic stability, light weight, and high construction quality, as well as quick repair, fast demolition, and reusability.

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Nonlinear Buckling Analysis of Stiffened Plate: A Review

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Abstract - Stiffened *plates are used as load bearing components in marine structures. Stiffeners are used in order to attain the economical design of plate instead of increasing the thickness of plate. They are used to avoid the usage of thick plates which produces high weight for the structures. The stiffeners are usually used in hull of a ship, deck of offshore platforms, in all main bridge beams etc. The factors which affect the behavior of stiffened plates are the geometry of plate, stiffener slenderness and its spacing and yield stress of material. The behavior of stiffened plates are also being affected by factors like initial deformation, residual stress, boundary conditions and type of loading. The failure modes of plates include plate buckling, tripping of the stiffener and Euler buckling. The stiffeners enhance the rigidity of the base structures by increasing the moment of inertia. A parametric study on ultimate strength of stiffened composite plate has not been conducted in the reviews read.*

Key Words: Stiffened plate; stiffeners; buckling; tripping; residual stress.

1.INTRODUCTION

Stiffeners are defined as the secondary plates or sections which are usually attached to web of beam or flange of beam, and they are used to stiffen the beam against the out of plane deformations. In many of the engineering structures, the stiffened plate is used as the major structural component. Stiffened plate is usually used in many engineering branches like aerospace engineering, automotive engineering, shipbuilding etc. They are used as main component in wings, truck boxes, bottom plate of ship etc. These structures are usually subjected to in-plane biaxial and shear loading. Stiffeners are economical and they have enough strength and therefore it helps to improve the strength / weight ratio and it also decreases the cost of structure. The stiffeners are positioned in such a way that it prevents the global buckling mode. The buckling strength analysis of stiffened plate subjected to in-plane loading is an important aspect in structural design and analysis. Stiffened plates are usually economical, efficient and aesthetic. The dead load can be minimized in a stiffened plate and the strength performance can be improved under various loading conditions. The stiffened members have good load carrying capacity with a small additional weight penalty. The smeared or discrete stiffener approaches can be used for the analysis of stiffened plate. The smeared approach can be used for larger stiffeners and widely spaced stiffeners. The discrete approach is used for sparsely spaced stiffeners of any size.

2. TYPES OF STIFFENED PLATE

The stiffened plate can be of two types: regular stiffened and arbitrarily stiffened. The regular stiffened plate is subjected to uniaxial stress and arbitrarily stiffened plate is subjected to the biaxial stress.

2.1 REGULAR STIFFENED PLATE

Liu and Wang [9] stated that a uniaxial stress refers to a stress which acts in one direction only. When a specimen is subjected to uniaxial loading, the force acts over the cross-sectional area and it generates a tensile stress and strain within the material. Whereas the biaxial stress refers to a two-dimensional state of stress and there only two normal stresses are present. A regular stiffened plate has its stiffeners on vertical or horizontal position. While in the case of the arbitrarily stiffened, the stiffeners are placed in inclined position. The arbitrarily stiffened plate provides a better buckling performance when compared to the regular stiffened plate as it resists the biaxial loadings. Therefore, the analytical analysis of arbitrarily stiffened plate is more complicated when compared to the regular stiffened plate.

Soares & Gordo [3] conducted several numerical studies and experiments for the performance of stiffened panels under the uniaxial compressive loadings. Throughout the design process, the probability of tripping of stiffener was also considered. They concluded that plate strength calculations must be done properly because it creates a huge impact on the strength of column. The results shows that there is a possibility of overall column type of failure. This failure usually occurs in uniaxially stiffened panels.

2.2 ARBITRARILY STIFFENED PLATE

When arbitrarily stiffened plate is compared to the regular stiffened plate, the arbitrarily stiffened plate provides better buckling performance. It provides better buckling performance by resisting the biaxial loadings. The regular

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Literature review on FRP wrapping over structural components

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Abstract – *Most of the researchers use FRP to strengthen and retrofit structural components. Fiber reinforced polymer is a composite, in which the matrix is a polymer and the fibers used for reinforcement are aramid fiber, carbon fiber, glass fiber, and basalt fiber. In which external wrapping of FRP on structural components has become a popular practice. Among these, AFRP (aramid fiber reinforced polymer) has the highest tensile strength, but it is not widely used in industries. Because AFRP has a cost, it is more than basalt and glass fiber. Using FRP for external strengthening does not change the buckling shape of steel tubular structures. It can effectively delay local buckling, prevent outward buckling, and also delay overall buckling.*

Key Words: Fiber reinforced polymer, Aramid, Steel structures, Wrapping, Strength.

1.INTRODUCTION

Several studies were conducted to determine the behavior of FRP - strengthened steel structures, subjected to static axial compression loading, and therefore the results are well documented in several analysis articles [5]. New developments in polymer technology have introduced new things like fibers and fiber reinforced polymers (FRP) to strengthen and improve the overall behavior of concrete structures [11]. Synthetic fiber reinforced compound (FRP) has been widely utilized in building construction, due to its high durability and low weight [8]. Retrofitting structures from natural calamities like floods, fire, and sensitive earthquakes has become a necessary construction activity for both concrete and steel structures. So, the introduction of FRP material is a great advantage for structural components. Previous experimental studies in this field demonstrated a significant positive impact on the retrofitting of structures using fiber reinforced polymers (FRPs) [7].

1.1 FRP

A fiber-reinforced polymer (FRP) is a chemical component. It consists of a matrix and fiber. It is usually used in industries like construction, transport, and marine to make structures resistant to deformation. Furthermore, it also improves the strength, safety, durability and reduces the formation of cracks. A skilled person will be needed for the installation process. Installation of FRP includes the following procedures, like site preparation, in which wet surfaces should be avoided because they cause the formation of bubbles. The next step is surface preparation. The surface should be cleaned and roughened to ensure the bond between resin and FRP. After that epoxy is applied on the surface and then FRP sheet is installed. There are various types of wrapping styles in the external bonding of FRP. They are fully wrapped in style, with strip type wrapping at various angles like 0°, 45°, 90°, and U- wrapping style.

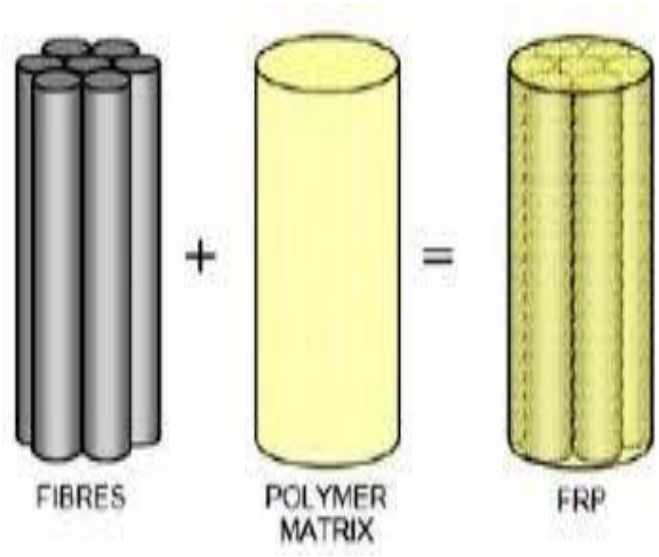

Fig -1: FRP (Fiber-reinforced polymer)

Some advantages of using FRP are

- It is lightweight, so the dead load will not increase.
- Corrosion-resistant
- High impact strength
- Electrical insulation
- Easy installation
- Low operating expenses
- Durable
- Low cost
- Waterproof

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Review on Web Crippling Capacity of Cold Formed Steel Sections

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Abstract -*Cold formed steel constructions are common in nowadays due to its benefits including light weight, faster construction and high strength. Major cold formed steel sections used construction activities include channel sections, perforated channel sections, SupaCee sections, Lite steel beam sections etc. However due to the limited thickness of CFS section, they are vulnerable to web crippling. Web crippling is a localized failure occurs when concentrated loads are acting on the section. This paper aims to provide a review in detail about the web crippling capacity analysis for different CFS channel sections along with experimental and FEM modeling of the sections and also describes the major parameters which affect the web crippling capacity of sections.*

Key Words: Cold Formed Steel, Web Crippling Capacity

1. INTRODUCTION

Cold formed steel is more popular than hot rolled steel due to its faster construction, light weight etc. Use of these CFS steel can lead to material savings because of having high strength to weight ratio. Nowadays these CFS section can be used in purlins, floor joists, prefabrication floor and wall panels, trusses and in steel racks. The CFS sections are usually designed as slender members because of having high width to thickness ratio. While subjecting to reaction forces or loading forces the section may get failed due to their limited thickness. The failures include web crippling failure and bending of the sections. Among these web crippling failures are common in which a localized failure occurs when the section is subjected to concentrated loads.

Fig -1: Cold Formed Steel Structures

2. WEB CRIPPLING

Gatheeshkar et al. [5] from his study define web crippling is a localized bearing failure occurs when cold formed steel beams are subjected to concentrated loads. Three main classification of cold formed steel section includes:

1) Single Web
2) Multi Web
3) I Sections

Depending on the load cases and failure locations web crippling failure of cold formed sections with a single web is classified into four types

1) ETF (End Two Flange),
2) ITF (Interior Two Flange Loading),
3) EOF (End One Flange) and
4) IOF (Interior Two Flange Loading).

Janarthanan et al. [8] stated that if failure occurs within 1.5 d_1(where d_1 is the depth of flat portion of web element) from the specimen edge then the load case is termed as end loading and if failure occurs at a distance more than $1.5d_1$ then it is termed as interior loading case. Web crippling strength for a section with lower thickness is lower for ETF load cases than other three cases. Web crippling capacity of section mainly depends on factors including shear area under bearing plate, inter laminar shear strength and shear stress distribution.

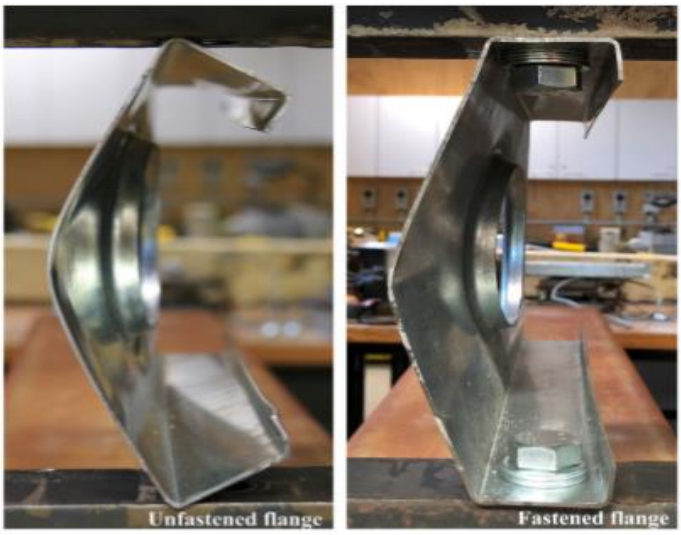

Fig -2: Web Crippling Failure

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A Review on Offshore Wind Turbine Foundations

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Abstract – *wind power are fastest-growing popular, sustainable and renewable energy resource that has lesser shock on the surroundings than burning conventional fuels. Offshore winds are clean and sustainable renewable energy resource with great latent value for the energy trade in the circumstance of a low carbon world. The rapid expansion of offshore wind power depends on a excellent understanding of the practical issues associated with offshore wind turbines, which drive current investigate and improvement programs. The foundation of an offshore wind turbine is one of the most challenging tasks in the design of an offshore wind turbine. This article provides an indication of the types of offshore wind turbine foundation, important design consideration, effect of vertical and horizontal loads etc.*

Key Words: **Wind Power, Renewable Energy, Offshore Wind Turbines, Offshore Wind Turbine Foundation, Design Consideration**

1.INTRODUCTION

Renewable energy source has become increasingly important over recent years as a means of achieving international goal for reduced greenhouse gas emissions while ensuring energy security. Sun is the primary source of renewable energy and wind is a secondary source of renewable energy dependent on the sun. The wind velocity is influence by topographical features and revolution of the earth. Bhattacharya et.al [6] studied that Offshore wind farms are consider most reliable energy source due to some reasons:

(1) The average wind speed is higher in offshore and it is consistent throughout the year

(2) Offshore wind turbine have minimum vibration impact and noise impact on human compare with onshore wind turbine

(3) By use of hybrid systems current and wave energies can be harvest along with wind farms.

