

**3.4.4 Number of books and chapters in edited volumes / books published, and papers in national/international conference proceedings year wise**

**Enclosed first page of conference paper/book/ chapter**

**(A.Y. 2019-2020)**

## Enhancing Image Encryption Approach Through Elliptic Curve Cryptography

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### Abstract

In this paper an approach for secured transmission of images and its implementation is proposed. The proposed method proves to be better compared to various presently existing cryptographic algorithms. The basic application of this algorithm is to provide secured transmission of digital images for various multimedia usages. These encrypted messages can further be used for compact storage of information for secured applications. In this paper replaced code algorithm is used for storage efficiency, and usage of elliptic curve cryptographic algorithm provides high security.

**Key Words:** *ECC- Elliptic Curve Cryptography, Discrete Logarithm, Authenticity, Integrity, compression, block substitution.*

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Cheeryal (M), Keesara (M), R.R. Dist. (A.P.) - 501 301

# A Traditional Analysis for Efficient Data Mining with Integrated Association Mining into Regression Techniques



G. SuryaNarayana, Kamakshaiah Kolli, Mohd Dilshad Ansari,  
and Vinit Kumar Gunjan

**Abstract** A Wal-Mart salesman was trying to surge the sales data of the store by combining the commodities together and putting discounts on those products. The goods are clearly distinct thus he found that nurturing kids is exhausting. And to release pain, guardian decided to buy beer. Data Mining, also known as KDD, to find irregularities, associations, arrangements, and tendencies to forecast consequences. Apriori algorithm is a standard process in data mining. It is utilised for mining recurrent sets of items and related association rubrics. It is formulated to work on a database comprising of a lot of transactions. It is very vital for operative Market Basket Investigation and this assistance the patrons in buying their substances with more effortlessness which escalates the sales of the markets. While finding goods to be associated together, it is imperative to have some association on which the commodities can be listed together. In this research work a hybrid method has been proposed to attenuate association rules using optimization algorithm Differential Evolution with Apriori Algorithm. Firstly, Apriori algorithm is applied to get frequent itemsets and association rules. Then, AMO is employed to scale back the amount of association rules with a brand new fitness function that comes with frequent rules. it's observed from the experiments that, as compared

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A. Kumar and S. Mozar (eds.), *ICCCE 2020*, Lecture Notes in Electrical Engineering 698, [https://doi.org/10.1007/978-981-15-7961-5\\_127](https://doi.org/10.1007/978-981-15-7961-5_127)

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34 (4) 19-20



ICCCCE 2019 pp 413-418 | Cite as

# Analyzing Correlation Based Matching in Biometric System

Authors Authors and affiliations

Puja S. Prasad, Rashmi Pathak, M. Janga Reddy, Vinit Kumar Gunjan

Conference paper  
First Online: 02 August 2019



Part of the Lecture Notes in Electrical Engineering book series (LNEE, volume 570)

## Abstract

Authentication is one of the very important phase of security. Biometric authentication is now becoming more demanding as it authenticates people by using biometric traits like fingerprint, face, iris etc. Biometric authentication method is different from the traditional method of authentication in which we have to remember password or having identification card for authenticating a person. Biometric authentication is more reliable and convenient. But the performance of the biometric system is fully depending on the true matching of the feature extracted and that stored in a template. In this paper we discuss about different matching techniques that are applied in the template and the extracted feature for authenticating a person. Three different techniques that is Ridge based matching, Minutia based matching, and correlation based matching are explained in the paper. In minutia based matching is done by using minutia. Minutia is actually a specific pattern present in the fingerprint like ridge, bifurcation etc. In Correlation based matching correlation function is applied for matching and in Ridge Based Matching finger ridge feature is used for matching purpose.

  
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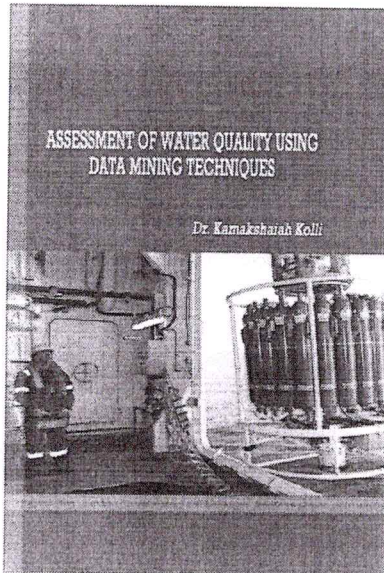


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## ASSESSMENT OF WATER QUALITY USING DATA MINING TECHNIQUES

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Operational Data – Sales, Purchase, book keeping and stock

Non Operational Data – Forecast Data

Meta Data – Data about Data.

### Detalles

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# Cryptanalysis of "A New Cryptosystem of Color Image Using a Dynamic-Chaos Hill Cipher Algorithm: A Chosen Ciphertext Attack"

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**Abstract:** This paper carries out a chosen ciphertext attack on the image encryption proposed by Said Hraoui et. al. [11]. The scheme proposed by Said Hraoui et. al. uses PWLCM to generate key matrix and other confidential information. But, the whole encryption algorithm boils down to a simple Affine Hill Cipher where only one component is generated dynamically for each pixel encryption. Since the relationship between the plaintext and the ciphertext is linear, the cipher suffers from the same weaknesses as that of the Hill Cipher. Particularly, this cipher exhibits its vulnerabilities in the face of an all zero plaintext. This paper exploits that weakness and breaks the cipher.

**Keywords:** PWLCM, Hill Cipher, Chaotic Maps, Image Cryptography, Cryptanalysis, Chosen Plaintext Attack.

## 1 Introduction

Growing dependence on the Internet in every sphere of activity necessitated the incorporation of strong measures for the security and privacy of the information. Cryptography is widely used for ensuring the confidentiality of information that is exchanged over the Internet, be it in the form of Textual data or multimedia. Cryptographic algorithms are classified as private key algorithms and public key algorithms depending on the number of keys involved, in encryption and decryption. They are also classified as block ciphers and stream ciphers depending on the unit of encryption (one byte / a group of bytes).

Hill Cipher [1, 2] proposed by Lester Hill is the first encryption algorithm, reported in the literature, that encrypts multiple characters at a time. This cipher, though exhibits very good diffusion property, is vulnerable to known plaintext attack as the relationship between plaintext and the ciphertext is linear in nature. There are numerous modifications proposed by various researchers to the Hill Cipher algorithm [3-10].


  
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Data Management, Analytics and Innovation pp 157-169 | Cite as

# Optimized Capacity Scheduler for MapReduce Applications in Cloud Environments

Adepu Sree Lakshmi , N. Subhash Chandra & M. BalRaju

Conference paper | First Online: 10 August 2018

748 Accesses | 2 Citations

Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 808)

## Abstract

Most of the current-day applications are data centric and involves lot of data processing. Technologies like hadoop enable data processing with automatic parallelism. Current-day applications which are more data intensive and compute intensive can take advantage of this

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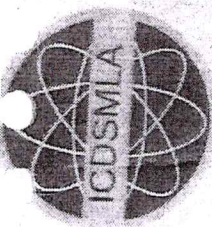
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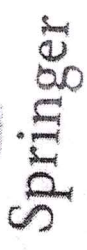
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## Enhanced Scrambled Prime Key Encryption Using Chaos Theory and Steganography

Authors Authors and affiliations

Shanmukha Shreyas Vedantam, Kushalnath Devaruppala, Ravi Shankar Manduri

Conference paper

First Online: 11 November 2019


Part of the [Lecture Notes on Data Engineering and Communications Technologies](#) book series (LNDECT, volume 38)

### Abstract

In this paper we have analyzed the strength and weakness of scrambled prime key encryption proposed by Haidar et al. [10] for data encryption using key elements which are prime numbers. However, this scheme exhibits its vulnerabilities in the face of chosen plaintext attack. Hence we, in this paper, extended the algorithm by introducing chaos theory and steganography, which offers better security and robustness. We have taken the partially encrypted text from [10] and embedded the same in a carrier image. In this process, we have chosen a novel chaos generator to select the pixels into which the text is to be embedded.

### Keywords

Double rod pendulum Pendulum velocity Pendulum acceleration Encryption Decryption Steganography Chaos theory

  
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# Feature Descriptors for Face Recognition

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**Abstract-** Human face has lot of information about identity as well as emotional status of the individual. Face recognition for authentication purpose is a challenging as well as an interesting problem. These problems have great impacts on crucial applications in several areas like identification, banking, law enforcement, security system access, and personal identification etc. This paper focuses on to provide information about different finding face descriptors for an image so that it can be used for classification purpose for various machines learning algorithm. Different types of finding descriptors are divided into two main types. Heuristic and Local Binary Pattern. PCA and LDA works on principal component and Fisher Discriminant Criterion for facial images.

