3.4.5 Number of research papers per teacher in the Journals notified on UGC website during the last five years: 3.648

3.4.5.1: Number of research papers in the Journals notified on UGC website during the last five years: 421

Supporting Documents

S. No.	Documents	Page No.
1.	Number of research papers in the Journals notified on UGC website during 2018-2019	01-49

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Synthesis, spectroscopic characterization, DFT calculations, and antimicrobial activities of N-arylsalicylaldiminate derivatives of diorganotin(IV)

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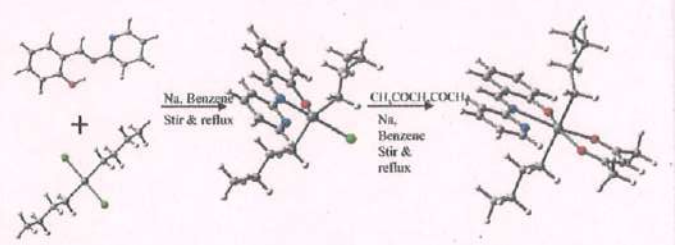
ABSTRACT

Equimolar reaction of di-*n*-butyltin(IV) complexes of bidentate Schiff bases of the type $[(n\text{-Bu})_2\text{Sn(sb)Cl}]$ with sodium salt of mono-functional bidentate ligands in THF-benzene solution afforded structurally interesting complexes of the type $[(n\text{-Bu})_2\text{Sn(sb)(L)}]$ (**1–6**) [where sbH = Schiff bases: N-salicylidene-2-aminopyridine (sapH) **I**, N-salicylidene-2-methylaminobenzene (*o*-smabH) **II**, and N-salicylidene-4-methylaminobenzene (*p*-smabH) **III**; LH = mono-functional bidentate ligands, acetylacetone (acacH), ethanolamine (eaH)]. All these colored solid complexes were soluble in common organic solvents and characterized by elemental (C, H, N, and Sn) analysis, spectroscopic techniques [IR, (^{1}H, ^{13}C, and ^{119}Sn) NMR] and mass spectrometry. Thermogravimetric analysis of complexes shows thermal behavior and stability of complexes. Computational studies of the synthesized Schiff bases and their organotin(IV) complexes were carried out using DFT which validate the structure of complexes proposed on the basis of spectroscopic data. The mixed-ligand complexes of diorganotin(IV) and Schiff bases were screened for their antibacterial and antifungal activities.



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Schiff bases; organotin(IV) complexes; 119Sn NMR; DFT; biological activity

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Dual colorimetric sensor for picric acid and pyrophosphate: Practical application for molecular logic gates

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ARTICLE INFO

Keywords:
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ABSTRACT

Simultaneous recognition of two different analytes such as picric acid or trinitro phenol (TNP) and pyrophosphate (PPi) by using the Dabsyl derivative **1** has been reported. TNP was detected by **1** with a remarkable red shift of 60 nm in the absorption spectra along with a color change from yellow to red. Biological important anion PPi was detected by color and UV–Vis absorption spectrum. Usually, multiple analytes can be detected either by sequential or simultaneous recognition by analytes having counter attraction such as anion-cation or acid-base. Here we have described the detection of two different analytes PPi and TNP, they do not have any counter-attraction. TNP can be detected with a detection limit of 7.2×10^{-6} M and PPi could be detected with LOD of 2.01×10^{-5} M in solution. The interaction between the TNP -OH group and the $-N(CH_3)_2$ group of receptors **1** plays a very important role in the detection of TNP. Anion PPi can be detected through hydrogen bond interaction between the sulfonamide group of **1** and PPi. To the best of our knowledge for the first time, we have used the dabsyl based receptor for the detection of TNP or picric acid. Receptor **1** was also explored for the construction of molecular logic gates such as AND and INHIBIT by using two analytes PPi and TNP.

1. Introduction

Colorimetric sensors, based on small molecules and functional materials, have an incredible role for the detection and determination of toxic metal ions, anionic pollutants, reactive oxygen species, gaseous signaling molecules and nitro aromatic compounds within biological and environmental systems [1–6]. However, most of the known chemical sensors are selective for a single analyte, rather than responding to the multiple analytes existing together. Compared to those single analyte specific sensors, to develop simple, efficient and functionalized chemical sensor with the multi-analyte response is very challenging [7]. Multi-analyte specific receptors have economic value and have great analytical applications in the biological and environmental field.

Usually, multiple analytes can be detected either by sequential or simultaneous recognition by analytes having counter attraction such as anion-cation [8–12] and acid-base [13–15]. These sensors comprise an "off-on-off" or "on-off-on" sensing mechanism in one channel. In contrast, multiple analytes recognition with an analyte having no counter attraction is more interesting [16]. In order to achieve this, the sensor should contain different recognition sites in the same unit. Colorimetric receptors that can respond to two different types of analytes (one anion and one neutral) with different signals are not commonly reported [16,17].

Dabsyl based compounds are well established UV-labeling agent and it has been widely used a FRET-based receptor in the biological assay and it has also shown utility as a singling moiety for the detection of anions, cations, thiols and other analytes [18,19]. Dabsyl chloride can be easily derivatized with different amine derivatives to prepare functionalized dabsyl receptors [20–25]. Thus, with an appropriate design, it is possible to achieve simultaneous recognition of different analytes by using their derivative.

Sensor for the detection of nitroaromatic compounds (NACs), such as nitrobenzene (NB), 4-nitrophenol (4-NP) 2,4-dinitrophenol (2,4-DNP), 2,4,6-trinitrophenol (TNP), 4-nitrobenzoic acid and 3-nitrobenzoic acid are essential because they cause severe environmental and health problems [3,26,27]. It is also crucial to have a chemical sensor that able to detect TNP in multifaceted environments such as minefields, arms storage facilities, blast sites, wastewater treatment area and agriculture land. Therefore, it is a challenging task to design a receptor for the selective detection of TNP in the presence of other

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Article

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Reshuffling of Electronic Environment by Introducing $CH_3NH_2F^+$ as an Organic Cation for Enhanced Power Conversion Efficiency and Stability of the Designed Hybrid Organic−Inorganic Perovskite

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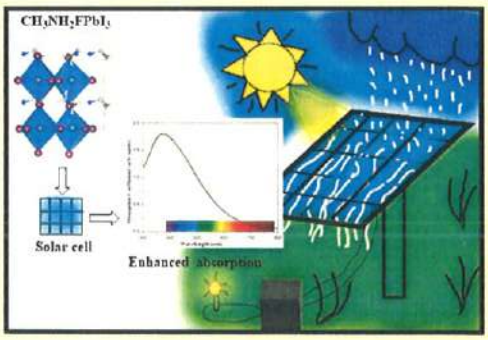
Supporting Information

ABSTRACT: A suitable substitution of the organic cation in hybrid organic−inorganic perovskite is an effective approach to tune carrier concentration, electronic structure, band gap, and optical absorption. Immense research efforts have been made to find perovskite with enhanced stability, red shift with high absorption yield, and better charge-transport properties. Presently, a new perovskite $CH_3NH_2FPbI_3$ has shown relatively improved properties in terms of structural stability, band gap, red-shifted absorption with high yield, and optical properties compared to $CH_3NH_3PbI_3$ ($MAPbI_3$). It infers that the $CH_3NH_2FPbI_3$ may be a better option for perovskite solor cell. The reaction enthalpy of $CH_3NH_2FPbI_3$ turns out to be −1.6 eV. It indicates that the designed perovskite is more stable compared to $MAPbI_3$. The calculated partial density of states and electron localization functions revealed electronic coupling between organic and inorganic networks of $CH_3NH_2FPbI_3$. The enhanced hydrogen-bond interaction between the cation and inorganic network modifies the covalent/ionic character of Pb−I bonds. The increased octahedral tilting in $CH_3NH_2FPbI_3$ compared to $MAPbI_3$ improves its optical properties significantly. The calculated results demonstrate that the strength of the hydrogen bond can be used as an additional control parameter to optimize the photovoltaic properties and structural stability of perovskites.