Offshore wind farms are popular in United Kingdom, Europe and Germany. The world's first seaward wind farm was built in Denmark. Offshore wind farm industry is expected to grow over the next decades. The future scope of offshore wind farms are wide by considering the lower airstream shear, higher energy density, lower instability, and low civil complaints contrast with inland wind farms. Total cumulative capacity in the offshore wind energy turbine (OWETs) was to 35.3 GW in 2020. United Kingdom is world leader in offshore wind power harvesting and currently generating approximately 3GW. Figure 1 indicates the gradual development and installations of offshore and onshore wind energies between 2011-2020.

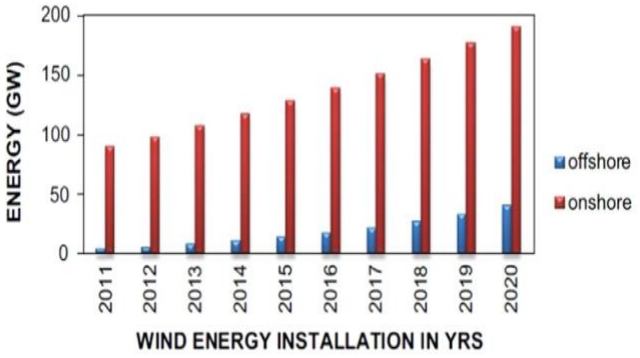

Fig -1: Wind Energy Installations [7]

2. TYPES OF FOUNDATIONS

Bhattacharya et.al [6] studied that foundations are the most crucial segment of the structure, So the design and stability of foundation determine economic viability of a project. Typically the investment in foundation account for 25% - 34% of the total cost of the project. The selection of suitable foundation is depending up on seabed conditions, weather conditions and environmental conditions. Offshore wind turbine foundations are broadly classified into two ie. Grounded system and Floating .

2.1 Grounded System Foundation

In this system the foundation is anchored or fixed in to seabed. The grounded system can be further divided into follows:

Bhattacharya et.al [6] studied the design of gravity based foundation is help to avoid overturning moment or uplift and the design of foundation is according with their self weight. In gravity based foundation there is no tensile load is conceder between seabed and substructure. The self weight of the groundwork will provide stability and also resist overturning moments. Figure 2(b) shows gravity based foundation for water depths less than 30m.

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Cost Forecasting of Construction Materials: A review

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Abstract - *Large-scale building projects are increasing day by day and because of that their construction costs become a matter of great concern, especially because of their lengthy construction periods. In particular, recent fluctuations of construction material prices have fueled problems like cost forecasting. This paper reviews the incorporation of artificial neural network for predicting the future cost construction materials. The main benefit of this study is providing construction stakeholders with a very reliable tool for expecting prices of coming projects, especially with the existing Rates of Inflation.*

Key Words: Future cost, construction, materials, artificial networks.

1.INTRODUCTION

Large scale construction projects have recently increased in number of residential, commercial and government facilities worldwide. A lot of high rise buildings are being constructed or planned as urban land marks. The construction costs are dynamic. Prices of different materials, human resources, and other costs varies continuously. This economic uncertainty could have a major impact on the business especially on long term and mega projects. There are many traditional methods for predicting future construction costs in India. A forecasting method based on Artificial neural networks would be a great benefit for contractors, project owners etc.

1.1 5D BIM

For a construction project perspective three phases can be classified such as the pre-construction, the construction and the maintenance and operation phases.5D BIM adds to the third and fourth dimensions with the ability to link costing information to the digital model and the project schedules to allow for better cost management. BEXEL Manager is software that integrates the most important 3D/4D/5D uses of BIM technology changing the perspective of integrated project management and allowing you to optimize your digital workflows and take advantage of advanced open BIM technologies.

1.2 Possibility of Artificial Intelligence

In India traditional methods are followed to forecast the prices of construction materials. But in foreign countries several methods incorporating Artificial Intelligence are widely used to forecast the construction material prices. By incorporating artificial intelligence much more accuracy can be achieved and the values will have more accuracy compared to the ordinary methods of forecasting. Prediction using Artificial intelligence is a faster method and it has world wide recognition. If such methods are used in India, greater accuracy can be achieved and it will be very helpful for the contractors, project owners etc. in evaluating ,pricing and bidding construction projects.

2. COST FORECASTING METHODS

Different approaches have been analyzed to determine the best fitting model for forecasting construction costs. These several methods are analyzed here. They are mainly Vector error-correction model, Time series models like Automated time series cost forecasting system, Interrupted time series forecasting model,5D BIM and Artificial Neural Network approach. They are discussed below.

2.1 Vector Error -Correction model

Forecasting the short and long-term movement of construction material prices can be advantageous to various project stakeholders. By improving accuracy of their cost forecasts, contractors can avoid bidding or profit losses. In 2015 Shanhandashti and Ashuri used VEC models for forecasting construction material prices. Commonly used univariate and multivariate time series models, such as Box Jenkis and VAR models can be used to produce short-term material price forecasts. Cointegration, an econometric property of the time series variables,is generally used to characterize the long term relationships between non-stationary variables. In cases where two or more time series are cointegrated, VEC models can be used to develop short and long term forecasts. VEC model development includes different steps. First one is to identify candidate explanatory variables and collect corresponding data. Time series

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BOLTING MECHANISM OF ONE-SIDED BOLTED CONNECTION IN PREFABRICATED STEEL STRUCTURE

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Abstract- *Steel bolted connections are common connection technique that we used in mechanical engineering, but these types of fasteners also play a inevitable role in civil engineering sector. Bolting steel section is desirable because of the easiness of its erection and durability of the joint. However, bolting an Standard High-strength Bolted on Hollow Structural Section (HSS) is herculean task, since there is no access from inside. So, in order to make simpler the bolted connection, we can opt a One-side Bolted Connection instead of conventional hexagonal head bolted connection. Alternatively, Hollo-bolt, Slip-critical Blind Bolt, Thread-fixed One-side Bolt, T-shaped One-side Bolt, T-headed square neck one side bolt, BOM Fastener, Ajax One-side are other kind of fasteners that shows almost similar properties of normal hexagonal headed bolt connection. This paper emphasis with a review regarding various one-sided bolt and the importance of preload force on bolts.*

1. INTRODUCTION

Prefabricated steel framed structures consist of many merits over conventional on-site built structures, including faster construction, reduced pollution, and greater quality control. The usage of prefabricated modular steel buildings aids in the buildup of industrialization in construction [1]. Prefabricated modular steel structures are now used mostly in low-rise buildings; their applicability in high-rise and multi-story buildings is still undergoing boundless research and development. There pose distinguishable researches in vibrational analysis of prefabricated modular steel structures for high-rise and multi-story buildings. The stability and load-carrying capacity of a structure can directly influenced by the performance of beam-to-column and beam-to-beam connections. These prefabricated steel sections are generally connected through welding or bolting. By the situation of applications, the type of fasteners will change and both poses some demerits too. Although both kinds of bolted connections were consisting of high rotational stiffness and load-carrying capacities, welding quality is susceptible to environmental and human influences, and welding process will lead to formation of significant stress concentrations [2,3].

Bolted connections are mostly used fasteners in prefabricated steel framed structural due its flexibility of assembly and disassembly sections. The connections considered as the weakest point in the steel framed structures. In many cases, bolted connection can be responsible for determining the overall durability and safety of the whole structure. A normal bolted connection emphasis with a threaded fastener, a nut, washer and other parts that would be used for clamping the bolt. Preloading of bolt is a process of applying pretension force on the bolt, in order to transfer various loads through the clamping action of bolted connection. The vibration of connections plays an inevitable role that can influenced the stability of entire structure. So, beyond the textbook knowledge, we have to think about more, regarding the effectiveness of the connection from seismic conditions. Connections with extra energy dissipation elements [4,5] and the self-centering connections that reduce severe earthquake displacement and overturning.

The reliability of normal bolted connection is mainly determined by both the initial preload level and rate of decay of clamp load over the life of the joint, which is signified by the residual amount of the clamp load. Hundreds of variables affect the preload level and its rate of decay; these variables are mostly related to material properties of the various components, design and analysis methods, fabrication, surface treatment, tolerances, assembly tools, and process control [6].

Table-1: Bolt pretension force values [21]

Bolt grade	Designed bolt pretension force (kN)
M20 Bolt	155
M24 Bolt	225

On the basis of property class, bolts are graded as 4.6, 4.8, 5.8, 8.8, 9.8, 10.9,12.9. Among this 4.6 to 5.8 grade bolts are categorised as bearing type bolts and the remaining bolts are distinguished as High Strength Friction Grip Bolt (HSFG). The values represent the ultimate and yield strength of bolt. The bearing action between bolt shank and bolt hole establishes the load-transfer mechanism for such a connection. The resistance of the connection is determined by the bearing between bolt and steel plate [7]. Although, the connections with HSFG bolts are designed to allow for slip and be sufficient to avoid tension failure. The shear failure and the resistance of the bolted connection is found out by analyzing the bearing strength between bolt and steel plate. Bolt fracture, bolt thread failure, and nut thread failure are the three most common failure types in bolted connection

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Strengthening of Masonry Structures: A Review

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Abstract -*Masonry can be said as one of the oldest construction systems. Therefore, strengthening of these structures are of greater concern. Different techniques that are used to strengthen masonry structures are discussed in this paper. Fibre Reinforced Polymer (FRP), Engineered Cementitious Composite (ECC) and Geotextile were used to strengthen masonry walls in a less invasive manner. The application of different types of FRPs like carbon, glass and basalt fibre reinforced polymers were discussed and their contribution to the enhancement of the strength of the masonry structures were also dealt with. Geotextiles were used in the in-plane and out-of-plane strengthening of masonry walls. The above techniques were successful in enhancing the structural strength of the masonry structures. Thus, the use of such techniques was useful in the conservation of historic masonry structures.*

Key Words: Fibre Reinforced Polymer (FRP), Engineered Cementitious Composite (ECC), Geotextile, in-plane, out-of-plane strength.

1. INTRODUCTION

Various studies have been done over a number of years to develop strengthening techniques which will improve the performance of masonry. Many unreinforced masonry structures are seismically deficient and several research studies have been conducted to improve the seismic performance of these structures. Strengthening methods such as the addition of new structural elements, steel plate bonding, external post tensioning, steel bracing, Fibre Reinforced Polymer (FRP) and many more have been applied with some degree of success. However, an innovative retrofitting technique using Geotextile has gained recognition and acceptance. Fibre-reinforced polymer is a composite material. It is made of a polymer matrix reinforced with fibres. Glass, carbon, or aramid are the fibres commonly used. Sometimes fibres such as paper, wood or asbestos are also used. The major advantages of FRP composites include lightweight, non-corrosive and they also exhibit high specific strength and stiffness. Thus, it can be used to satisfy performance requirements. FRP composites are thus used for new construction and rehabilitation of structures.