**Keywords-** PCA, LDA, Face, Karhunen-Lo`eve expansion, LBP Histogram

## I. INTRODUCTION

The way of identifying and verifying individual by analysing different features of the face comes under facial recognition. The method include capturing, analysing, and classifying patterns is completely based on the individual facial details. Biometric approaches works on identifying individuals by their unique physical characteristics like fingerprint ,irises, palm print etc. Traditional method of authentication like Personal Identification Numbers as well as password have already in use to identify persons but the main drawbacks of such authentication methods are that they can be easily forgotten or chances of someone else may use them. Due to these drawbacks, the growth of biometrics authentication come forward like fingerprint, iris/retina. Face recognition, and speech recognition and it provides a good solution for identifying individuals The main advantage with the biometric is that it not only distinctively identify individuals, also reduces the risk of theft of password or using someone else identity. Biometric is growing as well as demanding technology[3]. Even in certain Biometric traits require active cooperation from individuals like fingerprint, speech recognition retina, iris, ear lobe[1][3]. For instance,

recognition using fingerprint require applicant to compress their fingers to fingerprint authentication device effectively similarly iris/retina recognition needs applicant to keenly stand front of a iris/retina scanner, or speech recognition requires individual to speak carefully in front of microphone. Among all the biometric traits face recognition is considered a good solution because of its flexibility in a manner that persons are recognized keenly, by positioning in front of a camera of a face recognition device, or passively, walking beside a camera

or a face scanner. But face recognition or identifying individuals considered to be very challenging task due to its dynamic property[1].

The changes in face recognition is due to its variation of facial expression, lighting condition during capturing images, different orientations as well as Pose variations etc. Nowadays number of techniques are developing like RFID and facial recognition [2] and research is going on to minimize the problems that affect the facial recognition process. The main aim is to make system more robust as well as to enhance accuracy. But there are number of challenges in developing facial recognition system like age , facial expression, device quality etc. [4].

The main aim is to find efficient descriptor for individual face. Several works have been done in this area and this is divided into three broad areas-

- a. Holistic Method
- b. Local Region Methods-EBGM
- c. LBP based Face Descriptions

## II. HOLISTIC METHOD

The holistic method describes full face attributes like facial components distribution, skin color, outline of facial features etc. This method makes use of global information of the face for performing recognition task. The pixel value of small number of features present in the face images comes under global information [5].

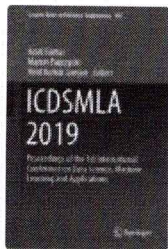
The main idea behind is to calculate variance among multiple faces to uniquely identify persons. This paper will briefly discuss two holistic method for face recognition named.

- i. Karhunen-Lo`eve expansion
- ii. Linear Discriminant Analysis

### A. Karhunen-Lo`eve expansion


Karhunen-Lo`eve expansion called Hotelling transform(HT) or Principal Component Analysis(PCA), is usually concerned with feature selection for signal representation. The main aim is to find principal component from the face image for signal representation. Some small number of features act as a principal component by applying Karhunen-Lo`eve expansion on the face image. In face images principal components have obtained by converting two- dimensional feature spaces into one dimensional feature subspace shown in Fig. 2. By Computing

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**ICDSMLA 2019** pp 1984–1988

## Machine Learning Methods for Extraction and Classification for Biometric Authentication

Vinit Kumar Gunjan, Puja S. Prasad, Rashmi Pathak  & Amit Kumar

Conference paper | First Online: 19 May 2020

**43** Accesses

Part of the Lecture Notes in Electrical Engineering book series (LNEE, volume 601)

### Abstract

In this paper our main focus is to discover different machine learning techniques that are useful biometric System. As biometric authentication system is a combination of both image processing and pattern recognition, in this classification of pattern is a difficult task. Machine learning have number of algorithm that makes classification task easy. Machine learning is divided as supervised as well as unsupervised learning. In unsupervised learning the machine construct representation of

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Dr. G. Soma Sekhar

### Key exchange and E-mail authentication using lagrange interpolation

[PDF] from researchgate.net

Authors P Lalitha Surya Kumari, G Soma Sekhar

Publication date 2020

Book Data Engineering and Communication Technology

Pages 253-264

Publisher Springer, Singapore

Description All corporate and government sectors like the aviation, banking, military, etc., need to determine genuineness of an authenticated user. This paper proposes an identity-based secure authentication system for e-mail security using Lagrange interpolation based on the concept of Zero-Knowledge Protocol. This protocol makes the user to prove to the server that he/she has password without sending any information, either encrypted password or clear text to the server and also without intervention of the third party (authentication server). In this protocol, one party allows the other party to confirm whether the statement is true without revealing any other information. Mutual identification of two users is done using this protocol, and it involves exchange of pseudorandom numbers to generate secret key or session key which in turn is used for encryption and decryption. Polynomial-based session key is generated using ...


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## Position Domain analysis of modernized GPS Ionosphere-free Code Observations

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### Abstract

New signals (L2C and L5) are added as a part of GPS modernization to improve the achievable accuracy of the system. Compared to the legacy signals (L1/L2), new signals provide good cross-correlation performance, Forward Error Correction (FEC) and tracking facility. But the systematic errors in range measurements are the concern, particularly due to the ionospheric delay. The ionosphere-free linear combinations of dual frequency code or carrier phase measurements can be used to correct the refraction effects on GPS signals. The availability of L2C and L5 on Block-IIR satellites has given an opportunity of direct comparison of coded signals instead of carrier-phase measurements. Simulation studies in the open literature on optimal linear combinations are focused in measurement domain. The analysis in respect of precision on coordinate parameters is essential to realize the optimal linear combination in position domain. Two ionosphere-free linear combinations L1/L5 and L2C/L5 of undifferenced/zero-differenced GPS coded signals are investigated for Single Point Positioning (SPP).

### 1. Introduction

Modernization of GPS is in progress by providing services through new civilian signals such as L5 and L2C along with Military codes on L1 and L2 signals. The L5 signal is the third civilian signal, after L1C/A and L2C. These three civilian signals can be used for Standard Positioning Services (SPS) by all the GNSS users worldwide for free of cost. Correcting for ionospheric error is a significant challenge to improve the positional accuracy. Either code-phase or carrier phase measurement on different frequencies can be combined to compensate for ionospheric delay. The undifferenced pseudorange/code-phase observables can be processed to obtain Single Point Position (SPP) solution.

Extensive research by Cocard and Geiger [1], Han and Rizos [2], Odjick [3] and Richert [4] outlines the criteria for optimal linear combinations using dual and triple frequency carrier phase measurements. However, the focus is into the measurement domain but not in the position domain. Also in case of triple frequency most of the research reported is based on simulated of signal measurements. In critical applications like Local Area Augmentation systems (LAAS) for category precision landing of aircrafts, code-

phase measurements are processed for navigation solution. Therefore, in this paper the undifferenced dual and triple frequency ionosphere-free code-phase linear combinations in position domain are evaluated.

### 2. Modernized GPS Signals

The satellites from Block-I through Block-IIR transmits C/A-code on L1 frequency and P(Y) code on both L1 and L2 frequencies. However, the new generation of satellite vehicle Block-IIR-M (L2C) and Block-IIF (L5I and L5Q) are under deployment to transmit additional civil signals. In addition to this, for PPS an M-code signal on L1 and L2 frequencies is transmitted to overcome the legacy P(Y) code in terms of accuracy and security. The representation, L2C indicates civil signal on L2 carrier frequency. As the L2C signal belongs to Radio Navigation Satellite Services (RNSS) band, it is not appropriate for civil aviation. On the other hand, L1 and L5 can be used for safety of life applications, as these frequencies belong to Aeronautical Radio Navigation Service (ARNS) band. The L5 signal is the third civilian signal, after L1C/A and L2C. The Block III GPS satellites will have the fourth civilian signal L1C superimposed on L1 carrier in near future. This is a new civil signal that has backward compatibility with L1C/A.

### 3. GPS principle of operation

The GPS receivers track and acquire afore mentioned signals, and measure ranges to all the satellites in-view to estimate the user's position in 3-D (latitude, longitude and height). Let the user be at  $x_u$ ,  $y_u$  and  $z_u$  in earth fixed, earth centered coordinate system and the Satellite Vehicles (SVs) be at  $x_i$ ,  $y_i$  and  $z_i$  (where  $i=1,2,3,4$ ) in the same coordinate system as the user. Fig. 1. depicts principle of operation. Assuming that the user starts his clock at  $t_u$  seconds, receives signals at  $t_i$  ( $i=1, 2, 3, 4$ ) seconds from SV and  $\Delta t$  is the time offset between the user and SV. 3D position and time offset are obtained by simultaneously solving the nonlinear equations [5],

$$(x_u - x_i)^2 + (y_u - y_i)^2 + (z_u - z_i)^2 = c(t_i - t_u + \Delta t)^2 \quad (1)$$

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### Performance Analysis of SBAS Aided GNSS Positioning

B. Ramu<sup>(1)</sup>, V. Satya Srinivas\*<sup>(1)</sup>, and S. Jyothirmaye<sup>(2)</sup>  
 (1) Geethanjali College of Engineering and Technology, Cheeryal(V), 501301,  
 e-mail: sathyavemuri@gmail.com

The navigation solution of multi-GNSS can be further improved with help of additional ranging signals from Satellite Based Augmentation systems (SBAS). Apart from ranging, SBAS satellites provide differential corrections and integrity monitoring ability. Several SBAS systems are operational in various parts of the world, such as WAAS (U.S.A), EGNOS (Europe), Beidou (China), MTSAT (Japan) and GAGAN (India) [1]. In the present study the satellite signals of multi-GNSS (GPS, GLONASS and Galileo) along with SBAS satellite signals visible at the GCET station are considered for evaluation of accuracy of the position. The error in the estimated position of GNSS receiver is usually described by terms accuracy and precision. The degree of closeness of an estimate to its true position, which is an unknown value is accuracy and precision is the degree of close of observations to their mean value. To quantify accuracy and precision, 2D-RMS horizontal and vertical error and 3D position error are calculated. The measured accuracy is evaluated instead of formal and predicted accuracy. The standard deviation of position error along x, y and z-axis have to be calculated from the estimates and is given as [2],

$$\sigma_x = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}; \sigma_y = \sqrt{\frac{\sum_{i=1}^n (y_i - \bar{y})^2}{n-1}}; \sigma_z = \sqrt{\frac{\sum_{i=1}^n (z_i - \bar{z})^2}{n-1}}$$

The following relations are used to determine error in 2D and 3D positioning,

$$2D - RMS = \sqrt{\sigma_x^2 + \sigma_y^2}; 3D - RMS = \sqrt{\sigma_x^2 + \sigma_y^2 + \sigma_z^2}$$

Multi-frequency GNSS receiver of make Septentrio, Nv (Model: PolaRxs pro) capable of tracking GNSS (GPS, GLONASS, Galileo) and SBAS (WAAS, GAGAN, EGNOS) satellite signals was setup at Geethanjali College of Engineering and Technology (GCET), Hyderabad, India. A typical day data of 9<sup>th</sup> Oct. 2018 is considered for the analysis. The SBAS satellites available at site include GAGAN, WAAS and MTSAT. LI SBAS satellites up to maximum six are visible. A maximum 22 and a minimum of 17 satellites are visible over 24 duration in a day. The error in X,Y, Z coordinates are depicted Figure 1.