INTRODUCTION

Recently, hybrid organic−inorganic perovskite (HOIPs)-based solar cells (SCs) have achieved power conversion efficiency (PCE) up to 22.7%,[1] and therefore, perovskite solar cells (PSCs) can be used for commercial application. However, the structural stability of perovskite is still the main concern for realizing its application as PSCs. Perovskite has an ABX_3-type crystal structure similar to the first known perovskite $CaTiO_3$, where A is an organic/inorganic species ($CH_3NH_3^+$/$HC(NH_2)_2^+$/$C(NH_2)_3^+$/Cs^+), B is a divalent metal cation (Pb^{2+}/Sn^{2+}/Ge^{2+}), and X is a halogen derivative (Cl^-, Br^-, I^-).[2,3] In the past few years, SCs formed with HOIP materials have attracted great attention in photovoltaic technology due to its easy and low-cost processing.[4−7] In 2009, Kojima et al.[8] successfully synthesized first PSCs, which converted 3.8% of the solar energy into electrical energy.[8] In addition to HOIPs, the efficiency of PSCs depends on several other factors such as chemical composition, device structure, interfacial engineering, and kinetic control over the crystallization.[9] One of the well-known compounds that is widely used in making PSCs is $CH_3NH_3PbI_3$ ($MAPbI_3$). The experimental value of band gap of $MAPbI_3$ is reported to be 1.5 eV.[10] This value is well in the range for realizing its photovoltaic application. The band gap of HOIPs can also be tuned by changing the metal, organic cation, or anion.[3,11]

$MAPbI_3$ shows a temperature-dependent phase transition from cubic (α) to tetragonal (β) and from tetragonal to orthorhombic (γ) at 330 and 160 K, respectively.[7] At room temperature, the tetragonal phase is relatively more stable, and therefore, we have considered it for the present study. The main features of the electronic structure of $MAPbI_3$ are: (a) the valence band (VB) maxima is composed of 5p orbital of I and 6s orbital of Pb; (b) the conduction band (CB) minima is composed of 6p orbital of Pb; and (c) electronic states due to $CH_3NH_3^+$ (MA) are located at few electron volts (eV) away from the band gap edge, which directly contribute to neither optical properties nor electronic properties.[12] However, the organic cation tunes the optical and electronic properties by distorting the octahedral network via electrostatic interactions.[13] Despite its excellent properties, it is highly sensitive to heat, light, oxygen, water, applied electric field, and many other physical factors.[14−16] These factors are mainly responsible for

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97

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Allosteric Regulation in Carbon Monoxide (CO) Release: Anion Responsive CO-Releasing Molecule (CORM) Derived from (Terpyridine)phenol Manganese Tricarbonyl Complex with Colorimetric and Fluorescence Monitoring

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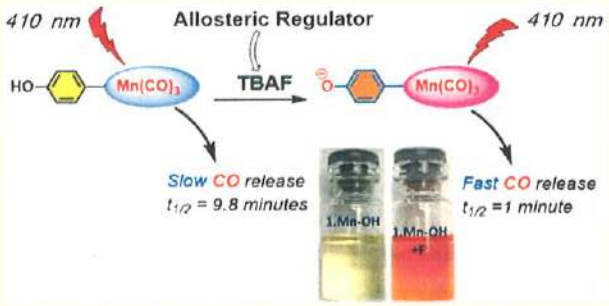
Supporting Information

ABSTRACT: A new CO-releasing terpyridine based manganese(I) tricarbonyl complex, $[MnBr(CO)_3(terpy\text{-}C_6H_4OH)]$ (**1·Mn-OH**) functioning via light has been reported. For the first time, we have demonstrated the allosteric regulation concept to control the CO-releasing properties of a CO-releasing molecule (CORM). Fluoride ion is reported to function as an allosteric activator to control the rate of CO release in the CORM. Complex **1·Mn-OH** represents an interesting new class of CO-releasing system that releases CO upon irradiation with blue light (410 nm) over a period of 40 min with the half-time of 9.8 min. Fluoride ion selectively binds to the phenol moiety of the complex through hydrogen bonding and deprotonates to phenolate with a color change. Interestingly in the presence of fluoride ion, the rate of CO release is fast with the half-time of less than a minute. The rate of CO release is allosterically regulated by fluoride anion and can be monitored through a color change, fluorescence, and absorption based spectral changes along with IR studies and myoglobin assay.



INTRODUCTION

Carbon monoxide (CO) is a small molecule bioregulator along with hydrogen sulfide (H_2S) and nitric oxide (NO).[1] The role of CO has been confirmed in various therapeutic and pharmacological studies such as myocardial infarction, organs transplantation procedures, cardiovascular disease, and antibacterial and anticancer activity.[2] Therefore, for future therapeutic applications, CO seems to have a high potential value.[3] But for therapeutic applications temporal and control delivery of CO is extremely important.[3−5] In this regard, "CO-releasing molecules" (CORMs) are gaining much attention and appeared as an important topic,[6−8] that bridges interdisciplinary research extending from chemistry to biology and medicine.[9−11]

The increasing interest in CORMs among researchers is due to the fact that they allow the controlled and targeted delivery of the CO gas into specific sites of the biological targets. Generally, CORMs are activated by various external stimuli, based on the way in which CO release is activated; it can be classified into solvent-triggered CORMs, photoactivated CORMs (PhotoCORMs),[9,12] enzyme-triggered CORMs (ET-CORMs),[13] thermal-triggered CORMs, oxidation-triggered CORMs,[14] and pH-triggered CORMs.[15]

However, the most commonly used stimulus to turn *on* CO release is light. Many photosensitive metal carbonyl complexes were studied to this end.[16−21] Despite significant developments, stimuli-responsive CORMs for biological applications and allosteric regulation/activation for CO release are not known.

Allosteric regulation is a well-known biological phenomenon and extensively used in nature.[22] In general, binding of a ligand or any analyte at the remote site of enzymes modifies the performance at a distant site through structural or dynamic changes.[23] In biological systems, allosteric regulation controls the structure and catalytic efficiency of many enzymes. In nature, allosteric regulation has been afforded by combining the conformational changes to the structure upon binding of specific coordinating analytes. Although the light-induced release of CO has received much attention among researchers because of its noninvasive, cheap, and controlled delivery, still it remains unexplored to manipulate CO delivery by the allosteric external regulator.

Herein, we have demonstrated a first proof-of-concept that uses a bioinspired allosteric regulatory mechanism to control

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Research paper

Effect of pressure and electrical resistivity on ultrasonic properties of MgB_2 single crystal at low temperatures

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ARTICLE INFO

Keywords:
Electron viscosity mechanism
Electrical resistivity
Ultrasonic attenuation
Semi metallic superconducting crystal

ABSTRACT

Higher order elastic constants have been calculated in semi-metallic superconducting single crystal magnesium diboride (MgB_2) at low temperatures following the interaction potential model. Second order elastic constants are used for the determination of other ultrasonic parameters. The pressure variation of the ultrasonic velocities is evaluated using the second order elastic constants. The ultrasonic attenuation due to electron-phonon interaction has been computed at different pressures and in low temperatures range 40–90 K. We have also calculated the electron-viscosity at different low temperature, needed for the calculation of ultrasonic attenuation. The behaviour of ultrasonic attenuation is almost similar to its inverse electrical resistivity. The electron–phonon interaction, which is the dominating cause of ultrasonic attenuation, occurs at lower temperatures in MgB_2 single crystal. It has been found that the electrical resistivity is the main contributor to the behaviour of ultrasonic attenuation as a function of temperature and the responsible cause of attenuation is phonon-phonon interaction.

1. Introduction

Ultrasonic offer the possibility to detect and characterize microstructural properties as well as flaws in materials, controlling materials behaviour based on physical mechanism to predict future performance of the materials. In the field of nondestructive characterization of materials, the use of ultrasonic method is very constructive to extract the different properties of different materials. This is also a helpful technique in many other imperative research areas which include the detection of poor cohesion and adhesion in adhesive joints, characterization of microstructures, appraisal of defects, thickness of sheet materials, detection of damage in composites, the inspection of surface, and measurement of the elastic properties of the materials. The study of the interaction of sound with materials is a versatile tools for determination of the elastic constants. The elastic constants of material are associated with the thermophysical properties of the materials such as specific heat, Debye temperature, and Grüneisen parameters, which provides better understanding of the solid state behaviour of the materials. With the help of these elastic constants, one can easily measure the velocity of longitudinal and shear waves. The relation between elastic constants and velocity is given by formula, $V = \sqrt{\frac{C}{\rho}}$ where 'C' is elastic constant and 'ρ' is the density of that particular material. The velocity of longitudinal and shear waves is directly related to ultrasonic attenuation at low temperature. Also the elastic constants provide the useful information about the Debye temperature and Debye average velocity at different temperatures [1–4].

The phenomenon superconductivity was discovered over a century ago by Kamerlingh Onnes in metallic mercury below 4 K. After several years many other types of superconductors were discovered with critical temperature below 20 K [5]. Magnesium diboride was discovered in early 1950's but the superconducting behaviour was defined in 2001 with critical temperature 38–40 K [6–11]. The superconductivity behavior of MgB_2 received extensive scientific interest by the researcher and scientist in recent years because of their simple hexagonal crystal structure. In MgB_2 the boron atoms form graphite like sheet separated by hexagonal layer of magnesium atoms. At equilibrium condition it has AlB_2 type structure with lattice parameters 'a' and 'c' about 3.076 Å and 3.525 Å respectively at zero pressure. The great theoretical as well as experimental progress has been made in last several years [13–15].

In former times the second order elastic constants (SOECs) was calculated by Zong et al. and also the second as well as third order elastic constants (TOECs) were calculated by Wang et al. using the first principle method in superconducting MgB_2 single crystal [5]. The low temperature resistivity has been reported by Schneider et al. [16], Sologubenko et al. [6], Tajima et al. [13] and many others. The value of temperature dependent electrical resistivity is taken from literature [16].