Babatunde [15] stated that improving the ability of the structure to absorb inelastic deformation is the objective of a strengthening technique. The strengthening techniques can be of different types like concentrated at joints by near surface mounted (NSM) or repointing techniques or may be applied on the entire masonry wall. The load carrying capacity of the structure and integrity can be improved by the use of fibre reinforced polymer (FRP). FRP include high resistance fibre impregnated with polymeric resin which has got high tensile strength and corrosion resistance. The main load carrying component in FRP is the fibres and the resin transfers shear. FRP are light weight. High cost, low impact resistance and high electrical conductivity are some of the disadvantages. Glass, Aramid and Carbon are the three basic types of FRPs used. Commercially it is available in the form of laminates, meshes, tendons and rods. Researchers concluded that FRP helped in improving the strength and ductility of the masonry walls. Post tensioning with CFRP tendons helped in reducing the size of cracks in damaged structures. It also helped in improving serviceability and increase cracking moment of resistance in masonry structures. Near Surface Mounted (NSM) FRP system follows the method of cutting grooves having a diameter of one and a half times the bar diameter in the bed joint and then cleaning and filling with cement-based mortar or epoxy. Then the FRP bars are inserted into the groove. FRP reinforcement is placed symmetrically on both faces of the walls to avoid the tilting or twisting of the strengthened wall. NSM FRP system is said to be three times more efficient than externally bonded FRP system. Increasing the thickness of the epoxy cover and using adhesives of high tensile strength can reduce the tensile stresses. Thus, the masonry walls strengthened with NSM FRP bars showed an increase in the shear capacity. In this paper we will be dealing with the strengthening techniques that were adopted during the past few years.

2 MATERIALS AND METHODS

2.1Fibre Reinforced Polymer (FRP)

Albert [4]et. al conducted an experimental program at the University of Alberta and observed that the fibre reinforced polymer (FRPs) applied externally on unreinforced masonry walls subjected to out-of-plane flexural loads were effective in increasing the load-carrying capacity. The experimental parameters investigated were the following:(1) type of fibre reinforcement; (2) amount of fibre reinforcement; (3) layout of fibre reinforcement; (4) effects of moderate compressive axial load; and (5) cyclic behaviour. It was observed that the fibre reinforcement was easy to handle and apply. Also, the results concluded that strengthening with FRP increased the strength and ductility of the specimens.

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GPC Filled Corrugated steel tubular column: A Review

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Abstract - Geopolymer is a sustainable binding material having similar binding property to ordinary Portland cement.it can be produced from fly ash, granulated blast furnace slag like aluminosilicate material it can be activated by alkaline solution. Geopolymer concrete having higher mechanical strength than ordinary Portland cement. Alkaline activators can improve strength and durability of geopolymer concrete. The geopolymer concrete technology reduce global carbon dioxide emission.

The Concrete filled corrugated steel tube have the same working mechanism as tube confined concrete columns because of its high lateral stiffness and corrosion resistance of corrugated steel pipe and corrugated steel pipe provide strong confinement effect. Concrete filled corrugated steel tube offers advantages such as ease of construction, high ductility, confinement effect, strong interlocking effect between corrugated steel pipe and concrete and load bearing capacity. So Geopolymer filled corrugated steel tube has benefit of both geopolymer concrete and concrete filled corrugated steel tube.

Key Words: geopolymer concrete, fly ash, alkaline solution, corrugated steel pipe, load bearing capacity.

1. INTRODUCTION

1.1 Geopolymer Concrete

In this world one of the mostly used construction material is concrete, but there is also have some environmental issues because of highly usage of concrete. Main reason is content of Portland cement in concrete, which cause massive production of carbon dioxide emission in environment, it's around 7% of total human induced carbon dioxide emission in every year. For example, for the production of one ton Portland cement around 1.5 tons of raw material needed, for this process leads to elimination of around one ton of carbon dioxide. Constructers are using Geopolymer cements, which producing from GGBS and Fly ash with alkali activator solution [1]. The ordinary Portland cement-based concretes have high internal energy than geopolymer cement. Production of OPC leads to high amount of greenhouse gas in atmosphere. Ordinary Portland cement-based concert are not that much durable in many environmental conditions. In this situation OPC can replace with Geopolymer concrete [2].

and alkaline activators are effect the mechanical properties of the Geopolymer concrete. There have some suitable materials are acknowledge for geopolymer materials such as class F Fly ash (FA), Silica and Alumina composition, even though the problem of generation of the F classs Fly ash based Geopolymer materials can be cured only high temperature. Curing of GPC at surrounding temperature slag is normally added. Mainly ground granulated blast furnace slag is used [3].

Experimental and research shows that substitution of fly ash with GGBS improve the compressive strength of concrete regardless of type of curing. The thing is more alkaline content improves strength of the concrete up to some range. Mix design is process that selecting suitable ingredients used in a particular concrete and identify their relative proportions to reach given target strength and workability. The Binder content, amount of fine and coarse aggregate used in the mix also matter of the strength of GPC. Basically more in the binder content, the compressive strength of GPC also increase [14].

1.2 Concrete Filled Corrugated Column.

Wang et al [5] state that Concrete filled galvanized corrugated steel tubular column is a new composite member to reduce the anticorrosion maintenance cost and improve the corrosion resistance of concrete filled steel tubular structure and it has advantages such as high load bearing capacity, free of maintenance, and good ductility. Corrugated steel pipe are made from cold- formed galvanized steel sheet after the crimping and mechanical pressing. Concrete filled corrugated steel tube fabricated from concrete filled galvanized corrugated steel pipe. Steel is protected by cathodic protection due to Zinc oxide film on the surface of the structure. In addition, cladding layer is difficult to remove which reduces periodic maintenance cost. Anticorrosive pipe used as bridges, rain water pipe, culvert, channel etc. service life of corrugated pipe depend on selection of appropriate coating. Concrete filled corrugated column will perform well under lateral cyclic loading and compression because of strong interlocking effect between concrete and corrugated steel pipe due to corrugation of corrugated steel pipe [5].

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A Review on Stressed Skin Behaviour of Steel Façade Frame

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Abstract - *When it comes to physical and mechanical characteristics, steel is an excellent building material. By utilizing structural elements with relatively small cross sections, large spans and great heights can be covered. Considering the flexibility and slenderness of these girders, space stability of the whole bearing structure must also be addressed because of their flexibility and slenderness. Traditionally, spatial stability is created by bracings, which serve as a conduit for horizontal forces to be transmitted to the ground and to the foundations. In coordination with the main structure, it can behave as a diaphragm and contribute to its spatial stability. This paper aims to study all the features of stressed skin behavior of steel façade frame under varying structural conditions. Conclusions, recommendations, and diagrams provided in this study may be used to guide the application of the "stressed skin design concept" to the real world. The goal here is specifically to optimize fastener number, sheet profile height, height-to-length ratio of façade frames, and bearing capacity using FEA. All the studies concluded that the introduction of stressed skin behavior of steel façade frame can increase the strength of the structure.*

Key Words: Stressed skin behavior, steel façade frame, fasteners, cladding, spatial stability, diaphragm.

1. INTRODUCTION

Different types of bracings are used in traditional steel frame constructions to stabilise the primary bearing structure in space, retain the planned geometry and shape, and limit horizontal displacements of the slender elements. The "stressed skin design," on the other hand, stabilises the frame structure because the wall and roof cladding have significant in-plane stiffness. As a result, the cladding has the ability to accept and transfer horizontal forces operating on the structure while also providing spatial stability. However, putting this concept into action is challenging due to the difficulty in determining the stiffness of various types of corrugated sheets used as cladding, as well as the stiffness of the connections between the cladding and also the bearing steel framework. The shear or diaphragm panel is a section of the shear diaphragm made up of one or more corrugated sheeting separated by structural elements. European standards (EUROCODE EN 1993-1-3 2006) and steel structural design recommendations only address this concept in broad terms (ECCS 1995). Stressed skin design is quite possible, and it produces results that are comparable to or better than braced skin design in terms of stress and deformation of the structure [1,2].

In reality, whether or not the diaphragm effect is considered, it is always there in a building. Economic studies conducted in Europe by organizations such as the European Convention for Constructional Steelwork (ECCS) or the Constructional Steel Research and Development Organization (CONSTRADO, 1976) revealed savings of up to 10% of the total cost of the steel structure when the diaphragm effect was taken into account in the design. The fundamental function of roof and wall cladding systems is to keep the structure dry and airtight, while the diaphragm effect transforms them into major structural components [5].

1.1 Steel façade frame

Any largely vertical aspect of a building envelope, such as an exterior wall, is referred to as a facade. A façade is one side of a building's exterior, usually the front, but also the sides and back on occasion. Steel is frequently used in the construction of façade frameworks. The lateral and vertical resistance to exterior elements such as wind is enhanced by a façade steel frame.

1.2 Cladding

Cladding is the process of applying one material above another to create a skin or layer, which can be both decorative and practical. Its purpose is to compliment the building's architectural design while also providing shelter from rain, wind, snow, and other external factors.

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A REVIEW ON ENERGY EFFICIENT BUILDINGS - USING PHASE CHANGE MATERIALS, GREEN ROOFS AND HEAT REFLECTIVE COATINGS

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Abstract - *Global energy demand is rapidly increasing and elevated fossil fuel consumption leads to depletion of ozone layer, global warming etc. In some countries the major sector of energy usage is buildings. Considering the reports from International Energy Agency (IEA), building sector accounts for more than 30 percent of total consumption of energy and is the producer of 30% of the total CO_2 emissions. Buildings being energy efficient is of primary concern recently. PCM (Phase Changing Materials) is an efficient solution to the issue. Its capable to reduce temperature variations by changing their state from solid to the liquid when temperature increases via absorbing energy, and can release the absorbed energy, and change from liquid to the solid state when temperature drops and obtain thermal comfort inside the building. Green roof tops are another superior example of a concept for reducing consumption of energy and improving business and residential building comfort levels. Furthermore, because it is obviously known that white colour has the highest solar reflective performance, white or light colour coatings have been frequently placed on the building's posterior walls or roofs so as to reflect the incident sunlight and thus reduce energy consumption for interior cooling.*

Key Words: **Thermal comfort, Phase change material, Heat reflectance, Thermochromic films, Green roofs.**

1.INTRODUCTION

In buildings, majority of energy is utilized to preserve a comfortable ambient environment in terms of comfort on thermal basis (heating or cooling) and the quality of air (ventilation). According to the report by World Bank on power consumption in residential sector, 40% of the energy demand is required to meet the electricity demand for such structures that are built to bring down the amount of energy required for heating and cooling are known as energy efficient buildings. The energy consumption for maintaining thermal comfort can be reduced by the use of Phase Changing Materials. Phase Changing Materials (PCM) are substances which release or absorbs sufficient energy at phase transition. These materials store thermal energy during the time of melting and in turn liberates thermal energy in the time of freezing. They are mainly employed for obtaining thermal comfort inside the building.

The phase transitions via produced latent heat is used to store thermal energy in phase change materials (PCMs). sssPCMs can be employed to acquire cooling (below ambient transition temperatures), building thermal swings (below ambient transition temperatures), and short-term storage of solar thermal energy. The capacity to store energy in a consolidated form can provide a supply of heat that is quickly accessible when thermal energy comes from a recurring and periodic source, such as radiation from sun. Phase changing materials that posses the ability to change state from solid state to liquid and vice versa are utilised in construction to achieve control over temperature changes. They melt by absorbing heat during daytime and then keeps the room temperature constant until the phase changes. The PCM then turn back to solid state at night. Thus, the phase change cycle repeats.

Green roof tops are another superior example of a concept for reducing energy consumption and improving the comfort of business and residential buildings. Green roofs have always been studied as a bioclimatic method for improving building energy efficiency. Green roofs provide undeniable thermal advantages. When opposed to an exposed naked roof, the indoor and roof temperatures of a structure with a green roof are much lower. The most important environmental element affecting the green roof's cooling capability is relative humidity. Because Infrared energy makes up almost half of all solar energy, increasing the infrared reflectivity of the outside wall or roof has recently been investigated and used to minimise energy usage. As it is commonly known that white has the highest solar reflective performance, white or light colour coatings have been frequently used on the posterior of building walls or roofs till date. However, white or light colours are always susceptible to pollution, and a single hue seldom meets human desire in practical building decorating. Furthermore, novel deep colour pigments with excellent infrared reflecting properties have been discovered in recent years.