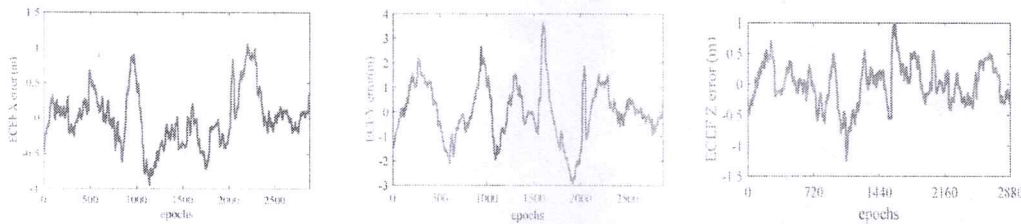


Figure 1. SBAS aided GNSS position error in X, Y and Z coordinates

The 2D and 3D position error are around 1.25 m. With this accuracy the coordinates of location are derived and are represented in X (1199419.67493542 m), Y (5965113.2901434 m) and Z (1908094.81560625 m).

- [1] Richard B. Langley, Peter J.G. Teunissen, and Oliver Montenbruck, "Principles of GNSS", Handbook of GNSS, Springer International Publishing, 2017, pp.3-23.
- [2] S. Subirana J, J.M. Juan Zornoza and M. Hernández-Pajares, "GNSS Data Processing: Fundamental and Algorithms", ESA manual Vol.1, May 2013.

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## Code-phase based combined GPS-Galileo positioning using Ionosphere-free linear combination

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### Abstract

To reduce the uncertainty in location information supplied by GNSS receiver, the range errors (clock bias, troposphere, ionosphere, multipath etc.,) have to be eliminated. The linear combinations of multi-frequency GNSS observables, will aid in eliminating most of the errors. The ionospheric error is treated as predominant error and can be mitigated by using ionosphere-free linear combination. In this paper, the attainable accuracy using ionosphere-free linear combination of combined GPS L1/L5 and Galileo E1/E5a is evaluated for single point positioning. Taking the advantages of availability of civilian codes on signal frequencies, code-phase measurements are used instead of carrier-phase. The 95<sup>th</sup> percentile horizontal, vertical and 3D position accuracies are 1.08m, 0.80m and 1.81m respectively

### 1. Introduction

The reliability of GNSS range measurements are degraded due to systematic errors or biases and random noise as well. Therefore, pre-processing, processing, analysis and proper interpretation of measurement data is required for achieving optimal navigation solution. The issues addressed in pre-processing include cycle slip detection and repair, ambiguity resolution and code smoothing. The mitigation and modelling of biases and systematic errors in measurements comes under processing. Several algorithms using single, double and triple difference techniques are developed with various linear combinations of dual frequency data for static and kinematic applications. The common limitation among these techniques is that, they depend on the baseline distance between the pair of receivers involved for processing the data. Apart from differencing techniques, new observable can be derived from the basic GNSS observations of multi-frequency, such that new signals can be generated with various with unique properties capable of eliminating GNSS errors and this is achieved using linear combinations [1]. In the present study the ionosphere-free linear combination in position domain for dual system (GPS and Galileo) is investigated.

### 2. GNSS signal characteristics

The modernization of GPS and upcoming Galileo provide open services with new civilian codes on the following

three radio frequencies L1/L2/L5 and E1/E5a/E5b respectively. The wavelengths of these signals are in between 19-25 cm. The frequencies of the signals are L1 (1575.42 MHz), L2 (1227.60MHz) and L5 (1176.45 MHz) and in case of Galileo E1(1575.42 MHz), E5a (1176.45 MHz), E5b (1207.14 MHz). These carrier frequencies are Bi-phase modulated in GPS and BOC modulated in Galileo system, by spread spectrum codes with a unique PRN sequence associated with each satellite vehicle (SV) and by the navigation data [2]. The dual mode GPS/Galileo with open service signals will enhance robustness of the navigation solution. Even in future, the dual frequency GBAS system can be deployed and get benefited from these new signals. Therefore, an attempt is made to evaluate the dual mode GPS/Galileo positioning using L1/L5 and E1/E5a signals.

### 3. Linear combinations

Developing various linear combinations of multi-frequency phase or code data, an optimal pseudo observation can be derived. The optimal combination will aid in elimination or mitigation of GNSS errors. Several linear combinations are proposed using GPS L1/L2 data. The various linear combinations are, narrow-lane, ionosphere-free, wide-lane, semi-wide-lane, and geometry-free combinations etc. The systematic errors eliminated using a specific linear combination can be found in open literature [3].

In particular, with ionosphere-free linear combination, most of the analysis carried out is mostly in measurement domain and not in position domain. The advantage of using linear model is that it can be directly in least squares adjustment to obtain position solution and eliminates using of a particular ionospheric model. Because, though Global, regional and local ionospheric models are being developed for supporting GNSS systems worldwide. The spatial and temporal resolution of these models is limited and major error still remains at times of high solar activity periods.

#### 3.1 Ionosphere-free linear combination

This linear combination eliminates the effect of ionosphere. This is widely used in time and frequency transfer applications as well. The noise in the derived measurements is less. The possible ionosphere-free combinations using GPS frequencies can be found in open literature [3]. The ionosphere-free linear combination or





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## IRNSS User Range Accuracy Evaluation for Receiver Autonomous Integrity

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### Abstract

Civil aviation is one sector that immensely will get benefited from Indian Regional Navigation Satellite System (IRNSS) services. However, for safety of life applications, integrity of navigation solution is crucial. Integrity of the system depends on Signal-in-Space (SIS) errors. The user range accuracy (URA) transmitted in navigation message for each satellite is a conservative estimate of SIS error and can be mainly used for integrity monitoring. Therefore, investigation of URA is important. Further, for development of receiver autonomous integrity monitoring algorithm for IRNSS, the typical value of URA has to be defined. In this paper, the cumulative distribution of URA is analyzed to over bound SIS errors. The sigma URE for 68% over bound is 2.8m.

### 1. Introduction

Indian Regional Navigation Satellite System (IRNSS)[2], is an emerging and independent satellite based navigation system developed by India with a proposed constellation of 7 satellites (4 Geosynchronous with 290 inclination and 3 Geostationary) with L5 and S-band ranging payloads. It is also called as Navigation with Indian Constellation (NavIC) system. Users of several applications including civil aviation get benefited from the standard Positioning Services (SPS) of this system. IRNSS is deployed to cover Indian subcontinent with extended service capability around 1500 km. At present the IRNSS constellation has 8 satellites (IRNSS-1A, 1B, 1C, 1D, 1E, 1F, 1G and 1I) on orbit. The present study is with respect to URA, which is a statistical indicator of range error obtained from a specific satellite and important parameter need to be defined precisely for implementation of RAIM or Advanced RAIM algorithms for IRNSS [1] [2].

### 2. IRNSS architecture

The architecture of IRNSS consists of three main segments namely, the space segment, ground segment and user segment [3].

**Space Segment:** It consists of three geostationary (GEO) and four geosynchronous (GSO) satellites located at 32.5° East, 83° East and 131.5° East longitude. At equator 55° East and 111.75° East, two GSO cross the plane. These satellites broadcast signals to the user segment for positioning, navigation, and timing (PNT).

**Ground Segment:** Space Craft Control Centre (SCC), IRNSS Navigation Centre (INC), IRNSS TTC & Up linking Stations (IRTTC), IRNSS Range and Integrity Monitoring Stations (IRIMS), IRNSS Timing Centre (IRNWT), IRNSS CDMA Ranging Stations, (IRC DR) Laser Ranging Station (ILRS) and Data Communication Network (IRDCN) are a part of ground segment. The SCC and the INC predict and provide IRNSS satellite positions, calculate integrity, ionospheric and clock corrections as well.

**User segment:** As the IRNSS satellites transmit signals on L5 and S band. Dual-frequency receivers (L5 and S band frequencies) or single frequency (L5 only frequency) are being developed.

### 3. Signal-in-space errors

The integrity of IRNSS is required for many applications including civil aviation, vehicle tracking, fleet management, disaster management etc. It is desired to monitor the satellite performance to maintain integrity. This requires SIS measurement, to identify the satellite failures of the systems. If SIS error exceeds 4.42\*URA, it can be considered as a major service failure. Therefore, evaluation of URA is critical [4][5].