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Enhanced dielectric response and thermal conduction in copper nanoparticles embedded polyaniline nanofibers

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ARTICLE INFO

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Nanocomposites
Dielectric spectroscopy
Thermal conductivity
Polyaniline

ABSTRACT

Herein we report, an easy, facile and *in-situ* synthesis of copper/polyaniline (Cu/PANI) nanocomposites through a chemical route via redox reaction. X-ray diffraction (XRD) confirms the characteristic peaks for polyaniline and copper. The UV–vis spectroscopy predicts the formation of emeraldine oxidation state of polyaniline, which is the only conducting state of PANI. The Cu/PANI nanocomposites have the fibril morphology and copper nanoparticles are embedded inside the PANI nanofibers. It was observed that copper reinforced polyaniline nanocomposites exhibit excellent dielectric behavior in a wide frequency range from 1.0 Hz to 1.0 MHz at room temperature. The thermal conductivity enhancement in the nanocomposites is observed in comparison to pure PANI nanofibers, which was studied in a wide temperature range 0–100 °C by Transient Plane Source method.

1. Introduction

To meet the necessity of 21st century high power density electronic devices, advanced energy storage technology is the key to manage the energy supply and demand. The specific capacitance value of nanostructured conducting polymers is typically very high, conducting polymers have potential to be an option for the next generation energy storage systems (ESSs) [1]. Out of the conducting polymers like polythiophenes, polypyrrole, polyacetylene, polyaniline, etc, polyaniline (PANI) proved its importance due to its cost effective monomer, easy synthesis, and environmental stability [2]. Nanostructured polyaniline in emeraldine oxidation states is a potential candidate for dielectric applications [3]. In the *ex-situ* synthesis of metal/PANI nanocomposites, metal ions may get reduced due to PANI matrix. Further, due to strong interaction of metal ions with the *imino* groups of the polymer, uniform dispersion of NPs in the polymer matrix is unlikely. Copper nanoparticles are considerable potential candidates in fabricating electrochemical devices due to its tendency to facilitate electron transfer between electro-active species and electrodes [4]. The Cu/PANI nanocomposites have been synthesized by Sharma *et al.* using sodium borohydride as reducing agent to reduce cupric nitrate for sensor applications [5]. However, most of the conventional reducing agents take a very long time for polymerization.

The dielectric spectroscopy is an effective method to study the molecular and the collective dynamics in the nanocomposites [3,6–10]. The AC conductivity and dielectric relaxation behavior of nanostructured polyaniline and polyaniline/Cadmium oxide (PANI/CdO) composites have been reported by Roy *et al.* [8]. Reda *et al.* [9] have reported the improvement in the electrical conductivity of PANI by doping it with silver atoms.

In the present work, the easy, facile and *in-situ* synthesis of Cu/PANI nanocomposites is reported through chemical route *via* redox reaction for two different concentrations of copper NPs in which potassium biiodate was used as a reducing agent for Cu nanoparticles. Notably, iodate as oxidant gives kinetically the fastest reaction as compared to sodium borohydride ($NaBH_4$), Chloroauric acid ($HAuCl_4$), bromate (BrO_3^-) and chlorate (ClO_3^-) ions due to its highest activity [11]. The effect of Cu nanoparticles on physical properties of PANI have been investigated. The dielectric response of the synthesized material is observed in the frequency of 1 to10^6 Hz frequency range at room temperature. Experimental study of thermal conductivity has also been made using transient plane source method in wide temperature range.

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Effect of electrical resistivity on ultrasonic attenuation in FeSe single crystal at low temperature

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The ultrasonic attenuation and velocities following electron viscosity mechanism has been computed in semi-metallic, superconducting single crystal Iron Selenide(FeSe) in low temperatures 10-70K. We have also calculated the electron-viscosity at different low temperature needed for the calculation of ultrasonic attenuation. The behaviour of ultrasonic attenuation is quite similar to its inverse electrical resistivity. The ultrasonic attenuation due to electron viscosity mechanism is most significant at 15 K. Computed results of ultrasonic parameter have been discussed.

Keywords: Electron viscosity mechanism,electrical resistivity,superconductor, ultrasonic attenuation.

Introduction

Ultrasonics, which is a sub category of acoustics, is a versatile tool for studying the properties of different types of materials. This is a useful technique for the characterization of microstructures, appraisal of defects, discontinuity and mechanical properties of objects. Ultrasonic measurements are very important during the material processing in the industries at different temperature to extract the internal microstructural and mechanical thermophysical properties of the materials. The interaction of ultrasound with microstructure is important for many material problems. Attenuation and backs scattering reduce the detectability of flaws, especially in materials with coarse grains or complex microstructures. The study of the propagation of ultrasonic waves in materials determines the elastic constants, which provides better understanding of the behaviour of the materials. The elastic constants of material are related with the fundamental solid state phenomenon such as specific heat, Debye temperature and Grüneisen parameters. The elastic constants in the materials can be determined by measuring the velocity of longitudinal and shear waves. The intensity of ultrasonic wave decreases with the distance from source during the propagation through the medium due to loss of energy. These losses are due to diffraction, scattering and absorption mechanisms, which take place in the medium. The change in the physical properties and microstructure of the medium is attributed to absorption while shape and macroscopic structure is concerned to the diffraction and scattering. Ultrasonic velocity play important role in the study of ultrasonic attenuation. It is directly related to elastic constants by formula, $v = \sqrt{\frac{c}{\rho}}$ where c is stand for elastic constant and ρ is the density of that particular material[1,8]. Anisotropy stiffness and stability of the crystals are directly related to the elastic constants. Also the elastic constant provides the information about the Debye temperature and Debye average velocity at different temperatures.

The Understanding of the high temperature superconductivity mechanism is a prominent and challenging task facing the solid state physics community. Comparing the cuprate superconductor and the iron based superconductor provides the information that leads to explore the high temperature superconductivity. The iron-based superconductors discovered in 2008 represent the second class of high temperature superconductors. A

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$BiVO_4$ Optimized to Nano-Worm Morphology for Enhanced Activity towards Photoelectrochemical Water Splitting

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Abstract

The article reports the preparation of unique worm-like $BiVO_4$ nanoparticles through hydrothermal treatment of scheelite tetragonal $BiVO_4$ obtained by simple precipitation method. The as obtained nano-worms were ~3-6 nm in width and ~12-20 nm in length. Their time dependent growth evolution was studied via transmission electron microscope and coupled with our observations from the XRD analysis a growth-morphology-mechanism was proposed. The as obtained $BiVO_4$ nanoparticles were deposited on ITO coated glass substrate and the resultant films were investigated for efficiency in photoelectrochemical water splitting. The $BiVO_4$ nanoworms outperformed all the other $BiVO_4$ obtained at different time of growth evolution by having both the highest anodic photocurrent densities and the lowest onset potential. Subsequent EIS and Mott-Schottky analysis revealed comparatively low charge interfacial charge transfer resistance and a cathodic shift in the flat band potential of the nanoworms lead to its better photoelectrochemical performance. Our analysis indicates a decrease in resistive photoelectron trapping surface states associated with the $BiVO_4$ nanoworms leads to its excellent photoelectrochemical activity.

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Research Article

Bacterial killing efficacy of synthesized rod shaped cuprous oxide nanoparticles using laser ablation technique

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Abstract

Recent interests with copper nanoparticles (Cu-NPs) has arisen because of its low cost and antibacterial properties, as it may be one of the very important alternatives to silver NPs. Pulsed laser ablation of a solid target (copper) in liquid media is used to synthesize colloidal oxide copper (Cu_2O and CuO NPs) NPs. These oxides of copper NPs were synthesized using Nd:YAG laser energy to maintain a 40 mJ/pulse wavelength at 1064 nm. During the synthesis of colloidal NPs only two conditions were opted, employing double distilled water (without PEG) and 10% preparation of PEG. Both NPs were prepared under the similar parameters such as optimized instrument settings, laser energy and time of laser exposure (1 h ablation). Further, these copper oxide NPs were characterized by advance technologies including UV–visible, X-ray diffraction, transmission electron microscopy and attenuated total reflection Fourier transform infrared spectroscopy techniques. The significant antibacterial properties of synthesized materials were also observed. The cuprous oxide NPs, showed remarkable antibacterial effect conducted using disc diffusion techniques. The minimum inhibitory concentration and minimum bactericidal concentration of synthesized Cu_2O NPs were recorded as 120 and 140 µg/L respectively against *Staphylococcus aureus* used as positive control. Therefore, based on the findings of present study Cu_2O NPs can be exploited as stable antimicrobial agents for multipurpose uses.