2 THERMAL EFFICIENT BUILDINGS - USING PHASE CHANGE MATERIAL (PCM)

Evidently every field including transportation, buildings and industry, requires energy as a vital component in

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An Extensive Research on Acoustic Underwater Wireless Sensor Networks (AUWSN)

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Abstract

It is a well-known fact that water covers nearly 71% of the total earth's surface. This makes the extraction of most valuable information from the seafloor and underwater resources extremely difficult for humans. As a result, in order to meet the requirements of underwater exploration, researchers have focused their efforts on developing new technologies for establishing underwater communication. The recent advancements in wireless acoustic underwater sensing and communication technology has resulted in an upsurge in the exploration of abundant underwater natural resources. This research study intends to provide a comprehensive overview of acoustic underwater sensor networks, including their implementation techniques, routing algorithms and applications. This study also provides a comparative analysis on various acoustic wireless sensor networks deployment in order to find the existing research gaps. Furthermore, some real-time AUWSN applications were reviewed, providing diverse and insightful information about the AUWSN approach. Finally, the study discusses about some potential future research directions for designing the next-generation AUWSNs.

Keywords: Acoustic networks, underwater communication, autonomous underwater vehicle, network analysis, underwater sensors

1. Introduction

Over the last decades, wireless sensor networks (WSNs) has shown a huge potential in the areas of military, healthcare, disaster management, and so on. With the sensors deployed on the particular region of interest, the data will be collected, analyzed and transferred to the base station (BS), which will be usually placed at long distance [1]. Due to

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A Review on Data Securing Techniques using Internet of Medical Things

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Speech emotion recognition using data augmentation

V. M. Praseetha & P. P. Joby

International Journal of Speech Technology **25**, 783–792 (2022)

Abstract

Humans are considered as emotional beings and so the uttered speech reflect the human emotions. Human computer interaction can be done more effectively by automatically identifying the emotions from speech. Automatic speech emotion recognition is applied in many areas like computer gaming, call centre, speech therapy controlling robots etc. Emotion recognition can be considered as feature space to label space mapping. From the uttered speech, the different features are calculated. Then, to automatically recognize the emotions, the relationship between the emotions and the features are learned. The required preprocessing is done with the collected training samples and the features are extracted from the speech signals. The extracted

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VR Kerala
An Integrated Tourism Application

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Abstract:- VR-Kerala is an interactive tourism application that offers an immersive experience to tourists who visit Kerala with the help of Augmented Reality and Artificial Intelligence. It offers an interactive virtual guide to tourists.

The AR guide will walk through different locations to guide tourists. The avatar facilitates both indoor and outdoor navigation as well. It also gives a 360-degree view of a multitude of places one would wish to travel, at the comfort of their home. The K'Lens feature included within the app identifies forts, monuments, etc that are unknown to them by pointing the camera at it when they reach a particular destination in Kerala. A multilingual chatbot to assist travellers, and a back to home feature to enable a tourist to trace back to home are additional features. The app notifies them about weather, disease, or any other cautionary alerts in their destinations. The app also shows nearby facilities like toilets, accommodations, restaurants, etc. The social impact would be that it promotes tourism, creates a welcoming, safe and helpful environment with a very interactive medium.

Keywords:- *Augmented Reality, AR guide, K'Lens, ChatBot, 360 Images, Multilingual.*

I. INTRODUCTION

We know that tourism is a rapidly growing industry and it has a lot of potential to be explored. Many people desire to visit Kerala every year for its rich nature and culture. Tourism helps in different areas like Increasing awareness about our culture and heritage. Provides jobs, Economic benefits, Infrastructural development, Cross-cultural connections. Promotional benefits: Tourism gives the locality a chance to show itself off and raise its profile in the world. Good travel experience requires an effective and trustworthy travel guide service. Using technology in this sector will make the whole process more efficient. Our Project aims to build an app that runs virtual assistance for travellers.

A. Background

Kerala is the first state in India to declare tourism as an industry. The tourism policy documents of the central and state governments claim that the Kerala tourism model is one of the most liberalized tourism models with the private sector leading tourism development. Tourism constitutes 10 percent of Kerala's GDP, as per official statistics, and reportedly contributes around 23.5 per cent to the total employment in the state. However, the truth is there is no reliable picture of the economic effects of tourism on Kerala.

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Handwritten Character Recognition using Deep Learning in Android Phones

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Abstract - *There are many things that humans have in common, yet there are other things that are very unique to every individual and one of them is handwriting. Handwriting is a skill that is personal to individuals. It has continued as a means of communication and recording information in day-to-day life. Because each person's handwriting is unique, it is sometimes hard to interpret the information they try to convey. As computerization is becoming more prominent these days, Handwriting Recognition is gaining importance in various fields. The major focus is to understand the handwriting and convert it into readable text. Deep learning, an ability of Artificial Intelligence (AI), is used for the system to learn the input automatically and convert the handwritten text to printed text.*

***Key Words*: Handwriting Recognition, Deep learning**

1. INTRODUCTION

Handwriting has continued as a means of communication in our day-to-day life. As each person's handwriting is unique, it is sometimes hard to interpret the information they try to convey. Handwriting Recognition is an ability of a computer to receive and interpret intelligible handwritten input from sources such as paper documents, photographs, touch-screens and other devices. Though it is a difficult problem due to the great variations of writing styles, different size and orientation angle of the characters, it is still found useful for the applications in some way. The main objective is to understand the handwriting and convert it into readable text, which includes characters, words, lines, paragraphs etc. In this project, the challenge is classifying the image of any handwritten word, which might be of the form of cursive or block writing. Along with this, Text-to-Speech is used to help people who have trouble reading on-screen text.

2. RELATED WORKS

Hao Zeng et al. proposes a method that focuses on using a simpler neural network instead of complicated ones that require high quality computer configuration to recognize handwritten digits with relatively promising accuracy[1]. MNIST dataset is used to train the neural network. An Efficient Algorithm for Real-Time Handwritten Character Recognition in Mobile Devices[2] that is used to measure the algorithm efficiency, tests were applied to 8 persons, who are related to the computing scene and outside it, with different writing styles. Mobile Client-Server Approach for handwritten digit recognition [3] is another one, in which CNN was also used to improve the performance of neural networks. The digit recognition consists of some modules for the processing.

Rohan Vaidya et al. designed an image segmentation based handwritten character recognition system using Deep-Learning [4]. OpenCV was used for performing Image processing and Tensor flow was used to train a neural network. Haishi Du et al. proposed a system that identifies words using acoustic signals generated by pens and paper using Deep-Learning [5]. The framework is created with three major components: segmentation, classification, and word suggestion. Handwritten Document into Digitized Text Using Segmentation Algorithm [6]. The main aim is to help in preserving history by making information searchable, easily, and reportable without the need for human labor.

Edgard Chammas et al. proposed a mobile application that is built on a distributed architecture that allows tourists to obtain additional information about location and menu entries in the Arabic language [7]. The recognition of printed texts is done using optical character recognition. SolveIt- an Application for Automated Recognition and Processing of Handwritten Mathematical Equations[8]. Here a convolutional neural network (CNN) is used to classify symbols. The recognized symbols are strung together to form an equation that can be parsed by the math engine (SymPy2). A framework that takes the image of multiple printed-papers using a mobile device's camera is used in Optical Character Recognition (OCR) Performance in Server-based Mobile Environment. After the first image is captured, the image is then directly sent to a server. Server processes the image using the OCR application directly and sends the text file back to the mobile device [9]. Handwritten Character Recognition to obtain Editable Text [10] is a system proposed by Ms. Jyoti A. Katkar. No internet connectivity is required for character recognition in the system. And the system offers 90% accuracy.

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WEBSKOOL- INTEGRATED PLATFORM FOR ONLINE EDUCATION

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Abstract - *Since the COVID -19 pandemic situation has disrupted the normal lifestyle of people, the virtual world has come to the rescue. Many of the institutions, schools, colleges etc have shifted their lifestyle to depend on virtual platforms to conduct online classes. So the entire classes from pre-primary to university level have changed to e-learning. It has been found that the existing platforms were not designed as a complete system for online education. Webskool is an integrated platform for all activities and communication that happen in an academic institution. This includes a learning management system and a platform for digital classes. The proposed system can also check whether a student is active or not using Tensorflow. We hope that this innovative solution can help the students and teachers in making e-learning easier.*

Keywords : Learning Management System, *Digital Classroom. Web App, Tensorflow*

1.INTRODUCTION

The Covid-19 pandemic has struck the lives of millions of people around the globe. This forced the educational institutes to shut down and switch to an online mode of teaching. Thus online platforms such as Google Meet, Zoom, etc became the classrooms of the students. But these platforms have a lot of limitations when it comes to providing education. Webskool is an integrated platform for all communication between a student and a teacher. It includes a video conferencing tool for the teachers to conduct the classes and a platform for sharing notes of the respective courses with the students. The integrated video conferencing tool checks whether a student is attentive in the class or not by monitoring their facial expressions using Machine Learning. The proposed system is implemented using Tensorflow js and can be done on the client-side to reduce the network load. It can also monitor the attendance of each student and a report will be generated automatically and send to the teacher for validation. Teachers have the provision to create classrooms and enroll students with respect to their courses. Each classroom can be used for scheduling and conducting classes, sharing notes, and conducting exams. The final solution will help the students and teachers to manage their courses better by bringing everything under a single roof.

2. PURPOSE

Nowadays, students face an obstacle in traditional education, this project enables teacher and student to set their own learning pace. Watching students through a webcam and generating a complete record of the attendance of each student automatically. It also has an integrated platform where the teachers can share notes, conduct exams, and the students can post queries on any topic.

3. PROBLEM STATEMENT

The novel coronavirus pandemic has forced the closure of schools all around the world. Over 1.2 billion children are out of school around the world. As a result, education has experienced considerable changes, with the emergence of e-learning, which allows students to receive instruction remotely and through digital platforms. According to studies, online learning improves information retention and saves time, signalling that the coronavirus's changes are here to stay. As a result, a platform that can meet all of the needs of both students and teachers is urgently needed. This project will seek to relieve many of the issues that students and teachers have by utilising existing platforms such as Zoom, Google Meet, Cisco Webex, and others. One of the difficulties within focus is determining whether or not a kid is paying attention in class.

4. OBJECTIVE

To solve the problem of monitoring attendance in an online mode by constantly watching the student through the webcam and detecting a face as well as recognizing the face:

- A single platform for interaction with teachers and students with all features and necessary controls.
- To Solve the dependency on third party applications for attendance monitoring.
- Solve the problem of checking the active participation of a student in an online mode by constantly watching the student through the webcam and providing the feedback.
- Also make a Learning Management System that is easily accessible by students and teachers.

Encryption and decryption of big data streams using Lightweight asymmetric method in WSN

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ABSTRACT: Resource constrained devices are used in critical fields such as agriculture, smart health, industries and others. These devices produce an immense amount of data. These data streams are used for the analysis and making proper decision related to the applications. It is having restricted processing and storage capabilities which provide maximum data outcomes using less power consumption. An attacker may tamper or access data these data's and is one of the key challenges faced by these devices. These systems are vulnerable to different security threats. Various lightweight cryptographic methods are there for solving issues like authenticity, confidentiality and data integrity. Most of these methods provide security from the attacks, but was completely secure or take more time for performing the security related encryptions steps. In this paper, a lightweight asymmetric algorithm based on RSA with key extension is proposed to provide security to the data sources generated by WSN. The enhancement is RSA is done by changing the key generation method. The system will satisfy all the key security properties. Here the proposed system is compared with existing methods in the perspective of computation time. The comparison is done for finding the better method.