### 4. RAIM

Receiver autonomous integrity monitoring (RAIM) is the ability of the receiver to check or assess the integrity of the satellite system (IRNSS) at receiver/user level. For applications with stringent accuracy requirements IRNSS system does not provide any integrity information of transmitting signals. There is a possibility, that a satellite broadcast slightly incorrect information which will cause the navigation information to be incorrect. However, there are no standard techniques to check for integrity. Conventional RAIM techniques/algorithms are based on least square approach using redundant signals to determine whether or not a fault is associated with any of the signals of single constellation. Advanced RAIM is a proposed extension of RAIM to multi-constellations of GNSS [4]. This is to enhance horizontal guidance coverage and eventually provide regional/global coverage of vertical guidance.

Either RAIM or ARAIM, their performance is affected by the various errors, especially the SIS (Signal-In- Space)

  
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**Fast Satellite Selection Techniques and DOPs for Multi-GNSS Positioning**

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**Abstract**

GNSS receivers are designed to track more of satellites corresponding to multi-constellation (GPS, GLONASS and Galileo). As the position error is function of DOP, which is a multiplicative factor, selection of subset of satellites with minimal Dilution of Precision (DOP) is crucial. Further, due to possibility of tracking more than 20 satellites, fast satellite selection techniques that provide optimal Dilution Precision DOP with less computational load are essential. In this paper, three prominent fast satellite selection techniques namely Quasi Optimal, Recursive Quasi-optimal and ..... are evaluated for multi-constellation.

$$A = \begin{bmatrix} \frac{x_s - x_r}{\rho_1} & \frac{y_s - y_r}{\rho_1} & \frac{z_s - z_r}{\rho_1} & 1 \\ \frac{x_s - x_r}{\rho_2} & \frac{y_s - y_r}{\rho_2} & \frac{z_s - z_r}{\rho_2} & 1 \\ \dots & \dots & \dots & \dots \\ \frac{x_s - x_r}{\rho_n} & \frac{y_s - y_r}{\rho_n} & \frac{z_s - z_r}{\rho_n} & 1 \end{bmatrix} = \begin{bmatrix} LOS_1 & 1 \\ LOS_2 & 1 \\ \dots & \dots \\ LOS_n & 1 \end{bmatrix}$$

**1. Introduction**

The performance of GNSS is not only affected by systematic error but also because of user satellite geometry i.e. Geometric Dilution of Precision (DOP). Traditional techniques used for selection of subset of satellites include highest elevation satellite selection algorithm, Kihara's maximum volume method and Four-step satellite selection technique etc. The above said techniques had limitations in terms of Floating point operations (FLOPs) and in some techniques though availability of satellites are in good number, still only a minimum of four satellites can be considered for DOP estimation. Therefore, fast satellite selection (FSS) techniques are being developed. However, it is also important to obtain optimal DOP values.

**2. DOP computation and rating**

The Geometric DOP is square root of variances of receiver position estimate in east, north, up component and receiver clock offset [1].

$$\sigma_G = \sqrt{\sigma_E + \sigma_N + \sigma_U + \sigma_{dt}} \tag{1}$$

$$= \sigma \text{tr} \{ (A^T A)^{-1} \}$$

DOP is computed from the design matrix 'A' elements (Eq.), which contains X, Y, Z (ECEF) coordinates of satellite vehicles visible at an instant of time. The co-factor matrix (Q<sub>X</sub>) is expressed as,

$$Q_X = (A^T A)^{-1} \tag{2}$$

The design matrix 'A' is given as,

where,

$x_r, y_r, z_r$  and  $x_s, y_s, z_s$  are receiver and satellite positions in ECEF coordinates.

$\rho_{1,n}$  are the respective pseudoranges from satellite to the receiver/user.

The subscript 'X' in Eq.(2) signifies the result in ECEF coordinate system. Q<sub>X</sub> is a [4x4] matrix and the elements of the matrix are as follows,

$$Q_X = \begin{bmatrix} q_{xx} & q_{xy} & q_{xz} & q_{xt} \\ q_{yx} & q_{yy} & q_{yz} & q_{yt} \\ q_{zx} & q_{zy} & q_{zz} & q_{zt} \\ q_{tx} & q_{ty} & q_{tz} & q_{tt} \end{bmatrix} \tag{3}$$

The diagonal elements of the Q<sub>X</sub> matrix are used to compute following DOPs:

Geometry DOP (GDOP) :  $\sqrt{q_{xx} + q_{yy} + q_{zz} + q_{tt}}$  (4)

Position DOP (PDOP) :  $\sqrt{q_{xx} + q_{yy} + q_{zz}}$  (5)

Time DOP (TDOP) :  $\sqrt{q_{tt}}$  (6)

These DOPs (GDOP, PDOP and TDOP) are expressed in equatorial plane. In order to define HDOP and VDOP, the transformation of 'Q<sub>x</sub>' matrix to local coordinates (n, e, u) is essential. "The factor that multiplies error in ranges to give approximate error in position is PDOP" (Strang and Borre, 1997). The dilution of precision in horizontal (two dimension), vertical (one dimension) and with respect to time are denoted as HDOP, VDOP and TDOP respectively. Table 1 depicts the rating for geometric DOP values [2].

**CH. Kranthi Rekha, Dr. B.L. Prakash**<sup>1</sup>KL University, Vijayawada,, City, 522502, India<sup>2</sup>Geethanjali College of Engineering and Technology, Medchal, 501301, India\*Corresponding Author. +919652307800, [sk1101143@gmail.com](mailto:sk1101143@gmail.com),+919346314538, [prakashvignan4368@gmail.com](mailto:prakashvignan4368@gmail.com)**Abstract**

Dermis canker detection is trivial task for medical practitioner in proper diagnosis. It is also observed in literature that dermis canker images suffer from textural noise referred to as sparse convolution noise. It is found that this noise representation and evaluation is a significant problem as the noise effect should be detectable and solved. So noise removal should be procedural and fast to implement. Hence its spectral content should be easily evaluated. This can be achieved by representing the sparse convolution noise by proper and specific random process. In this paper sparse convolution is described as a random process and represented using Poisson spectrum function. Sparse noise is also anisotropic in nature. Some of the removal techniques are developed in this paper. Sparse noise is easily removed by using hybrid method such as order statistics filter combined with fuzzy neural networks (OSFN). The performance of this method is compared with various conventional methods such as split Bregman algorithm etc. Peak Signal to noise ratio (PSNR), Mean Absolute error (MAE), Mean square error (MSE) are the parameters used for testing performance analysis of the proposed and existing methods.

Deep learning is an approach that makes computer to learn and gain knowledge through practice. Deep learning also performs classification of data without involvement of human interpretation. Deep learning is one form of neural network constituting several layers in the architecture. Convolutional neural network (CNN) is the most commonly used deep learning neural network. CNN uses large trained data set. CNN plays a significant role in feature extraction and classification from a very large data set. For medical applications of image processing, it is essential that the data produced at the system input should be without non-linearity and good in appearance. Thus the proposed approach consists of the following steps.

1. Collecting database and training the neural network.
2. Pre-processing of data.
3. Feature extraction and classification.

**Keywords:** Convolutional networks; deep learning; GoogleNet; Artefacts.

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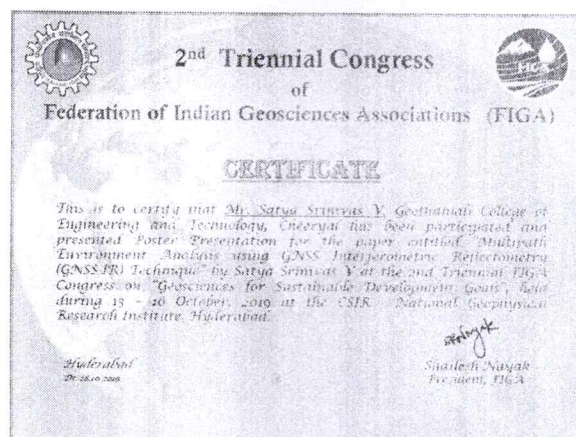
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## Multipath Environment Analysis using GNSS Interferometric Reflectometry (GNSS-IR) Technique

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### Abstract

The usefulness of Global Navigation Satellite Systems (GNSS) technology is not limited only to positioning, Navigation and Timing (PNT) applications but also revolutionizing in monitoring the environment. Multipath effect is considered as one of the major debilitating factor on GNSS systems. In the open literature, several approaches based on hardware, software and hybrid methods to mitigate the multipath are proposed. Since the multipath scenario depends on individual antenna environment, new techniques and methods like GNSS-IR are also now in use to sense the near-field environment. The signal reflections in near-field environment are due to terrain, buildings, vehicles etc. The focus of work in this context is mainly applied to understand the Fresnel zone for GNSS antenna site and estimation of changes in the height of a reflecting surface from GNSS SNR data. A multi-frequency GNSS receiver of Make: Septentrio, NV (Model: PolaRxs pro) capable of tracking GPS, GIONASS, Galileo and SBAS (WAAS, GAGAN, EGNOS) satellite signals was setup at Geethanjali College of Engineering and Technology (GCET), Hyderabad. The antenna was mounted on the terrace for better view of SVs and the mask angle is set to 10°. The data with sampling interval of 15 s is used for the analysis. The first Fresnel map view shows a 360-degree azimuthal coverage at the site at an elevation of 15° and below.