Keywords Copper oxide NPs · Antibacterial · Laser ablation · UV–visible · Polyethylene glycol

1 Introduction

In the era of rapid development of nanotechnology, continuous progress in the synthesis and self-assembly of nanomaterials in a controlled and repeatable manner has been a problem. Because of its possible potential applications in various research fields, it has attracted much attention [1, 16]. Copper and copper-based nanoparticles (NPs) are of particular interest due to their several applications such as surface properties for low cost electronic devices, conductive films of researchers [20], lubricants, nanofluids, catalysis and antimicrobial activity, against bacteria, fungi, algae and viruses [1, 22, 26]. These characteristics make them particularly attractive for a broader range of multiple applications [13]. However, high oxidation tendency, extreme sensitivity to air creates difficulty in its stability of copper NPs [7]. Various methods have been accepted for the synthesis of copper NPs but most of them have encountered the formation of mixed phases, complex synthetic strategies, and structural formation control is poor [4, 19]. But the laser ablation technique is simpler, with high purity and faster method of NPs synthesis than other methods. It involves ablating a solid target placed in a liquid environment to produce a NP collected as a colloidal dispersion. Laser ablation has the several advantages such as short reaction time, mild temperature conditions,

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Impact of Native ST-PGPR (*Bacillus pumilus*; EU927414) on PGP Traits, Antioxidants Activities, Wheat Plant Growth and Yield under Salinity

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Abstract The rhizobacterial isolate '121' identified as *Bacillus pumilus* - EU927414, which was a rich source of PGP traits like IAA, gibberellins, phosphate solubilisers and siderophore production at 8% NaCl (w/v). This isolate showed synergistic behaviour of PGP traits with its compatible ST-PGPRs like three-fold increases in IAA content in T9 combination (EU927414 - *B. pumilus* + EU927408 - *B. aquimaris* + EU742146 - *Bacillus* sp.). Synergistic behaviour of *B. pumilus* - EU927414 was also observed in the case of ACC deaminase activities in T9 at 8% NaCl (w/v). Growth and yield of wheat crop in saline soil (ECe>3.4 dSm^{-1}) were enhanced by the inoculation of native ST-PGPR (salt tolerant-plant growth promoting rhizobacteria) under half a dose of recommended synthetic fertilisers (N:P:K) as observed in two successive cropping seasons. Salinity tolerant wheat cultivar K-7903 was used to evaluate the effect of ST-PGPRs in the saline field. Antioxidants activities like SOD, APX, CAT and GR along with proline, TSS, RS content were increased in T9 treated leaves of wheat plant at 60 days, followed by 90 days. The N, P and K contents in plant leaf were significantly increased due to inoculation of compatible ST-PGPRs including *B. Pumilus* - EU927414. The results showed reduced sodium content in T9 treated wheat plant's leaf at 90 days, followed by 60 days. The yield of wheat was 24 % increases with the inoculation of T9 combination, followed by T3 combination (EU927414 - *B. pumilus* + EU927412 - *Pseudomonas medicona* + EU927410 - *Arthrobacter* sp.), when compared with control.

Keywords: ST-PGPR, 16S-rDNA sequencing, PGP traits, Antioxidants, Saline soil, Wheat

1. Introduction

Soil salinity is the brutal environmental factor which limits the productivity of crop in agricultural field. By the mid-21st century, it may result in loss of up to 50% of cultivable lands (Mahajan and Tuteja, 2005). Major physiological mechanisms in plant like photosynthesis, protein synthesis, lipid metabolism and growth are influenced by salt stress (Parida and Das, 2005). Use of PGPR like *Azospirillum*, *Agrobacterium*, *Pseudomonas* and *Bacillus* sp. as bio-inoculants is an eco-friendly, energy efficient and economically feasible approach to reclaim the salinity affected soil and help in rich production of biomass (Berg, 2009). Inoculation of ST-PGPR (salt-tolerant plant growth-promoting rhizobacteria) improves plant growth under salinity stress conditions (Han and Lee, 2005; Upadhyay *et al.*, 2011, 2012b, 2015). The ST-PGPR is considered useful in developing strategies to facilitate wheat cultivation in saline areas (Ashraf *et al.*, 2004; Upadhyay *et al.*, 2011, 2015). Based on plant–microbe interaction across the world, mitigation of

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Microwave-induced Montmorillonite-mediated synthesis of dihydropyridine

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A simple, inexpensive and efficient one-pot synthesis of 1,4-dihydropyridine derivatives using 10 wt.% of Montmorillonite K-10 clay as catalyst is developed under microwave irradiation. A most probable mechanism is also advanced.

Keywords: 1,4-Dihydropyridine (DHPs), Montmorillonite K-10, microwave, solid catalyst, Hantzsch reaction.

Introduction

Dihydropyridines (DHP) are important organic molecules with diverse biological activities. For example, they have vasodilator, anti-atherosclerotic, antitumor, and antidiabetic activities[1–7]. Owing to vast chemotherapeutic application and unique structural motif, various methods are reported for the synthesis of this class of molecules[8–17]. Hantzsch reaction is a very good method for the preparation of DHP[13], although numerous other methods are available for the synthesis of these molecules. Molecular iodine[8,18,19], lithium bromide[20], bismuth nitrate[21], ruthenium trichloride[22], Zn-proline complex[23], bakers' yeast[24] and ionic liquid[25] are used for this purpose. However, the existing methods suffer certain limitation like high temperature, longer reaction time, low yield and cost related issues. Therefore, the development of simple, efficient and versatile methods for the synthesis of 1,4-dihydropyridyl scaffold is immensely desirable. In recent years, the use of clay as catalyst especially Montmorillonite, has been extensively explored in organic synthesis[26–29]. The major advantages of this catalytic system over other existing catalyst include process recyclability, readily availability, easy handling process, nontoxic nature of the catalyst, inexpensive and noncorrosive nature.

As a part of our ongoing interest in clay-mediated organic transformation towards the search of anticancer drugs molecule[30–35] we studied the catalytic and non-catalytic effects of Montmorillonite K-10.

This paper describes clay-induced microwave-mediated novel synthesis of dihydropyridines in excellent yield. In comparison to existing methods, clay-mediated reactions have a much wider scope since this reaction is solventless, fast, and economical. The product can be isolated without conducting any tedious workup.

Results and discussion

In some of our previous publications, the use of Montmorillonite was demonstrated[36–38]. Interestingly, this clay is compatible in the presence of microwave irradiation and absorbs energy readily. Numerous dihydropyridines derivatives were prepared following microwave-assisted Montmorillonite-mediatedreaction of aldehyde **1a-e**, dicarbonyl compound **2** in presence of ammonium acetate **3** under solvent-free con-

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Microwave-induced stereospecific synthesis of *trans* 3-phenylthio β-lactams

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Phenylthioacetyl chloride is a potential precursor of ketene in Staudinger reaction with imine in synthesis of stereodefined 3-phenylthio β-lactam derivatives. Herein we describe the reaction of imines with phenylthioacetyl chloride in the presence of N-methylmorpholine under microwave irradiation and classical condition. The reaction is highly stereospecific since only *trans* β-lactam is formed exclusively. This is an example in which identical products are formed under microwave irradiation method and thermal conditions.

Keywords: Microwave, stereospecific, thio-β-lactam, ketene-imine, Staudinger [2+2] cycloaddition.

Introduction

Staudinger [2+2] cycloaddition reaction of ketene and imine is one of most power tool in synthetic organic chemistry for the synthesis of β-lactams under thermal conditions[1]. This is a classical reaction, a valuable method by Hermann Staudinger in 1907 for the synthesis of β-lactam antibiotics and their analogues[2–4]. The β-lactam ring is the key structural motif in most of the widely used antibiotics[5–7]. The increase of antibiotic resistant of pathogenic bacteria's has led to intense demand to develop the new and novel methods for the synthesis of antibiotics drugs molecules[8–13]. Over the past century numerous synthetic strategy has been developed for the β-lactam synthesis. For instance catalytic asymmetric kinugasa reaction[14–16], metal carbene C-H insertinion[17], α-diazoketone under photochemical irradiation[18–20], ester enolate-imine condensation[21] and radicle cyclization are very crucial[22–24].

Among these approaches, the Staudinger, ketene-imine [2+2] cycloaddition reaction has proven the most versatile method to construct the 2-azitidinone rings. This strategy is quite simple and effective for the synthesis of diverse densely functionalized β-lactams by the coupling of ketene and imine from easily accessible starting materials.

The stereochemical outcome of the reaction is difficult to predict normally because this reaction proceeds through stepwise manner and stereochemical assignment is elucidated based on torquoselectivity model[25]. Further the stereochemical assignment of this reaction is supported by intensive research based on theorical and experimental results[26–28].

In spite of the above studies the stereochemistry of β-lactams has been greatly depend on the structure of ketene and imine counterparts, mode of addition of the reagents, nature of the solvents, temperature and the base used to generate the ketene during the course of the reaction[29,30]. The nature of N-substitution has also effect on *cis* to *trans* β-lactam formation[31–33].