Keywords: Internet of Things (IoT), Rivest, Shamir, Adleman (RSA), Wireless multimedia sensor (WMSN), Wireless sensor networks (WSN),TEA(Tiny encryption algorithm)

I.INTRODUCTION

At present, Resource-constrained devices are commonly used in the Internet of Things (IoT). It is for information assortment and the format of getting admission to oversee conspiracy that allows a client as a piece of IoT. Wireless sensor networks(WSN) are an administered local area that incorporates a monstrous assortment of sensor hubs. It can aggregate the objective realities through the sensor hubs to get data [1]. These networks are used for basic applications like medical services, savvy urban areas, agriculture areas, mechanical control frameworks, and so on as sown in Fig [1].The work of WSNs has been accounted for help ranchers in different perspectives like the upkeep of wiring in a hazardous climate, water system motorization which helps more ingenious water use and decrease of squanders in agriculture sectors.WSNs can be used for checking the development of different primary ventures like structures and other infrastructural projects like flyovers, spans, streets, banks, burrows, and so on, permitting fabricating/designing practices to screen assets distantly without essentially visiting the locales, and this would lessen costs that would have been caused from actual site appearances in structural development and so forth.

The essential elements of a WSN, sensor hubs or the bits, have special residences that force novel necessities of WSN applications. Most widely is they conveying remotely, have little actual size, own low processing abilities, and capacity for the use of the batteries [2].Wireless sensor networks (WSNs) have rich large information streams: an enormous measure of information is created by different sources. It produces colossal measures of information on a regular schedule and sends them to the worker for investigation as information streams [3].The information delivered from a vast assortment of sources is flooding to the information stream administrator for its handling and taking appropriate choice for the basic applications [4]. Resource Sensor Networks (WSN) consolidates remote sensor hubs set up inside the area for the relentless proclamation of substantial or natural conditions. Data trustworthiness is a high initialization movement in WSN, because of cruel environmental factors producing faulty measurements and unreliable information switch over WSN. The earnest of the insights created from sensor hubs plays a crucial capacity to settle on indispensable choices [5].A sensor local area should not uncover the sensor readings to its encompassing networks. In many applications, hubs can convey gigantically fragile information. That information is encoding the information with a key for beneficiaries; however, key confirmation is extreme in remote sensor networks because of organizations [6]. Information respectability is the assurance that the records got with the guide of utilizing the place for getting away are the equivalent as that created with the guide of utilizing the stockpile and have now not, at this point been coincidentally or malignantly changed course. Trustworthiness attacks manage content material without the data or consent of the proprietor [7]. The biggest challenging tasks for these devices are to ensuring confidentiality and integrity with high information dependability.

In conventional cryptography, a cipher is a change over a variant of plain text by some vital qualities to make text safer. Cryptography is a main procedure related to segments of records security. Cryptography is worried about the encoding and deciphering of messages into puzzle code. These days the privateness of information of individuals or organizations is provided through cryptography, guaranteeing that information despatched is consistent in a way that the legitimate beneficiary can get right of section to the information, technique there's no malicious assault. An essential thought behind the framework is to accomplish information privacy and trustworthiness, to keep away from information from unapproved information access, deficient to comprehend the genuine significance. Here the significant employments of the cryptography to communicate the information through

Original Paper | Published: 30 May 2022

Real-time hardware emulation of WECS based on DFIG during unbalanced type-B and type-E voltage dips for enhanced low voltage ride-through

Tomson Thomas, A. Prince, P. R. Sunil Kumar & Elizabeth P. Cheriyan

Electrical Engineering **104**, 3717–3732 (2022)

Abstract

The presence of partially rated power electronic converters makes the doubly fed induction generator (DFIG)-based wind energy conversion systems (WECS) prominent. This paper focuses on an enhanced low voltage ride-through (LVRT) with reactive power support for WECS based on DFIG during unbalanced type-B and type-E grid voltage dips with the proposed negative sequence control technique. A variety of unbalanced voltage dips will happen in the power system due to different faults which are to be efficiently encountered as per the grid code requirements. WECS with DFIG can be regulated for different types of asymmetrical voltage

Australian Journal of Electrical and Electronics Engineering ›
Volume 19, 2022 - Issue 4

Research Article

Diagnostic feasibility of time domain features for detecting and characterizing cry cause factors - an investigation

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Department of Electronics and Communication Engineering, St. Joseph's College of Engineering and Technology, Palai, India

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ABSTRACT

The very first cry of an infant gives vital information about the health of infant, and as they grow the acoustics change with the development of their vocal tract system. This reflects the learning mechanism of infant cry-cause factors, which upon solving will give a huge impact in the areas of medical and household. The behaviour of infant cry records is frequently used for non-invasive infant health inspection and monitoring.

Automated approaches for forecasting health status, on the other hand, are highly dependent on the features extracted. In this paper, the diagnostic feasibility of the

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Automated colorectal polyp detection based on image enhancement and dual-path CNN architecture

Nisha J.S., Varun P. Gopi, Palanisamy P.

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Highlights

- A novel enhancement method has been proposed to emphasize the colonoscopic images.
- Enhancement in HSV effectively reduces the inconsistent illumination during image acquisition.
- A dual-path network is used to detect polyps in the colonoscopy images which shares common features.
- This method can be adopted for real-time applications due to its reduced computational complexity.
- The proposed network outperforms the highly complex existing deep learning methods.

Abstract

Colorectal Cancer (CRC) has the highest mortality rate of all cancers and is currently the third leading cause of cancer-related death worldwide. The early detection and diagnosis of colorectal polyps are necessary for early interventional therapies. The use of AI and ML techniques to analyse colonoscopy images has been gaining traction in recent years for early and accurate detection of polyps and other colorectal abnormalities. Existing deep learning classification and detection methods of polyps are computationally intensive, restrict memory potency, require extensive training, and affect the optimization of hyperparameters. This makes them unsuitable for real-time applications and applications with limited computing resources. This paper proposes a Dual-Path Convolutional Neural Network (DP-CNN) to classify polyp and non-polyp patches from the colonoscopy images. The proposed approach comprises image enhancement followed by the use of DP-CNN architecture and a sigmoid classifier for efficient detection of polyps. The publicly available database CVC ClinicDB is used to train the proposed network, and it is tested on ETIS-Larib and CVC ColonDB databases. The testing accuracy of the network on CVC ColonDB and ETIS-Larib are 99.60%, 90.81%, respectively. The performance measures are as follows: precision (100%), recall (99.20%), F1 score (99.60%) and F2 score (99.83%) on CVC ColonDB database and precision (89.81%), recall (92.85%), F1 score (91.00%) and F2 score (89.91%) on ETIS-Larib database. Compared with other existing methods, the proposed approach outperforms in precision, recall, F1-score, and F2-score in both databases. The number of learnable parameters of the proposed method is 8737. The proposed approach is promising as an accurate polyp detection technique. It is applicable for real-time applications due to lower complexity and fewer learnable parameters than required by other existing methods.

https://doi.org/10.4015/S1016237222500016 | **Cited by:** 0

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Abstract

Colonoscopy has proven to be an active diagnostic tool that examines the lower half of the digestive system's anomalies. This paper confers a Computer-Aided Detection (CAD) method for polyps from colonoscopy images that helps to diagnose the early stage of Colorectal Cancer (CRC). The proposed method consists primarily of image enhancement, followed by the creation of a saliency map, feature extraction using the Histogram of Oriented-Gradients (HOG) feature extractor, and classification using the Support Vector Machine (SVM). We present an efficient image enhancement algorithm for highlighting clinically significant features in colonoscopy images. The proposed enhancement approach can improve the overall contrast and brightness by minimizing the effects of inconsistent illumination conditions. Detailed experiments have been conducted using the publicly available colonoscopy databases CVC ClinicDB, CVC ColonDB and the ETIS Larib. The performance measures are found to be in terms of precision (91.69%), recall (81.53%), F1-score (86.31%) and F2-score (89.45%) for the CVC ColonDB database and precision (90.29%), recall (61.73%), F1-score (73.32%) and F2-score (82.64%) for the ETIS Larib database. Comparison with the futuristic method shows that the proposed approach surpasses the existing one in terms of precision, F1-score, and F2-score. The proposed enhancement with saliency-based selection significantly reduced the number of search windows, resulting in an efficient polyp detection algorithm.

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Abstract

Colorectal cancer (CRC) is the common cancer-related cause of death globally. It is now the third leading cause of cancer-related mortality worldwide. As the number of instances of colorectal polyps rises, it is more important than ever to identify and diagnose them early. Object detection models have recently become popular for extracting highly representative features. Colonoscopy is shown to be a useful diagnostic procedure for examining anomalies in the digestive system's bottom half. This research presents a novel image-enhancing approach followed by a Scaled YOLOv4 Network for the early diagnosis of polyps, lowering the high risk of CRC therapy. The proposed network is trained using the CVC ClinicDB and the CVC ColonDB and the Etis Larib database are used for testing. On the CVC ColonDB database, the performance metrics are precision (95.13%), recall (74.92%), F1-score (83.19%), and F2-score (89.89%). On the ETIS Larib database, the performance metrics are precision (94.30%), recall (77.30%), F1-score (84.90%), and F2-score (80.20%). On both the databases, the suggested methodology outperforms the present one in terms of F1-score, F2-score, and precision compared to the futuristic method. The proposed Yolo object identification model provides an accurate polyp detection strategy in a real-time application.

Keywords: Colonoscopy ▪ Image enhancement ▪ Yolo object detection model

Design and Implementation of a Smart Cost-effective Hearing Aid using Fractional Interpolated Filters

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A reconfigurable hearing aid is capable of adjusting to various impairments without any modification in the hardware. The design and implementation of a reconfigurable filter bank structure of minimal complexity are proposed in this paper for audiogram matching applications. The hearing spectrum is equally decomposed into four regions, and three different schemes are proposed in each region. The Parks McClellan algorithm based prototype filter is fractionally interpolated and various sub-bands are generated for the reconfigurable filter bank. The proposed smart structure can adapt to the optimum scheme by itself based on the hearing characteristics of the impaired person. The structure is tested with different hearing loss scenarios and the matching errors as well as operational delays are found to be within the tolerable limits. The proposed structure requires only 26 multipliers, which saves the hardware by almost 88% with respect to the existing structures. A power and device efficient hardware implementation of the proposed structure is also realized on Kintex7 FPGA board. In addition to the reduced complexity, the proposed structure has the advantage of minimal hardware, which permits the availability of cost-effective hearing aids a reality.

Keywords: Audiogram matching, Filter bank, Hearing aid, Reconfigurable, Fractional interpolation, Frequency response masking

1. INTRODUCTION

Hearing loss is one of the most common disorders associated with aging in humans. Studies by World Health Organization revealed that about 466 million people in the world suffers from hearing loss [1]. The estimate also states that by 2050, hearing loss has every chance of affecting one among ten people across the world. Some of the major factors resulting in hearing impairment are genetics, certain diseases, noise, drugs, aging etc. Hearing loss, if left untreated, has a greater risk of causing other diseases also such as dementia and declining cognitive abilities [2]. The most common type of hearing impairment is sensorineural hearing loss (SNHL) [3]. In SNHL, the sound perception is reduced at any frequency due to the damage of sound sensing hair cells in the inner ear. Another type of hearing loss that affects both ears simultaneously is presbycusis [4]. Presbycusis occurs naturally on high frequency sounds due to the diminishing performance of the hair cells in the ear due to aging. Since presbycusis occurs gradually, people may not be able to recognize their diminishing hearing ability [5].