  
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# DESIGN AND IMPLEMENTATION OF VINCULUM BINARY CODED DECIMAL MULTIPLIERS USING VINCULUM BINARY CODED DECIMAL COMPRESSORS

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## Abstract:

Compressor logics are used to speed up the processing time. These structures are used for addition of Partial Products in multipliers. It reduces the complexity by reducing number of stages in addition. This paper speaks about addition of partial products using Vinculum BCD compressors under Vedic Mathematics. The proposed architecture reduces 7.04% of delay over VBCD and around 20% delay on conventional BCD multipliers when it was synthesized and simulated on vertex 6 platform using Xilinx 14.2i.

**Keywords:** Vinculum numbers, Compressors, multipliers

## Introduction

In recent years nationally and internationally researches on Vedic mathematics is growing very much because of its efficiency, fast and ease of learning all algebraic and arithmetic operations. It was acknowledged by all over world that Vedic mathematics is faster than conventional methods. Vedic mathematics is a part of Adharva Veda. It explains about the formulas pertaining to various Engineering branches, sculpture, Mathematics, and all other sciences which are an emerging field for research. These formulae are suitable for building digital circuits and can be implemented using binary and decimal number system. The work was focused on addition of partial products using compressor logic in Vedic Multiplier (Urdhav Triyakbhyam method)

The paper is organized as follows. Section I presents Vedic mathematics and its algorithm for an 8bit multiplication. Section II describes Compressor

logic. Multiplier using Compressors is proposed in section III, Section IV shows simulation results and finally conclusion is provided in section V.

## I. Vedic Mathematics:

### 1.1 8bit Vedic multiplier Line Diagram

Figure 1 shows step by step procedure of multiplication[15].

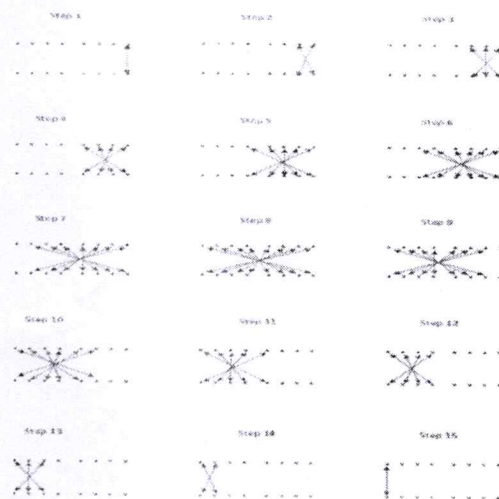


Fig 1: 8-bit Vedic Multiplier line diagram

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# Denoising of ECG signals using wavelet transform and principal component analysis

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## ABSTRACT

Electrocardiogram (ECG) is used for the analysis of the electrical activity of the heart. Processing of these ECG signals is thus important for detecting the presence of any abnormalities or onset of diseases. Distortion due to noise results in changes in the amplitude and frequency of the signal obtained, resulting in an inaccurate diagnosis. Various denoising techniques have been employed to remove noise or extract critical information from the signal. This paper attempts to study Discrete Wavelet Transform (DWT), Principal Component Analysis and associated parameters such as wavelet family, thresholding method and component analysis rule. Through results analysis, it was determined that Symlet wavelet family provided the best results for noise removal of the signals with its high SNR and PSNR values and it was observed that the scaling function of a symlet resembles that of a clean ECG signal.

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## 1. Introduction

This paper deals with the application of wavelet transform and principal component analysis on a noisy electrocardiogram (ECG) signal, while studying the efficiency of different wavelet families under the same conditions.

### 1.1. Electrocardiogram

The detection and measurement of electrical signals in the heart is done using Electrocardiograms. The procedure of acquiring ECGs is efficient and non-invasive, making them ideal for diagnosis. An ECG signal consists of the following segments (Mustapha El Hanine, et al (2014)):

- P wave: It is caused by atrial depolarization and represents a low voltage deflection shifted away from the baseline of the signal. (P. McSharry, G. Clifford, L. Tarassenko and L. Smith, (2003)).
- QRS complex: This complex has the largest amplitude in the signal. Caused by depolarization of the ventricles that generates contraction of the ventricles, a significant portion of clinically useful data is found in this complex. (E. Ashley and J. Niebauer (2004)).
- T wave: It is caused by repolarization of ventricles.

A recorded ECG often has noises and artifacts from different sources within the frequency band of the ECG present in it. These artifacts can change the parameters and characteristics of the signal. Thus, denoising the signal is important to extract useful information from it. Acquisition of noiseless signals is thus, paramount to determine the right parameters of the signal. An ECG signal may be corrupted due to the following (R. Khandpur, (2018)):

- Power line interference: The stray effects of alternating current or fields due to looping of cables can lead to disturbances while recording an ECG. It is visualized as impulses at 50-60Hz as well as additional spikes at multiples of the fundamental frequency. A 60Hz notch filter is usually used to remove the interference.
- Baseline wander: This represents the noise due to respiration or movement of the patient or electrodes resulting in low frequency artifacts. The removal of baseline wander is instrumental in analyzing a signal for both processing and interpretation. High pass filters can be used to distort the waveform.
- Muscle tremor: This is found in cases concerning older patients when muscles are cold or not relaxed. Muscle tremors are most prominent on the limbs. Hence, electrodes are usually placed on the chest.



## Statistical Modelling of GNSS Multipath Error Using Triple-Frequency Linear Combination

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### Abstract

Multipath is considered as the major debilitating factor affecting the accuracy of global navigation satellite system (GNSS) and can lead to position error of 10 meters. Therefore, multipath characterization and modelling is indispensable. Now multipath error can be precisely estimated using triple frequency linear combination of GNSS signals. In this paper the triple frequency linear combination of code measurements of GPS (L1/L2C/L5) and Galileo (E1/E5a/E5b) signals are considered to precisely estimate the multipath and statistical model the error distribution. For multipath free environment the data with residual multipath error, does not follow any distribution.

### 1. Introduction

The shadowing of the signal from obstructions, foliage etc., and signal reflections due to terrain, buildings, vehicles etc., cause multipath error. The combination of multipath and shadowing is more detrimental in the context of multi-GNSS positioning. Multipath is considered as systematic as well as random error depending upon the type of application. The calibration of multipath remained as unsolved problem even after efforts by many investigators. Multipath introduces errors in both code phase and carrier phase measurements and subsequently in Position, Velocity and Time estimation. To reduce multipath effects various counter measures are deployed. These approaches include hardware (Multipath Estimating Delay Lock Loop (MEDLL) technique, Multiple Signal Classification (MUSIC) technique with multiple antennas etc.), software (filtering techniques like RLS, MLS etc.) and hybrid (combination of both hardware and software) [1]. Altogether, these methods have their own advantages and limitations and can be found in open literature [2]. The new receivers today available in market are capable of Tracking signals of multi-GNSS systems. Therefore, the receiver should be capable of processing the multi-frequency signals of these systems in complex environment, while adopting suitable models for various errors of GNSS link-budget. Further, in the development of software-based receiver and simulators for GNSS applications, the algorithms for multipath characterization for various

environments will improve the commercial value of the receivers for various applications. Therefore, deep understanding of multipath characteristics is essential.

In the present study the linear combination of code measurements of GPS and Galileo signals are considered to precisely estimate the multipath at the station (GCET). As triple frequency approach found to be promising for precise estimation of multipath at a location, the three frequencies signals of GPS (L1/L2/L5) and Galileo (E1/E2/E5) are used. The following distributions namely Weibull, Gamma, Normal Beta and uniform ones are tested with the experimental data.

### 2. Multipath estimation: triple frequency linear combination

Direct and indirect signals received at the Global Positioning System (GPS) receiver have relative phase offsets and the phase differences, which are proportional to the differences of the path lengths. Multipath error can be estimated by using linear combinations of code and carrier phase measurements. The code phase and carrier phase multipath using triple frequency GPS measurements is given as [3],

$$M_{P_{1,2,5}} = \lambda_1^2 (P1 - P2) + \lambda_2^2 (P5 - P1) + \lambda_5^2 (P2 - P5) \quad (1)$$

$$M_{\phi_{1,2,5}} = \lambda_1^2 (\phi1 - \phi2) + \lambda_2^2 (\phi5 - \phi1) + \lambda_5^2 (\phi2 - \phi5) \quad (2)$$

Eq.(1) and (2), shows triple frequency linear model for multipath estimation from code and carrier phase observations pertaining to three frequency signals respectively. The indexing of 1, 2, 5 in above equations corresponds to three frequencies, in case of GPS (U.S.A) L1 (1575.42 MHz), L2 (1227.60 MHz) and L5 (1176.54 MHz), for Galileo (Europe) E1 (1575.42 MHz), E5a (1176.45 MHz) and E5b (1207.14 MHz).  $\lambda_{1,2,5}$  denotes wavelengths. This linear combination completely removes ionospheric error and other measurement errors as well and gives absolute estimate of multipath.