3-Phenylthio-β-lactam derivatives are potential synthetic

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प्राचीन भारतीय शिक्षा व्यवस्था एवं स्त्री शिक्षा

डॉ० महेन्द्र प्रताप यादव
असिस्टेन्ट प्रोफेसर, मानविकी एवं सामाजिक विज्ञान विभाग,
इंजीनियरिंग संकाय, वीर बहादुर सिंह पूर्वांचल वि०वि०, जौनपुर (उ०प्र०)

विद्या अथवा ज्ञान का व्यक्ति के जीवन में अत्यधिक महत्व रहा है। विद्या रहित व्यक्ति का व्यक्तित्व संकुचित तथा जीवन दिशाहीन होता है। शास्त्रों में अज्ञानता को अंधकार के समान कहा गया है। शिक्षा मनुष्य का तीसरा नेत्र है जो उसको समस्त तत्त्वों के मूल को समझने में समर्थ बनाता है जिससे वह सत्कर्मों की ओर प्रवृत्त होता है। ज्ञान से ही जीवन जीवन और जगत् के रहस्यों को जानता है और वर्णाश्रम धर्म का पालन एवं पुरुषार्थ चतुष्टय का सेवन करते हुए मोक्ष को प्राप्त करता है। यानि ज्ञान ही वह माध्यम है जिसके द्वारा मनुष्य जीवन सम्बन्धी सिद्धान्तों तथा आचरणों को समझता है तथा अपने एवं शरीर को परिष्कृत और पवित्र करता है और अपने जीवन को सार्थक बनाता है। वस्तुतः शिक्षा स्त्री और पुरुष दोनों के लिए समान रूप से उपयोगी है। इसकी इसी उपयोगिता के कारण प्राचीन काल से ही विद्या अथवा ज्ञान को मनीषियों द्वारा प्रतिष्ठा प्रदान की गई और दोनों को शिक्षा प्रदान करने की समुचित व्यवस्था की गई। प्राचीन काल में शिक्षा की महत्ता इस बात से ही स्पष्ट हो जाती है कि सोलह संस्कारों में चार संस्कार शिक्षा से जुड़े हुए थे।

प्राचीन भारतीय मनीषियों ने शिक्षा को धन, आयु, कर्म तथा सम्बन्धी आदि में सबसे महत्त्वपूर्ण माना।[1] मनु ने इसकी महत्ता को स्पष्ट करते हुए लिखा है कि मानव जीवन में विद्या और तप मोक्ष प्राप्ति के (अच्छे) साधन हैं। उनके अनुसार मनुष्य तप द्वारा पापों को नष्ट करता है और विद्या द्वारा मोक्ष को प्राप्त करता है– तपो विद्या च विप्रस्य, निःश्रेय संस्कारं परम्।

तपसा किल्विषं हन्ति, विद्ययाऽमृतमश्नुते।। मनु0 12.104

अत्रि का कहना है कि जिस प्रकार अन्न और मधु मिल कर पुष्टिदायक बनते हैं। उसी प्रकार तप और विद्या मिलकर महान रसायन हैं।[2] ज्ञान को मनुष्य का तीसरा नेत्र माना गया है जो उसे समस्त तत्त्वों के मूल को समझने में समर्थ करता है तथा उसे सही कर्मों की ओर प्रवृत्त करता है।[3]

शिक्षा की इसी महत्ता के कारण हमारे मनीषियों ने इसके प्रसार पर बल दिया तथा विद्यादान के लिए प्रोत्साहित किया। इसके दान को सर्वश्रेष्ठ दान की श्रेणी में रखकर इसपर उन्होंने विस्तार से लिखा। अत्रि ने लिखा कि विद्यादान सभी दानों में श्रेष्ठ है।[4]

संवर्त के अनुसार भी विद्या दान सर्वश्रेष्ठ है तथा वह ब्रह्मलोक की प्रतिष्ठा का साधन है–

दानैश्च विविधैः सम्यक्, पुण्यमेददुदा हृतम्।

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Cost efficient security system Using Internet of Things

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Abstract: *Home Security System is an Arduino based security system that not only protects our homes but also all those place where security is required. For domestic purpose, need of security alarm systems is required. As the number of crimes is increasing every day, there should be something that will keep us safe. We are aware of high end security systems present in all markets, but they are not easily available for everyone. Therefore we want to provide a solution by building a cost-effective electronic system that has the ability to feel the intruder's speed and stop the alarm with the user sending an SMS alert. The basic idea behind this letter is that all bodies produce some heat energy in the form of infrared which is invisible to human eyes. However, it can be detected by electronic motion sensors.*

This research paper includes the use of Arduino, Motion sensor, buzzer, LCD display, SIM800 GSM module and a simple program. The sensor detects any speed in its permissible range and turns on the alarm. It will also send a signal to Arduino which processes the signal and sets an alarm with the detecting message on the display and a SMS is also sent to the user when the motion is detected. With this system we can easily install a security alarm in our home for unwanted intruders.

Keywords: *Arduino, motion sensor, buzzer, LCD display, SIM800*

I. Introduction

Security System research paper is an Adriano based which can secure our not only home but any place where security is needed. This system has lot of implication for today's world and places where security is must. This system detects the motion in front of it and raises the alarm and not only raises the alarm it instantly sends an alert message on the mobile number of its owner. Laser security systems are a high tech technology that used to be a part of home security only available to the wealthy. It is manually switch dependent sensors and a basic alarm unit. Laser security system a person moves in front of the motion sensor, that person's body heat triggers the system's alarm. And the alarm signals the security monitoring company and local law enforcement [2]. The basic alarm unit will also sound a loud alarm. Oath analysis and experiment indicate that rather stringent requirements must be met in order to obtain efficient optical heterodyne detection. There is considerable experimental evidence that these requirements can be met by employing an enclosed transmission path, the so called optical pipeline, and that from a practical standpoint the difficulties are not much greater than for other types of detection. Such a line with servo control of beam position should provide a very satisfactory transmission medium for any type of receiver. The heterodyne receiver appears to be more satisfactory than the direct detector for the reception of phase$ or frequency modulated light or multiplied optical signals. At some wavelengths it may provide the only means of overcoming thermal noise and detection of noise problems. The operation of Doppler radars depends upon the heterodyning process or most applications, supplying a properly tuned local oscillator present no great difficulty [5]. The coherent receiver provides high discrimination against background light. It also provides efficient detection in the infrared region, in which other detectors of these reasons and since free space is an ideal transmission medium, the optical heterodyne receiver may have considerable advantage over others for space communication applications.

II. Methodology

The Figure 1 represents the combined representation of all the modules which are considered in this model for Security System.

Arduino is used as a microcontroller which will control all the sensors connected through it by the code embedded into it. The Arduino is an open source software and hardware development environment that is built around a Chip called ATMEGA G 328P [4].

The sensor detects any motion in its permissible range and triggers the alarm. It will also send the signal to Arduino which processes the signal and set off the alarm along with detection message on display and also a SMS is sent to the user as soon as motion is detected. With this system we can easily set up a security alarm in our home for unwanted intruders [3].

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Smart Fix Home Automation Using Internet of Things

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Abstract: *We are in the age of rapid technology change, where working on new technology is booming to create new things to easier the living style of human beings. This idea re present to design and implement a minimum cost and a highly secure home automation system which are controlled by smart phones. The whole system is based on Arduino Uno board connected with relay to access and control the home automated appliances with the help of android Smart phone. The communication medium between hardware and software is done using the low cost Bluetooth module i.e. wireless system implementation is going to be done. This system is design to provide low cost and easy to implement home automation system to control different electrical appliances. Each system is secure with the unique security feature of Bluetooth pairing technique i.e. based on MAC address to provide security feature during the connectivity.*

Keywords: *Arduino Uno, Smart phone, Android IDE, Bluetooth, Arduino BT.*

I. Introduction

Internet of Things (IOTs) are the trending concepts in the field of technology, working on different module to connect hardware with software is the integral part of Internet of Things. Wireless is the next concept in this connecting world, communication medium without physical connectivity is considered as the best way to communicate faster than physical old communication mediums. While talking about home automation system, Bluetooth technology is considered as safe and easy to implementation in the connecting the devices to the Smartphone, Bluetooth feature is available in every devices.

Today, Bluetooth technology is widely used in home automation system. Operating at a globally available frequency of 2.4GHz, unlicensed, this Bluetooth device can link digital devices from 10 meters to 100 meters, the speed of communication is upto 3Mbps which depends on the network class. We can use Bluetooth technology for design this home automation system [1]. This system involves controlling the high voltage devices with using relay module so it must be feasible and safe in terms of using high voltage to control this module.

When we are designing a home automation system then there are some issues involved. The new devices can be easily integrated into this system because system is scalable. This system provides a user friendly environment on the host side, the process of device configuration, monitoring and controlling is very easy. If any problems are raised in the system which is find out by the some diagnostic services. The overall performance of the system is very fast and cost effective for the application of proposed home automation system [5].

An architecture for home automation system is proposed by Neng [2, a dedicated network is used for proposed system, that shows the how to we solve the problems at any stage of software in home automation. we represent a telephone network and PIC based remote control systemwith the help of pin check algorithm, which algorithm is designed by Yavuz and Hasan [3].

In this proposed work we design a Android phone based, very low cost, security enabled automation system which used in homes. Arduino BT board is used to connect the appliance at home. The communication between the mobile phones and the Arduino BT board is provides by the wireless technology. We can connect more devices in this system with some changes in architecture. Since Android IDE is used for the development of applications, it provides the portability environment and run on any Android OS platform. The Figure 1 represents the overall connection architecture of this proposed model. This paper is defined as below.

In the first part the hardware implementations and general design of the system is described. In the next part we describe the software development process of the system.