Hearing aid is an assistive device used by the hearing impaired people to make sounds louder. Among the various type of hearing aids available, digital hearing aids are

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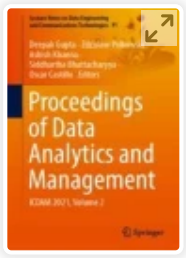

Proceedings of Data Analytics and Management pp 431–439

Statistical Significance of Wilson Amplitude Towards the Identification and Classification of Murmur from Phonocardiogram

P. Careena, M. Mary Synthuja Jain Preetha & P. Arun

Conference paper | First Online: 22 November 2021

Part of the Lecture Notes on Data Engineering and Communications Technologies book series (LNDECT,volume 91)

Abstract

The method of automatic recognizing of various valvular syndromes from the heart sound is a difficult job in cardiology. The features extracted from this may be time, frequency, or time-frequency domain and it bears a significant role in the automated systems to detect cardiovascular diseases. The examination of Phonocardiogram (PCG) signal

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Design and development of an IoT based intelligent multi parameter screening system

P. Arun, N. Prajith, C. Melvin, S.N. Sreejith, S. Sandesh

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Abstract

The SARS-CoV-2 or shortly COVID-19, is a viral disease which causes serious lung fever and hugely impacts different body parts from mild to critical depending on tolerant immune system. As the virus multiplies through human-to-human contact, it has affected our lives in a devastating way, including the vigorous pressure on the public health system, the world economy, education sector, workplaces, and shopping malls. Viral spreading of this virus can only be prevented by early detection of positive cases and to treat infected patients as quickly as possible. As many businesses, banks, gymnasiums, and stores etc., are using temperature screening as the primary step to assess for possible COVID-19 infection. Moreover, the proper hand sanitization is the very effective method to limit the outspread of this virus. This paper proposes the design and development of a fully automated low-cost portable electronic system in the form of a robot named CovBot that can be installed in the above-mentioned places by incorporating the mechanisms to automatically detect the body temperature, store the details directly to cloud so as to get the data latter by the authorities, to control/restrict the entry, a hand sanitization dispenser unit, auto alert to refill the sanitizer, a mobile display unit etc. Whole system can be managed by a mobile application. The system is controlled using an

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Design and implementation of fast RBSD multiplier

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Abstract

In the developing world, we need to meet the high-speed requirements of users in chips. It has become a necessity to have faster and more efficient gadgets in all sectors which can work beyond our expectations and imaginations and give a better experience. So, for that we have designed a multiplier which is faster and can provide results precisely. In this paper we are using RBSD encodings which make multiplier faster by not doing carry propagations and thereby reducing delay for getting output. Redundant Binary Signed Decimals (RBSD) multipliers are designed in such a way that it reduces partial products in multiplication and thereby the multiplier is carry-free. The RBSD multiplier proposed in this paper can perform both signed and unsigned number multiplication. The proposed system is being implemented in VIVADO 2020.2 version in Verilog language. This paper is a comparative analysis with the existing model of RBSD multiplier.

Introduction

With the development in VLSI technology there is a tremendous growth in high-speed arithmetic circuits, signal controllers, digital circuits and so on. Multiplication is one of the mostly used arithmetic operations. It is a key circuit block in all currently-used chips [1]. This block is utilized in virtual computing systems, controllers, filters, sign processors and numerous logic blocks as well. To meet the current high-speed technology, the computing speed of multipliers is to be increased by using RBSD encodings. Normal multipliers use binary numbers and create partial products and then addition is done which includes carry propagations and creates delay in output [2]. In this paper, binary numbers are first converted to RBSD numbers and then grouped, which aids in the creation of a smaller number of partial products. After this, partial

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Original Paper | Published: 16 June 2022

A novel U-Net with dense block for drum signal separation from polyphonic music signal mixture

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Signal, Image and Video Processing **17**, 627–633 (2023)

Abstract

Deep neural network algorithms have shown promising results for music source signal separation. Most existing methods rely on deep networks, where billions of parameters need to be trained. In this paper, we propose a novel autoencoder framework with a reduced number of parameters to separate the drum signal component from a music signal mixture. A denoising autoencoder with a U-Net architecture and direct skip connections was employed. A dense block is included in the bottleneck of the autoencoder stage. This technique was tested on both demixing secret data (DSD) and the MUSDB database. The source-to-distortion ratio (SDR) for the proposed method was at par with that of other state-of-the-art methods, whereas the number of parameters

Regular Paper | Published: 17 January 2022

Developing novel video coding model using modified dual-tree wavelet-based multi-resolution technique

S. S. Nithin, L. K. Padma Suresh, S. H. Krishnaveni & P. Muthukumar

Multimedia Systems **28**, 643–657 (2022)

Abstract

All data are kept on digital platforms in today's digital world, demanding a lot of storage space for images and video, as well as a lot of bandwidth for transmission. Data that have been compressed is highly beneficial for storing more data at the time. The objectives of this work are to examine various compression techniques developed by various researchers and to develop a new video compression method based on multi-resolution techniques. Initially, the video is compressed using wavelet transform and different encoding techniques. As a result, all comparisons will use Empirical Wavelet Transform (EWT). The encoding techniques used here are H.264, Huffman, LZW, SPIHT, and their

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Factors Affecting the Adoption of Social Media in Marketing of Higher Education: An Empirical Analysis

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Abstract

This study examines the persuasion process involved in social media marketing (SMM), particularly in the higher education sector. Based on the theoretical foundations of the information adoption model, a conceptual model of elaboration of SMM communication is developed and tested. The self-administered survey conducted among a sample of international student travellers in New Zealand examines the influence of argument quality, source credibility, audience involvement and audience engagement on their attitude formation and decision-making. The study particularly examines the mediating effects of audience involvement and engagement in SMM communication. Results based on structural equation modelling suggest that social media content quality is a significant predictor of online users' transportation, identification and parasocial interaction effects. Despite there being additional evidence to support the arguments over social media, source credibility is found to be a strong influencer of international student traveller's cognitive, emotional and behavioural engagement dimensions. Further, it is evident from the study that there is a strong correlation between cognitive engagement and attitude formation in SMM. Implications for tourism marketers in terms of SMM strategies are discussed.

A Study on the Consumer Behaviour towards Email Marketing

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***Abstract*: Email has become a significant piece of organizations' advertising blend and is considered as the best innovation for conveying the possibility to support promoting achievement and to improve the brand picture. It is likewise arisen as an important method for individual and corporate correspondence. With its intelligence, speed, and quantifiability, email directs people to the sites. Theaim of this study is to explore and investigate the determinants of consumer behaviour towards email advertising, with two distinct methods. To begin with, we intend to conduct a survey among the population to obtain the responses in the context of email advertising. We believe that the study will offer useful insights for both advertising scholars and executives to understand the intricacies of email advertising and to help advertisers in conceiving better ways to deal with the increment adequacy of email advertising.**

***Keywords*: Consumer Behaviour, e-mail marketing**

1. Introduction

Email showcasing is the point at which you send a business email message to your email supporters — contacts who have joined to your email rundown and expressed consent to get email interchanges from you. Email promoting is utilized to advise, drive deals, and create a local area around your image. Current email showcasing has moved away from one-size-fits-every single mass mailing and rather centres around assent, division, and personalization. Making a solid email promoting methodology assists you with coming to an associate with your intended interest group in a customized way and increment deals at a moderate expense. Similarly, as different stages and media have changed, email showcasing apparatuses enableyour business to arrive at clients in a simpler way than any time in recent memory.

2. Literature review

There are many researches and studies about thecomparison between traditional marketing and modern marketing and also advantages and disadvantages of E-marketing, which shows the performances and efficiencies of marketing approaches. Chaston and Mangles (2003), examined the influence of marketing style on theutilization of the Internet among small UK manufacturing firms. They employed a quantitativemethodology to determine whether, in business-to-business markets, the Internet is a technology that will be managed differently by the firms that have adopted a relationship versus a transactional marketing orientation. The research was conducted depending on a survey strategy through mailed questionnaires on a sample of 298 small UK firms (manufacturers of mechanical or electronic components / their primary area of activity is business to-business marketing / have between 10- 50 employees / not branch plants of British or multinational organizations). Insufficient evidence was found to support the view that relationship- orientated firms, when compared with transaction ally-orientated competitors, exhibit differing perceptions about the nature of online markets.

In this modern age of internet almost every progressive business has web presence, some people think that website is just a commercial requirement but others think that it is mandatory to run their company activities. These different theories about internet have been discussed a lot in recent marketing literature. In the past decade marketers have been arguing about the role of internet in marketing. In the start, marketers used internet as a communication tool but as time passed,they realized the true potential of internet and the idea of e-marketing evolved. According to Hoge (1993), Electronic marketing (EM) is the transfer ofgoods or services from seller to buyer that involves one or more electronic methods or media. Strauss and Ansary (2006) defined E-marketing in their latest book as the use of information technology in the process of creating, communicating, and delivering value to customers, and for managing customer relationships in ways that benefit the organization and its stake holders. This explanation tells that e-marketing is not only about selling products or providing services through IT but it is lot more than that. It is not just traditional marketing using the information technology tools but it is a strategic model to achieve brand value and provide customer satisfaction. Idea of E- marketing can be derived as type of marketing in which objectives are achieved through use of electronic communication tools like internet, interactive TV and mobile phones. Generally, people do confuse e-marketing with online or internet marketing, where online marketing is just limited to the use of internet technology to attain marketing objectives. Yasmin (2015), Digital mediais so pervasive that consumers have access to information any time and any place they want DaveChaffey (2002) defines E-marketing as "Applying Digital technologies which form online channels (Web, e-mail, databases, plus mobile/wireless & digital TV) to contribute to marketing activities aimed at achieving profitable acquisition and retention of customers (within a multichannel buying process and customer lifecycle) through improving our customer knowledge (of their profiles, behaviour, value and loyalty drivers), then delivering integrated targeted communications and online services that match their individual needs.

Chaffey's definition reflects the relationship marketing concept, it emphasis that it should not be a technology that drives Electronic marketing, but the business model. Ankur Kumar Rastogi (2010) isof the opinion that the argument was to fulfil the requirements of huge number of customers. And each time the marketers will understand precisely about the customers shopping requirements.

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SOCIAL COMMERCE AND CONSUMER ADOPTION – AN INVESTIGATION INTO THE COGNITIVE DECISION-MAKING PROCESS OF MILLENNIALS.

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Abstract

One of the major technology-driven changes in the recent times is the evolution of Social Media (SM) as a marketing tool.Today, social media platforms are much more than just social interaction platforms. Thegrowth and evolution of social media hasprompted changes in marketing communications and the consumer decision-making process. Utilizing the capabilities of SM in communicating with the customers, a new form of business named Social Commerce (SC) has emerged.

In this article, an attempt is made toinvestigate the relationship between SCand Consumer Adoption (CA) with a special emphasis on the cognitive stages. Italso aims to propose a conceptual model to study the relationship between SC and CA. The study is descriptive in nature and the relevant data were collected through an online survey among millennials in Kerala using a structured questionnaire. The data generatedare analyzed using SPSS(version 23).

It is revealed from the study that social media is playing a crucial role in the cognitive decision-making stages of consumption among millennials. The study provides critical insights to marketers for designing targeted communication strategies through Social Media.

Keywords: Social Media, Social Commerce, Adoption, Consumer Decision Making, Millennials.

Introduction

Technology has been the greatest change agent for marketing in the last two decades. A major technology-driven change in recent times is the evolution of SM as a marketing tool. Social media platforms such as Facebook, YouTube, Instagram, Twitter and LinkedIn are now extensively used to connect and communicate with consumers.The traditional media which used to behave as a 'one-way communication tool'from marketers to consumers with 'low personal touch' is getting increasingly replaced by SM with 'two-way' interactive capabilities and a 'high personal touch'. The 'new medium' has gained lot of academic and business research interest.Utilizing the capabilities of SM in communicating with the customers, a new form of business named Social Commerce has now emerged in a big way. This article aims to investigate how SC influences the various stages of CA. These consist of cognitive, affective and conative components. In this study, the cognitive phases – awareness and knowledge-- are focused. Ever since Roger's proposed Diffusion of Innovation Theory, the concept is a hot topic in marketing. He, while explaining his theory, suggested that non personal/ mass media is more effective in the initial phases of adoption and personal media have larger impact in the later phases. As Social Media possess both 'personal 'and 'mass media' characteristics; it is worthwhile to investigate if social media follows the above pattern.The usage characteristics and preferences of the millennials are also studied.