### 3. Distributions and statistical modelling

To characterize the behavior of a random variable PDFs can be used. Multipath effect is also random and thus can be described by using PDFs. In order to understand which

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## Mammogram Classification Using Rotation-Invariant Local Frequency Features

Sparshana Paramkuzham<sup>1</sup> & C. Venkata Narsimhulu

Conference paper | First Online: 13 October 2020

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**Abstract**

Breast cancer accounts for the highest mortality rate among women in the world. Mammograms play a prominent role in detecting abnormalities in the breast. Computer-aided diagnosis systems help the radiologist in detection abnormalities in less time. This work deals with the extraction of features from ROIs to reduce false positives in computer-aided diagnosis systems. In this paper, the rotational invariant local frequency technique is implemented using three methods for the extraction of features from mammogram region of interest (ROIs). Features obtained from ROIs are given to SVM for further classification of ROIs into normal-abnormal using SVM classifier via 10 fold cross-validation method. The proposed methods are validated using ROIs obtained from Image Retrieval in Medical Applications (IRMA) database for feature extraction

**Keywords**

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# Deep convolutional Neural Network in Smart Assistant for Blinds

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**Abstract**— Increasing pollution and changing life styles has severely affected human health specially our sense organs. More exposure to screen has increased vision related problems even at very early age of life. The developing technologies should be utilized to help the persons with no or very less vision to lead an independent life in society. Computer vision is one such field that can be utilized to develop some cost effective products that can be very useful for these scenarios. The detection and recognition of text from natural image can be very useful for visually impaired persons as well as in various other applications like developing a smart system to help driver in getting voice signal for every road sign, and even warning if we did not follow the one. The proposed work uses deep convolutional neural network to implement a text detection and recognition system that is much simpler and faster as compare to traditional hand crafted feature based methods.

**Index Terms**—Convolutional neural network, deep neural network,

## I. INTRODUCTION

“VISION” is one of the most precious gift we have received from nature. But many among us could not receive this gift or lost this gift because of different reasons. Life of all these people becomes very difficult and they need to be dependent on others for each work. One of main reason for this is excessive exposure to screen. Many measures are already taken, the government as well as non-government organizations to help such persons.

Artificial intelligence has lead to many smart devices that can help human in various fields of life. These technologies can also be utilize to help visually impaired persons. Deep convolutional neural network is one such technology that has made object detection face detection possible.

The computer vision is the key to develop various products that can help to provide artificial vision to various people. This artificial vision can be for face detection, object detection, text detection and recognition or the combination of all of these. The present work is a initial step for development of one such cost effective and easily portable or wearable device. The current project considers a scenario where a

person suffering from a visual impairment needs a tool to carry around and receive a voice signal for the texts that are available around him. This will help in getting information from sign boards at various places.

Some products are available in the international market like one shown below but they are very costly (between 1500\$ to 2000\$):

1. Assisted Vision Smart Glasses: They are constructed using transparent OLED displays, two small cameras, a gyroscope, a compass, a GPS unit, and a headphone. Most visually impaired people can distinguish light and dark, these glasses can make anything that's close to the wearer brighter, so they can discern people and obstacles. The main problem with these glasses is they are very costly and cannot identify text from images.

2. A wearable device called Horus is using combination of computer vision, machine learning and audio cues to improve the lives of visually impaired people. Developed by a Swiss startup called Eyra, Horus consists of a headband with stereo cameras on one end that can recognize text, faces and objects. Information from the cameras is fed via a 1m cable into a smartphone-sized box containing a battery and a NVIDIA Tegra K1 processor. This provides GPU-accelerated computer vision, deep learning and sensors that process, analyze and describe the images from the cameras.

Apart from this one more device, available in market is “figure reader”. This MIT Media Labs project is a wearable device, a very chunky ring that sits on the finger and is capable of detecting and interpreting 12-point printed text as the user scans his or her finger across it. It reads aloud in real-time. Small vibrations alert the wearer to any deviation off the line. Seeing AI, an app developed by Microsoft AI & Research. It essentially narrates the world for blind and low-vision users, allowing them to use their smartphones to identify everything from an object or a color to a dollar bill.

But when the exact location of text is not known or the distance between the user and text is much more, these scanner based devices will not be much affective.

# Diesel Generator and SOFC Fuel Cell Based Hybrid Energy System

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**Abstract:** This paper aims to design SOFC and diesel generator based hybrid system that will cater domestic as well as irrigation need in a remote located village. Design and modeling of Solid Oxide Fuel cell (SOFC) is explained for the distributed generation applications. Modeling and simulations are carried out in MATLAB Simulink platform. Solid oxide fuel cells operate at temperatures near 1000°C. Modeling of SOFC is done by using Nernst equation. In that the output power of the fuel cell can be controlled by controlling the flow rate of the fuels used in the process. The fuel cell source is integrated with diesel generator and battery hybrid energy system.

**Keywords:** — Battery, Diesel Generator, Fuel Cell, SOFC, IES

## 1. INTRODUCTION

Electricity is the driving force of major of the activities performed by human beings. However, there are a many people all over the world, especially in India, who live in remote or rural areas and have no access to electricity. They depend on local resources like firewood or cow dung in daily energy requirements and usually enjoy a poor quality of life when compared to people living in urban areas. If the living conditions in such areas are to be improved, the first and foremost action to be taken is to provide electricity to the people living there. This would impart an economic impetus to such communities and also contribute to the overall growth of the society.

Moreover, it is known that these fossil fuels will be eventually exhausted in the near future, which motivates the search for alternate energy resources. Renewable energy sources such as solar energy, wind energy etc. are seen as clean and green options to this energy deficit scenario and have vast potential to reduce dependence on fossil fuels and mitigate greenhouse gas emissions. Although they are being widely integrated into the electric sector, certain issues remain such as the variability and uncertainty in the availability of the renewable energy resources. This makes them less reliable and dependable than the conventional sources used for the majority of electricity generation. In addition, the deployment of an energy system using a single renewable resource becomes less economical in many cases. This calls for an Integrated Energy System (IES) where a number of renewable energy sources along with electrical energy storage components are integrated together to operate as a reliable power source and meet the electrical demand of a load. They can be either grid-connected or stand-alone installations depending on the application and geography of the site. Electrification of rural villages and other sites which are too far from the general load centres using electricity from the grid would be an extremely costly affair, considering the costs incurred in grid extension and the transmission and distribution losses.

The purpose of the study is to model, simulate and optimize an Integrated Energy System suitable for an un-electrified village to investigate its performance under dynamic conditions. A dynamic model is developed for this optimized IES, in MATLAB Simulink environment to understand and investigate the dynamic performance of the system with respect to varying load profile. The dynamic performance of the system is analyzed for a typical day in each season and the outputs of the individual components are observed with respect to time.

The system is also simulated for obtaining the dynamic response under transient load conditions. It is noticed that when there is sudden connection or disconnection of load, sharp overshoots of dangerously high magnitude appear in the voltage and current waveforms of the AC power supplied to the load. To overcome this problem, it is recommended that a low pass LC filter is connected at the output side of the transformer. The dynamic model of the IES is modified to include the filter and the response of the system

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# "IMPACT OF DEREGULATED POWER SYSTEM MARKET IN CONGESTION MANAGEMENT OF A TRANSMISSION LINE" A CONCEPTUAL APPROACH

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**Abstract.** Electricity is essential for daily life of the people and also for strengthening the economy. Over the past few years, the electric power industry, in many countries, has undergone significant changes in the total installed generation capacity using conventional and non-conventional energy sources. Despite of this remarkable progress, economy is still facing an enormous need to meet the growing demand of electricity thereby increasing the competition, offering opportunities to number of generating companies, to deliver the electric power with same local service, same local quality, and same local load delivery. This rapid increase in the power generation from various emerging integrated energy sources are becoming a challenge to the existing transmission network. Considering calculation accuracy and time this paper focuses on the study of different computational approaches to continuously compute Available Transfer capability (ATC) of a load change and line outages to give accurate results so as to upgrade it in a deregulated transmission network. Different optimization techniques are briefly discussed in the review paper necessary for a large scale power bus transmission system to withstand the contingencies more efficiently. This conceptual approach unites various publications on congestion management in deregulated power system in past few decades considering it in a hybrid power market.

**keywords:** Available Transmission capability, Congestion management, Deregulated power system, large scale power bus transmission system, optimization techniques.

## INTRODUCTION

Power market, industrially is moving from conventional, Vertical Integrated Electrical Utility (VIEU) system to unbundling or restructured electrical utility referred to as Deregulation, an element of competition in electrical energy generation and distribution, allowing market forces to fix energy with high efficiency at low rates to the consumers [1].

In order to exist in the power market with deregulation, to increase the total installed generation capacity and open access of the electricity supply industry internationally it is necessary to track the activities taking place in the emerging field of deregulation [2]. From past few decades, Non-conventional sources which are appropriate sources are in cooperated in the power market. This combination of conventional and non-conventional energy sources or any two or more modes of generation forms a hybrid power market.

Non-conventional energy when incorporated with existing generation has given rise to many challenges to overcome, some of which are voltage limits, thermal limits, stability limits, relieving transmission line from congestion, load change, single line outage, fault conditions, generator outages, number of seller bus/area and buyer bus/area entering and exiting.

To over come such issues using conventional and non conventional energy sources a optimal power flow(OPF) oriented algorithm is to be developed which can allow number of seller bus/area and buyer bus/area using conventional and non conventional energy to participate in the market as well as help them to maximize the reserved transmission services by continuously updating in the real time quickly and accurately to evaluate transactions between buyers and sellers using ATC computation techniques through Internet- based, Open Access Same time Information System (OASIS) [1][3][4].

A comprehensive attempt using various compensational, conventional methods, optimization techniques has been presented to manage congestion.

# Low cost Smart Refrigerator

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**Abstract**— Emergence of smart systems has created an environment with improved monitoring enabling ease of control. Any smart system has a communication module which gives access to the control of the system even remotely. These systems have emerged as a new area into the development of smart home appliances. Many smart home appliances like television, lighting etc. have emerged. A commercially available smart appliance is quite expensive and not very accessible to even some part of the working community. The following paper discusses the concept of a smart refrigerator developed for an existing one with a rule based algorithm. When making a new appliance the rules for building a customized device have to be defined.