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110
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CNN-based Single-Fault Diagnosis of Self-Priming Centrifugal Pump

Sandip Kumar Singh

Abstract: CNN is a very powerful deep learning technique for classification when the size of data is significant. It has been observed that it fails to give any reasonable classification when size of the data is small. This paper deals with an enhanced data technique, which is very useful for smaller size of available data. We proposed to increase the size of data to multiple times until a good classification accuracy is acquired. The paper shows that the neural networks perform very efficiently when such type of enhancement is done. It has been elaborated for evaluating the classification of faults of centrifugal pumps. The CNN-2D and CNN-1D yield 100% accuracy for diagnosing the faults of in this case. The performance is also compared with that of ANN. The number of epochs required to reach 100% accuracy for multiple different sizes of data is used to evaluate the performance. The enhanced data approach also shows that there is a drastic fall in overall classification time of CNN.

Keywords: Artificial Neural Networks (ANN), Convolution Neural Network (CNN), Multinomial Logistic Regression (MLR) Support Vector Classification (SVC)

I. INTRODUCTION

Centrifugal pumps are very vital, and abundantly used rotating machinery. Under an abnormal state, all rotating machinery is accompanied by changes in vibration. Vibration signal analysis has been in application for fault diagnosis of rotating machinery. Feature extraction is an important stage that determines diagnosis accuracy, and substantial research has taken place on different types of feature extraction methods. In many techniques, a pre-decomposition of raw signal is also applied before the feature extraction. The most important components which succumb to failure in centrifugal pumps are the bearing and impeller. Therefore, the whole diagnosis in this research work is focused on pump-system failure due to the failure of these components. The operating state of bearing significantly affects the accuracy, reliability, and useful life of the pump system. The performance of knowledge-based methods rely on training data and the quality of selected features heavily. In several studies, different feature extraction methods are proposed. The extracted features are given to classifiers as inputs.

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CNNs are feed-forward and constrained 2D neural networks that have both alternating convolution and sub-sampling layers. Convolution layers model the cells in the human visual cortex [1]. CNNs have accomplished state-of-the-art performance. The Detection of faults in machines using an ANN-based approach is proposed in [2-4]. Singh *et.al.* used Convolution Neural Network (CNN) for bearing fault detection[6-7].

II. PRECISION-RECALL METRIC TO EVALUATE CLASSIFIER PERFORMANCE

The precision-recall curve: The precision-recall curve depicts the relation between Precision and recall for different values. The high president implies that there is a low false-positive rate. The high recall means a low false-negative rate. When Precision and recall both are large, the area under the curve is also very large, which is the most desired situation. Figs 5,6 & 7 show that the classifier is predicting correctly, and all predictions are positive.
The Precision-recall curves are generally useful in binary classification to understand the output of a machine learning classifier. It is necessary to binarize the output to extend the concept of the precision-recall curve and average precision to multi-class or multi-label classification (as is our case).

III. THE BASIC THEORY OF CNN AND PROPOSED METHOD

Convolutional Neural Network (CNN) consists of one or more convolutional layers (generally, with a sub-sampling step) and then followed by fully connected layers as in a standard multilayer neural network. A CNN consists of some convolutional and subsampling layers which are followed by fully connected layers. Then the input to a convolutional layer is an m ×m ×r image where r is the number of multimedia channels, which for RGB image has r=3. There is k number of filters in the convolution layer. The size of these filters is an m × n × q,where m is the dimension of image and n is smaller than m, k is number filters, r is the number of channels, and q can be equal to r, or less than it.

Each map is then sub-sampled typically max-pooling over p x p regions with p ranges between 2 to 5 for smaller and larger inputs, respectively. A full layer in a CNN consists of convolutional and sub-sampling sub-layers.

IV. DATA DESCRIPTION

The data of the self-priming centrifugal pump are collected on a self-priming centrifugal pump data acquisition system, as shown in Fig 3.5. The acceleration sensor is placed above the motor housing, and the sensor is fixed on a specific pedestal.

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Data -Enhanced Convolution Neural Networks for Wall Following Robot Navigation

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Abstract: Machine learning has been used for solving the Robot Navigation Task through the wall-following control. The wall-following control involves the movement of the robot in some directed direction maintaining a constant distance from a given wall. The path of the movement of robot is measured by ultrasonic sensors. Many machine learning methods have been used for this problem, as classifiers, but Convolution Neural Networks (CNN) outperforms them all with almost 98% of accuracy. This study compared the performance of five classifiers SVC, MLR, ANN, CNN-1D, and CNN-2D, which play the part of controller in the navigation work. We have used the ultrasonic sensor data to understand the hidden pattern in the navigation work and classified the actions by robot in terms of different motions performed by robot in response to it.

The classification reports of CNN-2D and CNN-1D with Artificial Neural Networks (ANN) have also been presented in this paper. The smart Data-Enhancement used in proposed method significantly improves the classification performance of all classifiers, especially CNN.

Keywords: Convolution Neural Networks (CNN), Wall-following robot navigation, Multinomial logistic Regression (MLR), Support Vector Classifier (SVC)

I. INTRODUCTION

A robot is an automatically working machine and can do some task that human can do. A mobile robot is specially designed to operate in environments such as automated assembly halls, factories, or warehouses [2]. The wall-following robot navigation is the movement of robot keeping a fixed distance from wall. The path of the movement of the robot is measured by ultrasonic sensors. [11]. The ultrasonic sensors are used in many numbers to generate data for wall and path following robots. This data is used as a feature for pattern learning and further utilized to control the robot motion. The immediate response of the robot after learning the sensor data is called real time obstacle avoidance. The sensor data is converted to usable data with the help of complex algorithms. Juang et al. [1] proposed fuzzy controller (FC) based reinforcement ant optimized design method, and applied it to wheeled-mobile-robot wall-following control. Ando, Y presents a method for an autonomous mobile robot with a sonar-ring to follow walls [8]. The sonar-ring consists of multiple ultrasonic range sensors. The proposed wall-following algorithm makes a robot able to follow a wall in various shapes. Hsu, C. H., & Juang, C. F. propose evolutionary wall-following control of a mobile robot using an interval type-2 fuzzy controller (IT2FC) with species- differential -evolution-activated continuous ant colony optimization [4]. Das, A. K describes the method of real-time estimation on a car-like robot using a single omnidirectional camera as a sensor [7]. The concepts of car maneuvers, fuzzy logic control (FLC), and sensor-based behaviors are merged to implement the human-like driving skills by an autonomous car-like mobile robot (CLMR) by Li, T. H [6]. Millan et al. used machine learning along with asynchronous electro cephalogram in advanced robotics [9] for control of a mobile robot. Ge, S. S describes the problem of goals unreachable with obstacles nearby when using potential field methods for mobile robot path planning [10]. Negishi, Y [3] describes the navigation of a mobile robot in unknown tactic environments using an omnidirectional stereo and a laser range finder. Brooks et al. used a new design methodology for control systems, known as subsumption architecture. It decomposed the problems in task- achieving behaviors [5]. Classifying data is a prime task of machine learning. Support vector machines (SVM) are used as binary classifiers. They are used both as supervised learning methods and unsupervised learning methods. When the data is labelled, classification by SVM is called SVC that is support vector classifier. In case of unsupervised learning where data is unlabelled, it is clustered in two distinct groups with the help of SVM. The Multinomial Logistic Regression (MLR) is a further extension of Logistic regression, which is a binary classifier. MLR classifies multiclass data both linearly and nonlinearly. Primary Logistic regression classifier is useful in binary situations like on /off, fail /pass, live/ dead, etc., where classes are discretely separable. In such situations, the classes can be labelled between "0" or "1". Multinomial Logistic Regression is used for the dependent variables which are categorically equivalent. This categorical equivalence of dependent variables is also called nomiality. This multiclass Logistic Regression is also called Multinomial Logistic Regression. We propose, a CNN based classification solution of wall-following control of robot navigation with outstanding performance of 98% classification accuracy.

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Phishing Diagnosis: A Multi-Feature Decision Tree-based Method

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Abstract: Phishing is an electronically connected criminal activity in which the attacker steals the user's personal information like username, countersign, internet banking account, credit/debit card number with the expiration date, password, pin, legitimacy, confidential patient record, CVV number, etc. to boon financially. Email-based phishing is the most common and traditional way of phishing scams, in which the phisher will send a suspicious email with an embedded URL and ask the user to click the URL. When the user clicks on the link, the link will be redirected to a spoofed site that looks the same to the original site to steal their credentials and displays some error message. Later the phishing uses those credentials for malicious purposes. To overcome these scams, many anti-phishing tools have developed. Among that the machine learning-based approaches can give a better result. This paper is an extensive study of the various machine learning-based anti-phishing approaches and their results that detect the phishing URL's from the URLs with URLs features. Six most important models of machine learning have been examined for the phishing detection problem. The Decision Tree-based method outperforms other methods.

Keywords: Phishing, Anti-phishing, Machine learning, Phish tank, Legitimate, Suspicious, Decision Tree.