Literature Review

The word SM is closely knitted to our day-to-day life. SMis defined as being a group of Internet-based applications which allow for the creation and exchange of user-generated content (Kaplan and Haenlein, 2010). In the initial days of its origin, SM was seen as a facilitator of social connectivity. However, it has now evolved into a powerful phenomenon that can considerably influence all spheres involving human interactions. Social media has becomean indispensable part of life in the modern era, especially among young consumers who have

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THE SIGNIFICANCE OF TECHNOLOGICAL ORIENTATION TOWARDS GREEN INNOVATION PRACTICES AND ITS IMPACT ON ENVIRONMENTAL PERFORMANCE

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Abstract
In the present era, organisations should not ignore increased environmental concerns when serving any markets because all industrial processes involve the consumption of energy, materials, generations of wastes and the like leading to the production of products or services. These physical transactions constitute the most direct relationship between firms and the environment, especially in the manufacturing industries as they are the prime contributors to the various ecological problems. Since environmental strategies create differentiation in the world of competition by reducing adverse environmental impacts and better economic viability, the study emphasised a detailed literature review on core strategy called green innovation(GI).Because successful green innovation performance (GIP) helps firms to achieve greater efficiency, establish and strengthen their core competency and enhance their green image all of which may eventually enable firms to attain superior performance and enhanced profitability (Chen, 2008; Albort-Morant, Leal-Millan and Cepeda-Carrion, 2016). At the same time (Frambach and Schillewaert, 2002) state that the degree to which an organisation is receptive to new ideas will influence its propensity to adopt new technologies. Hence it is not possible for an organization to have better GI without having proper technological orientation (TECOR). Hence the study focused on understanding the role of technological orientation towards green innovation practices (GIP) and its impact on environmental performance (EP) in the competitive world.
Keywords: Technological orientation, Green innovation, Green product innovations, Green process innovations and Environmental performance.

1. INTRODUCTION

Eco-innovation processes within organisations are related to practices within the internal boundary, including organisational management (Eiadat et al., 2008), production process (Dangelico and Pontrandolfo, 2010) and new product development (Lin, Chen and Ho, 2013). GI requires modifications to the design of an existing product and process to reduce the natural environment's negative impact during any stage of a PLC (Huang and Li, 2017). The process innovation equips existing production processes with advanced techniques that improve the capability of adding new product features to meet the market needs (Bigliardi and Dormio, 2009; Raymond and Pierre, 2010; Maine, Lubik and Garnsey, 2012) Ghisetti, Marzucchi and Montresor (2015) state that GI is substantially different from standard technological and non-technological innovations.

The environmental capabilities of a company's leader are the most effective way to develop green innovation strategies (Chen, Zhu, Yu and Noori, 2012). An organisation can achieve a competitive advantage only when they have equipped with enough resources and skills. Barney (1991)

Article PDF Available

SOCIAL MEDIA MARKETING (SMM) AND CONSUMER ADOPTION (CA) A STUDY AMONG YOUTH IN KERALA

January 2021

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Abstract

Social Media (SM) is gaining popularity as a marketing communication tool all over the world. Consumers and companies are found to actively engage in mutual conversations using SM. Unique capabilities offered by the medium has made it a popular choice for marketing, leading to a new genre of marketing called Social Media Marketing (SMM). In this context, a study is undertaken to explore the effect of SMM on CA among youth in Kerala. The study attempts to understand the SM habits, preferences and perception towards SM and in particular explores its influence on the cognitive, affective and conative phases of Consumer Adoption (CA).

ScienceDirect

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Review article

Phase change material based thermal management of lithium ion batteries: A review on thermal performance of various thermal conductivity enhancers

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Received 30 September 2021, Revised 16 February 2022, Accepted 2 April 2022, Available online 20 April 2022, Version of Record 20 April 2022.

Abstract

World is slowly moving away from the conventional energy sources to renewable and sustainable energy alternatives. Introduction of electric vehicles in the market is a step in the right direction for the forward march towards energy security and reduction of carbon footprint. Lithium ion (Li-ion) batteries are popular for the use in electric vehicles, because of their high energy density, long cycle life and so on. The cell temperature has a significant impact on the reliability, safety and lifespan of these batteries, making thermal assessment of battery inevitable for its use in various applications. Phase change material (PCM) based thermal management is highly promising in this regard. Overcoming the low thermal conductivity of these materials is the key challenge in the development of a PCM-based battery thermal management system (BTMS). Apart from focussing on various aspects of Li-ion battery and PCM, the main thrust of this review paper is on providing necessary details of various thermal conductivity enhancing techniques used in tandem with PCMs. The thermal conductivity enhancers discussed are: metal fins, metal foams, metal mesh, carbon fibre, carbon nanotubes, graphene and expanded graphite. Machine learning techniques employed for multi - scale modelling of PCM based Li-ion battery thermal management were also discussed. This review mainly focusses on the literature published in the last five years in order to provide new insights to the development of Li-ion battery thermal management using various PCM-thermal conductivity enhancer combinations. Finally, conclusions are drawn and recommendations are presented to highlight the research gap in this area.

Introduction

The global demand for fossil fuels is ever increasing due to the growing levels of economic progress and the increase in vehicular traffic associated with it. Around 80% worldwide energy utilization is fuelled by fossil fuels [1]. There are growing concerns word over about the depleting levels of traditional energy sources. The emissions and the consequent irreversible environmental damages due to the burning of fossil fuels necessitated the searches for cleaner and renewable sources of energy. For more than a century, IC engines are powering a plethora of transport vehicles, on land, water and in the sky as well.

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Review on novel biomaterials and innovative 3D printing techniques in biomedical applications

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Abstract

3D printing is a quickly developing research domain, which considerably adds to bring the most important improvements in a variety of disciplines of engineering, science, and medicine. Even though the scientific development of 3D printing technology has empowered the expansion of complex geometries, there is still a growing demand for state-of-the-art 3D printing practices and materials to meet the tasks in creating speed and accuracy, surface fineness, stability, and functionality. Current review explains the innovative biomaterials used in 3D bioprinting expertise, in addition to the utilization of the advanced 3D printing related procedures considered by the researchers. In this study, the up-to-date improvements in the field of innovative materials and 3D printing technologies over the conventional 3D printing practices, particularly in biomedical applications, such as printing speed, cell growth feasibility, and complex shape achievement are explained.

Introduction

Ever since the growth of the Stereolithography (SLA) method, 3D printing has been accepted in countless areas such as manufacturing, medicine, and education, in a well-known manner. Nowadays, the expertise has been sprouting, permitting investigators to form 3D objects with multifaceted geometries. The advancement in 3D printing permitted investigators to produce intricate objects, biomimetic tissue constructs, independent soft robots, and personalized drug transport structures, and enabled the development of system designs with higher resolution and more detailed control by merging multi-material design, machine learning, and topological optimization algorithms. However, 3D printing able to print complicated 3D objects with high customization has drawn the interest of many scientists, because its characteristics are particularly useful for rapid prototyping, generating models, and manufacturing final products readily available to the market. Medical investigators found that building complex parts of the human body these days is possible using biomaterials as inks for 3D printing. Many benefits of 3D printing in biomedical applications are leading the way for probable medical results such as replacement of human tissues or organs for regenerative medicine, and the 3D printing of human tissues and organs is currently a promising research domain. 3D bioprinting has been widely used in the manufacture of biomimetic tissue models for perusing the pathogenesis of various diseases, recognizing, and improving possible drugs, and discovering valuable novel medical applications, because it appeared as an exceptional technique to make complex custom-made biological constructs with chosen physical and biological properties and is rapidly growing. In this assessment, we

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Experimental investigation of μ-abrasive jet machining with dust collection mechanism

Anoop Joy, Lijo Paul, Pradeep P.V.

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Abstract

Micro abrasive jet machining process is an advanced machining process used for the production of micro holes, micro channels and machining of different type of brittle materials. It is a non contact type machining process, were highly pressurized air and abrasive particles are mixed using a mixing chamber and directed towards the work piece. The material is removed by means of mechanical erosion. During the machining time, there are lot of abrasive particles expelled out and it may cause environmental pollution. To avoid this problem an abrasive dust collector mechanism with liquid film is used in the current work. In this experiment the work piece is placed in the liquid chamber and three input process parameters such as mass flow rate, standoff distance, motor speed and there effects on the output responses such as material removal rate, radial overcut and area of frosted zone is discussed. The process parameters are optimized using Taguchi method and utility concept in Minitab statistical software.

Introduction

The micro abrasive jet machining uses different type of application like micro fluidic device fabrication, micro hole drilling etc. The machining process creates environmental pollution due to the expelled abrasive particles. This problem can be solved by using a dust collecting mechanism with liquid film [1]. The abrasive jet machining are mainly used for hard and brittle work pieces [2]. The better mixing of abrasive

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Experimental analysis of the influence of discharge gap on EDM performance

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Available online 23 December 2021, Version of Record 2 April 2022.

Abstract

In order to reduce the machining time and improve the surface quality of holes, a high speed self adjusting electrical discharge machining (EDM) approach is needed with independent flushing system that were able to remove the debris in the machining process. With the change in the gap distance and depth of the hole drilled, the electrode automatically adjusts the gap with the help of a linear actuator. For that, the optimum gap distance for getting maximum result is crucial. Taguchi L27 orthogonal array technique is used for the preliminary experimental analysis. The study revealed that discharge gap which is proportional to the gap voltage is the most influential parameter that affects the surface finish and material removal rate. The formation mechanism of the hole in the copper plate had found out, in order to get the optimum gap distance for the maximum MRR, TWR, and ROC. The results from the comparison experiment shows that the best result will be get at 0.5 mm gap distance and this can be taken as the optimum gap distance for the automatic feeding mechanism. In addition, low voltage and current would benefit for the EDM process working in micro level and for the removal of the recast layer.

Introduction

Today the traditional machines are replaced by the Electric Discharge Machines in small scale and large scale industries because of the remarkable importance and advantageous of micro EDM[1]. The burr free nature of the components with least heat affected zone and better surface finish are some of them. Micro EDM has the ability to machine the particles in the micro level with better accuracy[2]. Discharge gap or gap distance is the distance between the tool and the workpiece[[3]. Most of the study revealed that the discharge gap which is proportional to the gap voltage is the major influencing parameter for increasing surface finish and MRR. The existence of the debris in the machining gap also adversely affects to the output. This debris will result in uneven sparking and drastically affect to the surface finish of the particle. The variations in the gap distance will proportionally made changes in the discharge voltage and this will seriously affect during the smooth machining of high accuracy parts. To greater the qualityof the machining, this gap distance has to be maintained by finding out the optimum gap distance for that condition. Set of experiments are done on an indigenously prepared EDM machine with different discharge gaps by adopting L27 series. A relative study is conducted and results are examined.