**Keywords**—smart home appliance, rule based algorithm, smart refrigerator

## I. INTRODUCTION

The effective use of available resources has driven researchers to work on technology to ease man's everyday life. Smart technology has been enabled in all aspects of life right from environment, to power to our homes to enable us to lead a comfortable life. The meaning of 'smart' immediately in sense of technology and research is to include a communication into the application to enable a two way flow of information right from low power to very high power. Communication encompasses the sensing, monitoring and controlling aspects of the application.

The area of smart technology includes device development for control, data acquisition systems, sensor technology and communication [1]. The application areas include power monitoring, health care technology [2] and smart appliances [3] which have grown to become a big umbrella for smart cities. Designing smart appliances has take a priority to ease the life of the common man. With increase in mobile technology one mobile is enabled to control and this has found increasing application in smart home appliance design [4] and control [5].

The increase in smart systems in the Asia-Pacific region is not as significant compared to the west. To implement a smart system in these countries requires including the smart technology in an existing system rather than providing a completely new solution. Smart home appliances are one of the areas where technology can be applied to existing systems. A 'smartness' incorporated into the conventional or to the existing appliances makes the technology affordable and more convenient to use. [4] discusses the basic rules followed for developing smart appliances. The sensor technology has developed to cater to applications at all power levels. The sensors for home automation are ([7] and

[8]) are low power sensors. [7] gives an introduction to sensors required for home automation. These technologies are under the umbrella of Internet of Things (IoT).

This paper discusses a rule based smart refrigerator where the monitoring of the commodities is implemented by using load cells, level sensors and RFID tags integrated to an ARDUINO board. A message is sent to an application to enable shopping for working people to enable ease. A rule based algorithm is necessary as discussed in [7] because when making customized set up for already existing appliances, the implementation may not be common for all range of customers.

Companies like SAMSUNG and LG are working aggressively toward this concept and seem to have taken lead too. They have been able to come up with prototypes as well as some commercial smart refrigerators (still expensive though) recently. For example the Samsung T9000 "smart" refrigerator has software features inbuilt that can track its contents. It has a built-in grocery manager, which allows you to manually add food (with a drag-and-drop interface), and set a reminder and expiry date, so you never lose track of what's in the fridge. These models are very expensive almost two to three times the conventional refrigerator price. This paper proposes the inclusion of 'smartness' in to the existing refrigerator which is proposed as an economic option compared to the expensive commercial ones.

## II. BLOCK DIAGRAM

A smart refrigerator here refers to incorporating a sensor based system to a 'non smart' refrigerator. The system identifies the commodities in the refrigerator. A message is then sent to the customer at the remote end to enable them to buy before coming home. This application is a low cost solution for making a 'smart refrigerator'. The block diagram for implementation is shown in Fig. 1.

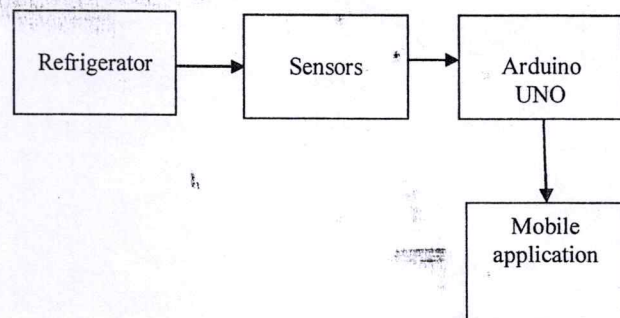


Fig. 1 Block diagram of proposed system

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# INNOVATIVE TEACHING PRACTICES FOR 4G STUDENTS

## Editors

Mr. Daniel C, Dr. Sarala, Dr. Vincent Sam  
Jebadurai, Mr. Arunraj E, Dr. Hemalatha G

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ICMMM 2019

## A Concise Review on processing of Hybrid Composites produced by the combination of glass and natural fibers

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### Abstract

The application of natural fibers-based hybrid and pure composite materials is intensifying in the recent era. The driving factor behind this tendency is the amplified concern regarding the harm to the environment and the exhaustion of the natural resources, that is occurring due to the use of synthetic fiber-based composites. But, if the natural fiber composites are directly used for manufacturing, they can have potential challenges such as low mechanical properties, lower hygrothermal resistance...etc. In order to overcome those deficiencies, researchers are tending towards the development of natural fiber-based hybrid composites by hybridizing the natural fiber with the synthetic fibers. In this paper, a concise review was made on different methods through which hybrid composites can be manufactured. Advantages, disadvantages, and applications of those production techniques are also presented.

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**Keywords:** Natural fiber composites; Hybrid composites; Processing methods; Manufacturing; Glass fiber; Natural fibers;

### 1. Introduction

The gush in the anxiety of the people towards environmental sustainability has led the researchers and designers to develop new materials which are environmentally friendly. In this context, the integration of natural fibers for manufacturing composites is one of the ways of designing more eco-friendly materials. But, the main cons with

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## A Concise Report on properties of Hybrid Composites manufactured from glass and natural fibers

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### Abstract

The utilization of natural fibers as a potential reinforcement phase for manufacturing composite materials is on the rise due to the increased concern towards reducing the damage to the environment and to control the depletion of the natural resources. But, using the natural fiber composites directly can have potential challenges such as the low mechanical strength, low thermal stability, high degradation rate, etc. In order to improve those shortcomings, researchers are tending towards hybridizing the natural fiber composites with the glass fibers. In this paper, a concise review was done over the consequence of hybridization on the mechanical properties of the hybrid composites made from a mixture of both glass fibers and different natural fibers. From this review, it was concluded that hybrid composites with this particular combination have a great potential for property improvement and applications.

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Peer-review under responsibility of the scientific committee of the 2nd International Conference on Materials Manufacturing and Modelling, ICMMM – 2019.

**Keywords:** Hybrid composites; Glass fiber; Natural fiber composites; mechanical properties; Natural fibers;

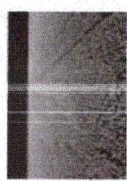
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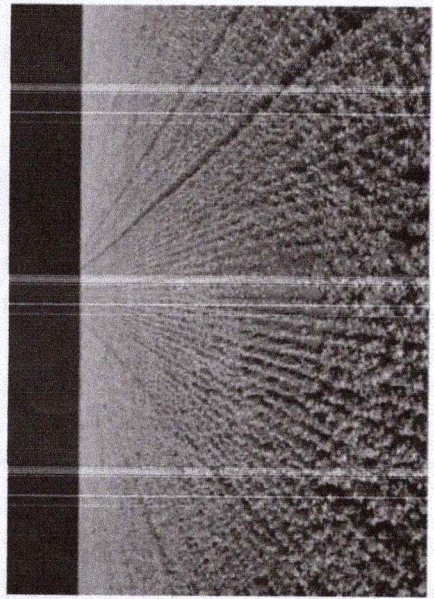
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### RICULTURAL DRONE



Devalah Melhaspuram  
P. Chuchanur  
Shank-Jaweid

### DESIGN, AERODYNAMIC ANALYSIS AND FABRICATION OF AGRICULTURAL DRONE



to use development in Agriculture is not only to using Agricultural Drones. One of the main sources is like temperature, humidity, rain, etc. which are ease, fertilizers, etc. which can be controlled by giving (World Health Organization) estimated as one million Precision Agriculture by managing to spray the fertilizer load capacity, more thrust, and p

Windows taskbar showing system tray with icons for network, volume, and battery. System clock displays 12:20 PM on 5/5/2022. Temperature is 33°C. A notification for Windows activation is visible.

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# Influence of Elevated Temperatures on Flexural Strength of Polysialate Composite

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**Abstract:** Polysialate composites are a new class of high performance materials due to its excellent inherent high temperature resistance, low density and ease of manufacturing. These properties also suggest that polysialate composites have a high temperature resistance, environmental friendliness, light weight structures for both aerospace and motorsport applications. The foremost important requirements for these applications are a high temperature resistance, low density, good structural properties and ability to form complex geometries at low lead times. The polysialate matrix is based on polymineral resins, it allows manufacturing using conventional polymer composite lay-up, and also it allows for complex geometries to be fabricated. The most and widely used polysialate matrix materials are reinforced with silicon carbide fibres material will be used to study behavior of flexural strength over a representative temperature range. In addition to this, the results also provide the data required for the design of next generation high temperature structures. The three point bending test simulation analyses were performed according to ASTM standard on these polysialate composites. The simulation analysis results revealed that flexural strength of polysialate composites were stable over a representative temperature range 200OC to 600OC.

## INTRODUCTION

Polymer matrix composites (PMCs) have traditionally been exploited to produce light weight structures. However they can only withstand maximum operating temperatures up to 300°C. Ceramic matrix composite (CMC) materials are often used in higher temperature applications, as these can withstand elevated temperatures in excess of 1600°C, although concerns still remain regarding their structural performance. The cost, and more specifically processing times, of CMC's can also be prohibitive when considering application in high temperature structures. There is, therefore, a need for materials which bridge this gap to aid in the development of high temperature structures.

Polysialates are ceramics derived from inorganic polymers and processed through a polymerisation chemical activation, rather than the extreme temperature processing synonymous with traditional engineering ceramics. This gives them a number of advantages over typical CMC materials such as low production times, environmental friendliness and low density. The materials used in this study were polysialate-type materials as matrix reinforced with silicon carbide fibre material.