I. INTRODUCTION

Phishing is a wide term used to describe a group of scam people with their personal information shared such as consumer name, password, credit/debit card number, etc., that manipulate information for disseminating rea-sons. Earliest contact is sent to a bulky group of people at once, so anyone can be a victim. They will contact their victims with the help of URLs, social media, emails, and phones. The only target through this attack of these people is to send a fake correspondence, which appears to have originated from the actual organization, hoping that a large group will follow the links provided to them from these contacts and disclose their personal information to the phishers (Figure 1). Phishing is an automated detection method used to cheat billions of dollars to out-siders and phishing technology uses human nature as well as the power of the internet to deceive millions of people in the world [1]. The social media platforms are used for deceitful, cultivated and perceptive information from internet users by covering through a legitimate entity. The basic goal of phishing technology is to illegally commit deceitful financial transactions on behalf of internet users [2]. According to the anti-phishing working group (APWG), which is an NGO community (a non-profitable group) report issued on June 2017, the global phishing survey 2016 has shown all the phishing attacks from 2012-2016 (Figure 2) [3]. The anti-phishing working group (APWG), which has also reported on the 1st quarter of 2019 (January, February, March) that there were 180,768 phishing incidents detected [4]. Various methodologies are being adopted at present to identify phishing web sites and emails. Sajid Yousuf Bhat *et al.* proposes an approach for "Spammer classification using ensemble methods over structural social network features" [5]. In [5] finds out whether the URL is spam/legitimate on the social network with community-based features. Mouad Zouina *et al.* proposes an approach for "A novel lightweight URL phishing detection using SVM and similarities index" [6]. In [6] phishing detection from the URL with the help of 6 features. SVM and similarity index is targeted to improve overall recognition of the phishing detection system. Alejandro Correa *et al.* explore "Classifying phishing URLs using recurrent neural networks" [7]. In [7] we explored the use of URLs as input for machine learning models applied for phishing site prediction with the help of 14 features. Suh *et al.* used "Comparing writing style feature-based classification methods for estimating user reputations in social media" it evaluates the performance of classifiers depend on the state-of-art methods 4 writing style features such as lexical, syntactic, structural, content-specific [8]. Gunikhan Sonowal *et al.* using "Masphid: a Model to Assist Screen Reader Users for Detecting Phishing Sites Using Aural and Visual Similarity measures" [9]. In [9] URL is phishing, suspicious or legitimate based on the 10 features. Kshitij Tayal *et al.* explore "Particle swarm optimization trained class association rule mining: Application to phishing detection" [10]. In [10] class association rules used to detect the URLs are phished or legitimate.

1.1 Motivation for phishing

1.1.1 Financial gain: E-mail spoofing is also called spear phishing which is used for fraud that targets a specific organization, seeking unauthorized access to confidential data.

1.1.2 Theft the login credentials: Typically, the networked login credentials of prominent high-street banking organizations and successive access to funds ready to transfer and seizure the home address mobile, number and other personal information.

1.1.3 Theft the bank credentials: More recently, the increase in networked share trading businesses have portended that a customer's trading attention gives an uncomplicated direction for global money transfers.

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Comparison of skin disease prediction by feature selection using ensemble data mining techniques

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ABSTRACT

Background: Skin disease is a major problem among people worldwide. Different machine learning techniques can be applied to identify classes of skin disease. Herein, we have applied machine learning algorithms to categorize classes of skin disease using ensemble techniques, and then a feature selection method is utilized to compare the results obtained.

Method: In the proposed study, we present a new method which applies six different data mining classification techniques, and then develop an ensemble approach using Bagging, AdaBoost and Gradient Boosting classifier techniques to predict classes of skin disease. Furthermore, a feature importance method is utilized to select the most salient 15 features which will play a major role in prediction. A subset of the original dataset is obtained after selecting the 15 features, to compare the results of six machine learning techniques, and an ensemble approach is applied to the entire dataset.

Results: The ensemble method is compared with the subset obtained from the feature selection method. The outcome shows that the dermatological prediction accuracy of the test dataset is increased as compared to the use of an individual classifier, and improved accuracy is obtained as compared with the feature selection subset method.

Conclusion: The ensemble method and feature selection applied to dermatology datasets yields a better performance as compared to individual classifier algorithms. The ensemble method provides a more accurate and effective skin disease prediction.

1. Introduction

Machine learning algorithms are widely used in medicine. Various disease diagnosis classification algorithms have been developed to provide high accuracy for predicting disease. Many machine learning algorithms are developed for predicting various types of disease at early stages after examining the various attributes of the disease. These algorithms are widely applicable in breast cancer, kidney diseases, thyroid disease, diabetes, other cancer, erythemato-squamous diseases, and many more. In this research paper, we selected erythemato-squamous disease for analysis. Various classification algorithms are applied and then ensemble methods are applied in this study. Another approach using feature selection is applied with these classification algorithms to obtain the accuracy of the prediction, for application to develop an expert system [7]. Various studies have been done in this field and are discussed below.

There are a number of related methods to the work we describe in this article [2]. achieved a 96.71% classification accurate rate for diagnosis of erythemato-squamous diseases using a novel hybrid intelligence method based on the C4.5 decision tree classifier and a one against all approach for the multi-class classification problem [3]. focused on non-melanoma skin cancer and classified using support vector machines (SVM) to accurately predict disease types. The chrominance and texture features were extracted in pre-processed training datasets [4]. discussed using a decision tree combined with neural network classification methods to construct the best predictive model of dermatology. The learning predicted and analyzed six common skin conditions. All classification techniques could predict disease fairly accurately, and the neural network model has the highest accuracy of 92.62% [5]. discussed the Gray-Level Co-Occurrence Matrix (GLCM) technique for finding features from segmented disease and classifying skin disease based on fuzzy classification, which improves accuracy [6]. deployed a k-Means clustering approach to classify a erythemato-squamous disease dataset. The results of the study indicate a 94%

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RESEARCH ARTICLE

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Classification of Skin Disease using Ensemble Data Mining Techniques

Anurag Kumar Verma, Saurabh Pal*, Surjeet Kumar

Abstract

Objective: Skin diseases are a major global health problem associated with high number of people. With the rapid development of technologies and the application of various data mining techniques in recent years, the progress of dermatological predictive classification has become more and more predictive and accurate. Therefore, development of machine learning techniques, which can effectively differentiate skin disease classification, is of vast importance. The machine learning techniques applied to skin disease prediction so far, no techniques outperforms over all the others. **Methods:** In this research paper, we present a new method, which applies five different data mining techniques and then developed an ensemble approach that consists all the five different data mining techniques as a single unit. We use informative Dermatology data to analysis different data mining techniques to classify the skin disease and then, an ensemble machine learning method is applied. **Results:** The proposed ensemble method, which is based on machine learning was tested on Dermatology datasets and classify the type of skin disease in six different classes like include C1: psoriasis, C2: seborrheic dermatitis, C3: lichen planus, C4: pityriasis rosea, C5: chronic dermatitis, C6: pityriasis rubra. The results show that the dermatological prediction accuracy of the test data set is increased compared to a single classifier. **Conclusion:** The ensemble method used on Dermatology datasets give better performance as compared to different classifier algorithms. Ensemble method gives more accurate and effective skin disease prediction.

Keywords: Primary health care- health information systems- skin disease- dermatology- support vector machines

Asian Pac J Cancer Prev, **20 (6)**, 1887-1894

Introduction

The skin is the most significant part of human body. The skin protects the body from UV radiation infections, injuries, heat and harmful radiation, and also helps in the manufacture of vitamin D. The skin plays an important role in controlling body temperature, so it is important to maintain good health and protect the body from skin diseases.

The fast development of computer technology in present decades, the use of data mining technology plays a crucial role in the analysis of skin diseases. Researchers are constantly developing various prediction methods, but the largest researchers use only a few classification algorithms instead of ensemble methods. The ensemble method uses different data mining techniques and combines them to find predictions.

Ramya and Rajeshkumar (2015) discussed the Gray-Level Co-Occurrence Matrix (GLCM) technique for finding features from segmented disease and classifying skin disease based on fuzzy classification, which is more accurate than existing ones.

Ahmed et al., (2013) discussed clusters of preprocessed data, using k-means clustering algorithms to separate related and unrelated data into skin disease. Frequent patterns were evaluated using the MAFIA algorithm. decision tree and AprioriTid algorithms are used to extract frequent patterns from clustered data sets.

Vijaya (2015) focuses on non-melanoma skin cancer and classifies types, using support vector machines (SVM) to accurately predict disease types. The chrominance and texture features are extracted pre-processed training data sets.

Chang and Chen (2009) discussed decision tree combined with neural network classification methods to construct the best predictive model of dermatology. The learning predicted and analyzed six common skin conditions. All classification techniques can predict disease fairly accurately, and the neural network model has the highest accuracy of 92.62%.

Fernando et al., (2013) discussed a disease prediction method, DOCAID, to predict malaria, typhoid fever, jaundice, tuberculosis and gastroenteritis based on patient symptoms and complaints using the naive Bayesian classifier algorithm. The authors reported an accuracy rate of 91% for predicting disease.