Section snippets

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Design, fabrication and testing of a direct methanol fuel cell stack

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Abstract

The present paper reports the results of an experimental work done on a direct methanol fuel cell (DMFC) stack. The two cell DMFC stack of active area 16cm^2 is designed, fabricated and tested. The studies are focused on determining the performance characteristics of two cell DMFC stack at various operating conditions and oxygen flow rates. In order to investigate the effect of various operating parameters on DMFC stack performance, experiments are performed at cell temperatures of 50°C, 60°C, 70°C, 75°C and 80°C. The methanol concentration varied from 2M to 5M in steps of 1M and cathode (oxygen) flow rate considered are 100 –300cc/min in steps of 100cc/min. The membrane electrode assembly (MEA) used is Nafion 117, by loading a Platinum-Ruthenium (Pt-Ru) catalyst at the anode and Pt-black catalyst at the cathode side. Results revealed that the performance of the DMFC was enhanced by increasing the cell temperature, cathode flow rate and methanol concentration. The present DMFC stack shows a peak power density of 0.1W/cm^2 with a cell voltage of 0.4V and a current density of 0.25 A/cm^2 at methanol concentration of 4M, temperature of 75°C and oxygen flow rate of 200cc/min. Comparison study between the stack and single cell of the same stack with 4M methanol solution under the operating conditions of 200cc/min and 70°C is also carried out in which maximum power density of single cell is obtained as 0.04W/cm^2.

Introduction

Fuel cells are considered to be a promising solution to the sustainable energy needs of the future. Electricity is produced directly from the fuel cells as a result of the chemical reactions occurring inside. The efficiency of these systems are very high as these cells eliminate various intermediate steps to produce the electrical energy in comparison with the conventional systems. As long as the fuel and the oxidiser are supplied to these cells, electricity is guaranteed. This is a major difference with these cells, in comparison with batteries. Fuel cells are useful to both stationary and mobile applications.

Polymer electrolyte membrane (PEM) fuel cells and alkaline fuel cells works at less than 100°C is coming under the low temperature category. Proton exchange membrane fuel cell is further divided into hydrogen fuelled PEMFC and direct liquid fuel cells. Hydrogen at higher purity levels is used as the fuel in proton exchange membrane fuel cells. The issues associated with the production and storage of hydrogen is still a limitation. In comparison with these fuel cells, direct liquid fuel cells have high theoretical energy density, easy storage, transportation and distribution of liquid fuel, and elimination of reformer and humidifier. Anode fuel in Direct Methanol Fuel Cell (DMFC) is CH_3OH and O_2 is

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Implementation of an origami inspired gripper robot for picking objects of variable geometry

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Abstract

An origami-based reconfigurable gripper soft robot, capable of replacing the current grippers in the market for pick and place application of fragile objects was designed, fabricated and tested. The device is made by integrating a six-crease water-bomb origami pattern gripper on the robotic arm. The origami inspired gripper robot is based on origami silicone rubber skeleton which is enclosed in latex skin with grasping motion obtained through a negative pressure. The primary aim of the gripper is to grasp objects of different sizes, shapes, geometry and loads without damaging the object. Current grippers are not capable of handling objects properly because of the irregularities in textures and uneven shapes. Origami based robots require lesser degrees of freedom and movement than traditional robots to achieve the gripping. Gripper's adaptability to handle objects of different shapes and sizes brings high flexibility to manipulation. Designing soft grippers with substantial grasping strength while remaining compliant and gentle is one of the most important challenges in this field. The present work describes the design and fabrication of the gripper, integration of robotic arm and testing of the gripper robot for diverse applications.

Introduction

Rigid joints and links are an inevitable part of traditional robotic grippers. Gripper designs range from two-fingered grippers to anthropomorphic hands with articulated fingers and palms. To achieve speed, flexibility and capability to handle fragile objects, the present form of grippers needs further modifications. In order to design simple and lighter universal grippers, many studies are carried out on advanced materials and soft components. Generation of shock is often an issue and it can damage the object in case of conventional grippers. A representation of conventional gripper is given in Fig. 1. In order to pick and place a wide variety of materials with various size and shape without any damage to even very fragile materials, an origami-inspired soft robot is of great potential. The origami-inspired soft robot can be modified with high precision and speed robots that can be used in industrial sorting facilities.

The term "origami" has been associated primarily with the art of folding paper. The term origami has the Japanese roots, "ori" meaning "folded", and "kami" meaning "paper". The traditional water bomb origami, produced from a pattern consisting of a series of vertices where six creases meet, is one of the most widely used origami patterns. From a rigid origami viewpoint, it generally has multiple degrees of freedom, but when the pattern is folded symmetrically, the mobility reduces to one. Fig. 2 represents an origami flying dove and Fig. 3 represent an origami bird.

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Development of standing aid for physically disabled people including Cerebral palsy

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Abstract

Health is one of the significant realms where Mechanical Engineers steer to take the leadership position by developing futuristic technologies. The undergraduate educational sector of Mechanical Engineering should be trained in this area to adapt to the transforming role of the professional Mechanical Engineering domain and to apply Engineering principles in this area. In this work, the detailed study of the development of a biomedical course in a Mechanical Engineering major is introduced. The work, initiated by analyzing physically disabled patients, focuses on the analysis of biomedical problems using engineering problem-solving skills. The possible treatment methods were analyzed from the perspective of medical experts of the Orthopaedic Department. The standing frame is manufactured with an average load capacity of 130 kg. Thus, the frame can be used as assistive technology to treat physically disabled patients through physiotherapy. This durable machine with a combined design to support different disabled parts of the body is convenient for the patients to adopt a passive upright position throughout the treatment. The joints of the standing frame are adjustable, which makes it more feasible and reliable for people of age 4 and above. This standing frame assists the differently-abled people during the standing therapy sessions. The standing frame can also be used for walking therapy by using the treadmill mechanism. The main advantages of this work are that the patient can do exercises himself according to the instructions of the Physiotherapist.

Introduction

Cerebral palsy occurs in 2.5 per 1,000 live births; otherwise, say 1 in 400 children [1], [2]. Cerebral palsy is also known as CP is a condition caused by an injury in the parts of the brain that control our ability to use our muscles and bodies. CP creates problems with movement and posture that makes certain day-to day activities difficult. A standing frame or standing aid is an assistive technology that can be used by a person who is unable to stand by themselves. Standing can help to stretch out tight muscles and maintain a good range of motion. It is especially helpful for tight hamstrings, calves and the muscles at the front of the hips.For children whohave already gota limited range of motion, certain standers can accommodate and workto enhancetheir current range. Standing frames also help for the better functioning of internal organs, helping them to operate in a natural way. This indicates the obvious advantages of the standing frame by providing a higher range of movement. [3], [4], [5], [6]. Since there are not any medicines available for the treatment, postural management is the only way of treatment. The use of a continuous postural management program was recommended for children with CP in Gross Motor Function Classification System (GMFCS) [7] levels IV and V. It is to be used when youngstersare sleeping, sitting, and standing, with particular emphasis

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Application of grey fuzzy logic in abrasive jet machining process

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Abstract. Micro Abrasive Jet Machining (μAJM) of glass materials is being used widely in MEMS and biomedical industries. Precise control of input parameters is necessary to obtain quality holes in these materials. In the present study, parameter optimization of AJM is carried out with a hybrid multi-criteria optimization technique namely Gray based Fuzzy Logic. The control variables used in this study include Nozzle diameter, Stand-off distance, Jet pressure and Angle of impact. The process performance measures taken in the study include Material Removal Rate (MRR) and Radial Over Cut (ROC). The best parameter combination for maximum MRR was found at SOD 2.5 mm, angle of impact 85°, pressure 4.5 kgf/cm^2 and nozzle diameter 3.5 mm. The best parameter combination for minimum ROC was found at SOD 2.5 mm, angle of impact 85°, pressure 5 kgf/cm^2 and nozzle diameter 2.5 mm. Gray based Fuzzy Logic is conducted to determine the most influencing parameter for AJM with maximum MRR and minimum ROC. The angle of impact is found to be the most influencing parameter.

Keywords. Abrasive jet machining (AJM); stand off distance (SOD); nozzle diameter; jet pressure; angle of impact; grey based fuzzy logic.

1. Introduction

The escalating demand for precisely machined micro fluidic and opto-electronic components calls for increasing adoption of micro machining in ceramics and semiconductors materials. Abrasive Jet Machining (AJM) machines are high hard, brittle materials with high velocity abrasive particles [1]. An alternative shadow mask technique is presented by Nouchi *et al* [2] to increase the quality of the micro features machined on glass work pieces. Accuracy of the machining is controlled by a mask attached to the work piece. The AJM is used in machining, cleaning and polishing of ceramic materials, polymers [3, 4] and is much cheaper compared to conventional machining processes. AJM has been reported as a feasible tool in Micro Electro Mechanical Systems applications in glass [5, 6]. Jagannatha *et al* [7] reported that use of hot air during AJM of soda lime glass, improves the MRR and surface finish. This work did not present the optimization of process parameters. Nouhi *et al* [8] studied the surface effect of different abrasive particles on glass workpiece. They have observed the influence of harder particles causing higher order of fracturing on workpiece. Suresh *et al* [9] have conducted machining on borosilicate glass with AJM. They have used pressure in the range of 4–6 bar and SOD 0.5 mm to 1 mm range for optimizing MRR. Srikanth and Sreenivasa [10] have also used similar pressure and SOD range with nozzle diameter in the range of 2–4 mm for optimizing the glass machining with AJM process. Domiaty *et al* [11] have used nozzle diameter and pressure in the same range for drilling of glass sheets and has reported better results. In AJM, removal occurs due to impact of high velocity air or gas stream of abrasive particles. Very less work has been reported in the Grey fuzzy optimization on soda lime glass workpiece [7, 8, 11]. Also, the impact of various process parameters in AJM is not properly addressed in many research works. Hence the present work aims optimization of machining parameters during AJM of soda lime glass.

2. Experimental procedure

The equipment has an air compressor and machining chamber (figure 1). The compressor provides air in controlled pressure. The apparatus has a vibrator for

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Abstract

The present study deals with the extended version of our previous research work. In this article, for predicting the entire weld bead geometry and engineering stress–strain curve of the cold metal transfer (CMT) weldment, a MATLAB based application window (second version) is developed with certain modifications. In the first version, for predicting the entire weld bead geometry, apart from weld bead characteristics, *x* and *y* coordinates (24 from each) of the extracted points are considered. Finally, in the first version, 53 output values (five for weld bead characteristics and 48 for *x* and *y* coordinates) are predicted using both multiple regression analysis (MRA) and adaptive neuro fuzzy inference system (ANFIS) technique to get an idea related to the complete weld bead geometry without performing the actual welding process. The obtained weld bead shapes using both the techniques are compared with the experimentally obtained bead shapes. Based on the results obtained from the first version and the knowledge acquired from literature, the complete shape of weld bead obtained using ANFIS is in good agreement with the experimentally obtained weld bead shape. This motivated us to adopt a hybrid technique known as ANFIS (combined artificial neural network and fuzzy features) alone in this paper for predicting the weld bead shape and engineering stress–strain curve of the welded joint. In the present study, an attempt is made to evaluate the accuracy of the prediction when the number of trials is reduced to half and increasing the number of data points from the macrograph to twice. Complete weld bead geometry and the engineering stress–strain curves were predicted against the input welding parameters (welding current and welding speed), fed by the user in the MATLAB application window. Finally, the entire weld bead geometries were predicted by both the first and the second version are compared and validated with the experimentally

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Recent advances in ruthenium-catalyzed hydrosilylation of unsaturated compounds: Applications and mechanistic studies

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Abstract

Organosilanes have great importance in the field of synthetic organic chemistry. They are widely used as intermediates for the preparation of natural products, elastomers, resins and act as effective coupling partners in cross-coupling reactions. Hydrosilylation of the unsaturated compound is the most effective method for the preparation of organosilicon compounds and exploited widely in the area of material chemistry and organic synthesis. Recently the area of hydrosilylation is governed by a variety of transition metal catalysts. This review examines the applications of well-defined Ru-catalytic complexes in the hydrosilylation of unsaturated organic compounds and heterocycles. The high reactivity and electron transfer property of Ru-based complexes made them a competent catalyst for hydrosilylation reactions.

Graphical abstract

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