  
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# Thermal Degradation Study for Manufacturability of Polyetheretherketone/Hydroxyapatite Bone Implant Composite

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**Abstract.** Polyetheretherketone (PEEK) is a semi-crystalline, high temperature resistant, FDA approved polymer, attracted many engineering and medical research practitioners due to its excellent mechanical and biological properties. PEEK has comparable mechanical properties to natural bone and its polymeric constituent. PEEK has been identified as one of the high temperature ( $T_m = 373^\circ\text{C}$ ) polymers with excellent thermal, chemical and radiological inertness. High temperature resistance, good Young's modulus and biological inertness of PEEK attract it to be a prominent bone implant material. Metallic bone implants have been surpassed slowly by PEEK composites. However, PEEK is found to be inferior in rigidity to natural bone due to its limited Young's modulus. Hydroxyapatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ), a bone inductive and ceramic reinforcement is extracted from egg shells by thermal processing to strengthen PEEK matrix of the proposed bone composite. Upon several delimiting studies, ceramic constituent is limited to 40% by weight. The combination of constituents being newer, an exhaustive study on thermal stability of the composite has been carried out at ARCI, IICT and KELVN Hyderabad. Thermal gravimetric analysis (TGA), Derivative thermo gravimetric analysis (DTG) and Differential Scanning Calorimetry (DSC) were the sources of analysis. TGA, DTG and DSC have been used to evaluate percentage of weight loss, peak degradation temperature and melting temperature respectively. Degradation of the composite was found to increase with the percentage of PEEK in the composite. The study has been conducted beyond the melting temperature of the PEEK and up to  $600^\circ\text{C}$ . Degradation of the composite has been showing an inverse relation with rate of heating. Maximum percentage of mass degradation 28.7% of the total weight was recorded in structurally superior PEEK/HA 80/20 composite at a rate of heating  $10^\circ\text{C}/\text{min}$  as against 33.9% in pure PEEK.

## INTRODUCTION

Polyetheretherketone (PEEK) has been identified for excellent mechanical strength and biological inertness in human body implants [1, 2]. PEEK has also been found with excellent thermal, chemical and radiological inertness [2]. Physical and mechanical properties of PEEK have become the best alternative to Collagen, the natural bone matrix. Metallic bone implants with inherited drawbacks in host tissue healing and radiological artifacts have promoted PEEK usage in bone composites. Mechanical Properties of bone and bio materials [3] presented in table 1,

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# Module 7

## Personal-Emotional Development and Counselling

Foreword

  
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Human race has all along been in pursuit of its search for excellence, be it in academics, work or life. Development is the basic mantra in any field that an individual will look forward. Progress is the key to the survival of the mankind. For progress to happen, individuals need emotional development.

Knowing about the self and the identity of self is a precursor to any advancement for the human race. This course on Personal – Emotional Development and counselling deals with this subject.

From time immemorial, Intelligence Quotient (IQ) remained the key parameter to measure one's core competence and ability. It is only in the 90's that psychologists have found that IQ alone is not enough for one's success in life. They have come out with a relatively new measurable trait, Emotional Intelligence (EI) or Emotional Quotient (EQ).

Self – awareness, Self – Control, Self – motivation, Empathy are the key ingredients of EI. One who excels in these traits is found to achieve a lot better than those who don't. This has led to the need to study about Emotional Intelligence and the ways to improve it. A methodical study was done on the subject and encapsulated in this course material.

The subject is prepared to make the teacher and the student understand the subject in an easy to learn approach, by demystifying the topics.

People in general and students in particular come from diverse backgrounds. The diversity is what makes a university or a society complete. Diversity in classroom opens up the horizons of the students. For achieving diversity and making best use of it, teachers need to understand the ways to handle diverse classrooms. This can happen only when teachers understand the importance of diversity.

There are children with various forms of disabilities and special traits. A teacher has to understand and handle accordingly. Unless teachers understand the ways and means of handling students from various backgrounds, with varying abilities, they won't be doing justice. It is for this purpose this area is dealt widely in this course material.

Counselling and counselling strategies are discussed in detail in this course material. Hope this course material will serve the purpose for which it is intended to.

This course material is developed to provide a vivid picture of the different components of Personal-emotional development and counselling to the students and teachers. Hope that they make use of this study material to understand various components of Personal-emotional development and counselling and use it for personal and professional success in their lives.

## **Contents**

### **Block 1 Conceptualizing Identity:**

- 1.1 Understanding identity in contexts
- 1.2 Nature of the 'Self' in contexts
- 1.3 Approaches to study the self

  
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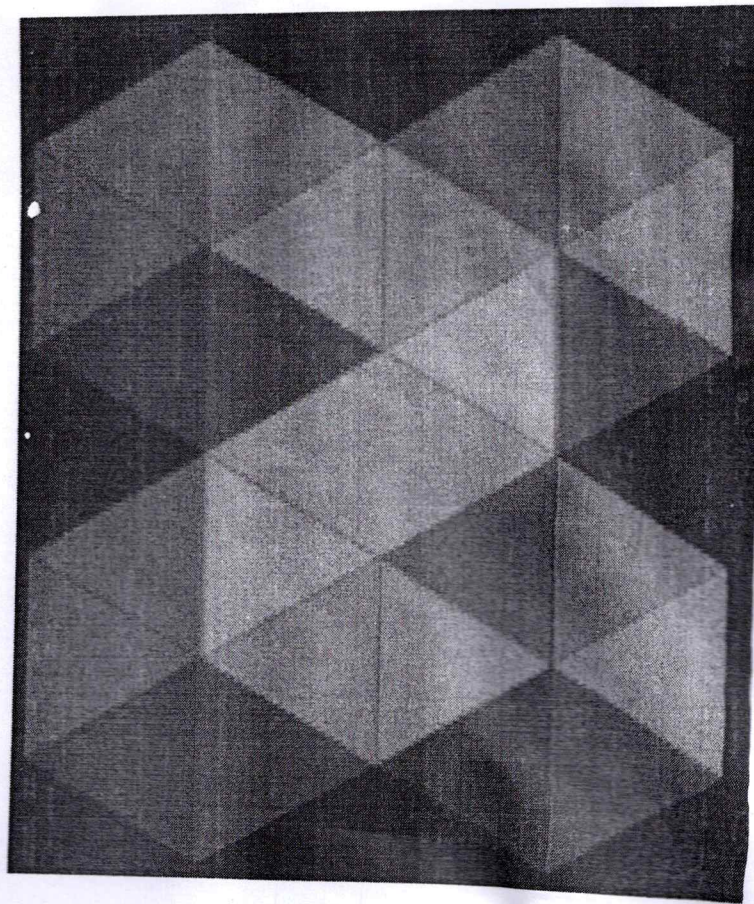
# International Conference on Multifunctional Materials (ICMM-2019)

Hyderabad, India • 19–21 December 2019

Editors • G Neeraja Rani, J Anjaiah and P Raju

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## **Preface: International Conference on Multifunctional Materials (ICMM-2019)**

Higher education is undergoing the process of paradigm shift. Multidisciplinary research is gaining attention from policy makers and educationists. The Draft National Educational Policy 2019, (NEP) has given importance for multidisciplinary research in Higher Education from the undergraduate level. Geethanjali College of Engineering and Technology is sensible of and sensible to the growing research needs and paradigm shift. It is in this backdrop that International Conference on Multifunctional Materials (ICMM-2019) was organized during December 19-21, 2019 at Geethanjali College of Engineering and Technology, Cheeryal (V), Keesara (M), Telangana State, India, to provide a platform for the researchers, educationists, scientists and industrialists to collaborate and deliberate on emerging and growing research opportunities in the field of Multifunctional Materials.

The multifunctionality in materials enables many modern applications which can improve quality of life and address many important global challenges. In the era of Industry Revolution 4.0 and the phase of 'Rediscovering Growth', the theme of the conference is apt.

We are immensely grateful to all the sponsors for their continuous support. Our special thanks to DMRL-DRDO for sanctioning the conference grant. We thank MRSI Hyderabad Chapter, Sai Ram Graphics, Canara Bank, FHM International, Physitech Electronics, Yamto Instruments, Progressive Techno Engineers, and Micro-technologies for their unflinching support and immense faith in us.

Geethanjali College of Engineering and Technology is promoted by Teja Educational Society and was established in the year 2005. As an autonomous college since 2016 and NAAC Accredited with 'A' Grade, N.B.A. Accredited and affiliated to JNTU (H) Hyderabad and AICTE, the college has been making inroads, providing quality technical education.

The literature available in the form of this edition or volume of AIP Conference Proceedings will provide innumerable avenues for research in the field of Multifunctional Materials.

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## PREFACE

International Conference on Multifunctional Materials (ICMM-2019) was organized during December 19-21, 2019 at Geethanjali College of Engineering and Technology, Cheeryal (V), Keesara (M), Telangana State, India, on the ubiquitous features of Industrial Revolution 4.0. Industry 4.0 provides a comprehensive and interconnected approach to manufacturing. It aims at better collaboration with various sectors in terms of research for holistic development. This Conference provided a platform for researchers, academicians, scientists to deliberate on the challenges and opportunities on the role of multifunctional materials, a cutting edge technology area in supporting the goals of industry 4.0.

The conference also aimed at keeping abreast with the latest developments in the field of multifunctional materials and their applications.

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This volume or edition of IOP consists of selected papers after the peer review process. Papers presented on various topics related to Multifunctional Materials are combined and presented in this volume. We are sure that this intellectual resource will pave way for many new research proposals in future. Our special thanks to authors for abiding by the time and guidelines provided by the Conference team.

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