Theodorali et al., (2010) developed a predictive model to predict the final outcome of a seriously injured

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RESEARCH ARTICLE

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To Generate an Ensemble Model for Women Thyroid Prediction Using Data Mining Techniques

Dhyan Chandra Yadav*, Saurabh Pal

Abstract

Objective: The main objective of this paper is to easily identify thyroid symptom for treatment. **Methods:** In this paper two main techniques are proposed for mining the hidden pattern in the dataset. Ensemble-I and Ensemble-II both are machine learning techniques. Ensemble-I generated from decision tree, over fitting and neural network and Ensemble-II generated from combinations of Bagging and Boosting techniques. Finally proposed experiment is conducted by Ensemble-I vs. Ensemble-II. **Results:** In the entire experimental setup find an ensemble –II generated model is the higher compare to other ensemble-I model. In each experiment observe and compare the value of all the performance of ROC, MAE, RMSE, RAE and RRSE. Stacking (ensemble-I) ensemble model estimate the weights for input with output model by thyroid dataset. After the measurement find out the results ROC=(98.80), MAE= (0.89), 6RMSE=(0.21), RAE= (52.78), RRSE=(83.71)and in the ensemble-II observe thyroid dataset and measure all performance of the model ROC=(98.79), MAE= (0.31), RMSE=(0.05) and RAE= (35.89) and RRSE=(52.67). Finally concluded that (Bagging+ Boosting) ensemble-II model is the best compare to other.

Keywords: Meta classifier algorithms- boosting- bagging- ensemble-I, ensemble-II- ROC- MAE- RMSE- RAE- RRSE

Asian Pac J Cancer Prev, **20 (4)**, 1275-1281

Introduction

It is very critical to observe and measure combination of hormonal disturbance in women. It is not detected only in ladies but also find in gens. The reason behind thyroid is flexuation of hormones over or low in the human. It is very necessary for healthcare to balance hormonal over or low variation of hormones'. Hormonal disturbance have some risk factors so it is more required to continuous concern for the doctors and find the correct diagnosis at the correct time. Some very importance questions in thyroid to making decision as like what is most important technique to classify and identify thyroid symptoms? How treats in this situation? How minimize the thyroid symptom? How take best decision to minimize death risk? In this paper focus their work and using different ensemble models to identify the best algorithms for classification thyroid disorders. Thyroid glands have the shape as like butterfly. Thyroid gland produces two different type hormones a like T3 and T4. These hormones manage the effective function of body as like body temperature, blood pressure, heart rate sexual system etc. In some happening if T3 and T4 are not in proper way then some difference problems arise as like Hyperthyroidism and Hypothyroidism. If T3 is high and T4 normal means thyroid gland produce much hormone it will be Hyperthyroid and in other hand if T3 is less and T4 is normal then it will be Hypothyroid. This paper is organized in the two different sections. Data mining technique in healthcare observed all the discovering patterns between various collections of thyroid dataset for women (Farwell, 2019).

Diagnosis of thyroid disease in which the thyroid gland produces hormones to maintain metabolism of the human body. The thyroid disorders are classified into three parts first is Hypothyroidism second is the Hypothyroidism and third is Euthyroidism. In this paper author used machine learning methods linear discriminate analysis, K-nearest neighbour and adaptive neuro-fuzzy inference system. In the final analysis author find out accuracy (98.5%), sensitivity (94.7%) and specificity of this approach (Ahmad et al., 2018). A combine method of adaptive neuro-fuzzy inference system and information gain method. They decreased computation time and classification complexity. They find out classification accuracy (95.24%), specificity (91.7%) and sensitivity (96.17%) (Ahmad et al., 2018). A system by machine learning method for thyroid disease and the effectiveness of analyzed system measured in term of classification accuracy (Ma et al.,2018). Classification tree and its accuracy (98.89%) over the other classification techniques. They used k-nearest neighbours, support vector machine, decision tree and naïve bayes (Umar Sidiq et al., 2019).

Thyroid disease are analyzed by J48 graft and they take (7,200) thyroid dataset due to hypothyroidism and hyperthyroidism. They measure maximum classification accuracy (97.02%) and they suggested a model for thyroid

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Research Article

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Prediction of benign and malignant breast cancer using data mining techniques

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Abstract

Breast cancer is the second most leading cancer occurring in women compared to all other cancers. Around 1.1 million cases were recorded in 2004. Observed rates of this cancer increase with industrialization and urbanization and also with facilities for early detection. It remains much more common in high-income countries but is now increasing rapidly in middle- and low-income countries including within Africa, much of Asia, and Latin America. Breast cancer is fatal in under half of all cases and is the leading cause of death from cancer in women, accounting for 16% of all cancer deaths worldwide. The objective of this research paper is to present a report on breast cancer where we took advantage of those available technological advancements to develop prediction models for breast cancer survivability. We used three popular data mining algorithms (Naïve Bayes, RBF Network, J48) to develop the prediction models using a large dataset (683 breast cancer cases). We also used 10-fold cross-validation methods to measure the unbiased estimate of the three prediction models for performance comparison purposes. The results (based on average accuracy Breast Cancer dataset) indicated that the Naïve Bayes is the best predictor with 97.36% accuracy on the holdout sample (this prediction accuracy is better than any reported in the literature), RBF Network came out to be the second with 96.77% accuracy, J48 came out third with 93.41% accuracy.

Keywords

Breast cancer, data mining, Naïve Bayes, RBF Network, J48

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Introduction

The number and the size of databases recording medical data are increasing rapidly. Medical data, produced from measurements, examinations, prescriptions, etc., are stored in different databases on a continuous basis. This enormous amount of data exceeds the ability of traditional methods to analyze and search for interesting patterns and information that is hidden in them. Therefore, new techniques and tools for discovering useful information in these data depositories are becoming more demanding.[1] Analyzing these data with new analytical methods in order to find interesting patterns and hidden knowledge is the first step in extending the traditional function of these data sources.

Breast cancer

The organs and tissues of the body are made up of tiny building blocks called cells. Cancer is a disease of these cells. Although cells in each part of the body may look and work differently, most repair and reproduce themselves in the same way. Normally, cells divide in an orderly and controlled way. But if for some reason the process gets out of control, the cells carry on dividing and develop into a lump called a tumour. Breast tumours are usually caused by an overgrowth of the cells lining the breast ducts. They can be either benign or malignant. In a benign tumour, the cells grow abnormally and form a lump. But they do not

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Open Access Review Article

An Overview on Transdermal Drug Delivery System

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ABSTRACT

Transdermal drug delivery is involved in the transportation of drug through the skin for systemic circulation. Now a day's more than 74% of drugs are administered drug in the form of tablet, capsule, which are taken orally but sometimes those are not effective as desired due to physiological activities of body. The major obstruction caused by stratum corneum to penetrate the drug. So there is need to facilitate the stratum corneum to increase the flux, a number of approaches are used to enhance the penetration of drug. Transdermal drug delivery system (TDDS) are very effectively overcome the hepatic first pass metabolism and improve the steady plasma drug concentration. The present review article provides an overview of various types of transedrmal patches, method of preparation and their evaluation.

Keywords- Transdermal drug delivery system, First pass metabolism, TDDS

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Introduction-

Transdermal drug delivery is one of the most approachable controlled drug delivery system by which we can topically administered medicament in the form of patches by which drugs are delivered for systemic circulation with a controlled rate. The TDDS offers many advantages upon conventional dosage form including more patient compliance, elimination of hepatic first pass metabolism, more uniform plasma level, prolong action to reduce the dosing frequency.

Advantages of transdermal drug delivery system[1,2]:

1- Ease of handling, self-administration is possible.

2- Avoid the first pass metabolism of drug.

3- In case of any adverse action, it can be easily discontinued by simply detaching the patches.

4- Avoid the interaction of drug with gastro-intestinal fluid and other medication, thus improve the bio-availability.

5- A predetermined and stable drug plasma concentration of drug can be achieved.

6- It is easy to applicable in nauseated or unconscious patient.

7- The patches can be designed for prolong action. It may ranges from few hours to weeks.

Disadvantages of transdermal drug delivery system[3]:

1- Sometime drug or excipient may cause the skin irritation.

2- Drugs with hydrophilic characteristic are slowly permeate through stratum corneum.

3- Due to variable thickness of skin from one place to another or with age, the permeability of drug is affected.

4- It is costlier than conventional dosage form.

5- Higher molecular weight of drug (>500Da) is usually difficult to cross the stratum corneum.

Component of transdermal drug delivery system:

(1) **Polymer Matrix[4,5,6,7]:-** Polymers are the base of TDDS that manage the release of drug from the devices. The drug and other excipient are embedded in Polymer matrices and that can be prepared by dispersion. Hence

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Research Article

CONTROLLED DELIVERY OF HIV DRUG BY USING MUCOADHESIVE POLYMER

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ABSTRACT

One of the novel drug delivery systems are mucoadhesive drug delivery system. It utilizes the property of bioadhesion of polymers which becomes adhesive on hydration. This delivery system can be used to target a drug to a particular region of the body for extended period of time. Stavudine a nucleoside analogue of thymidine used in the treatment of HIV. Stavudine has short half-life of 2.3 hours and is taken twice daily in large number of patients which leads to no patient compliance. Thus, the development of mucoadhesive microspheres for controlled release would be advantageous. The objective of this study was to prepare, characterize and evaluate mucoadhesive microspheres of stavudine employing chitosan as coat that is used as natural mucoadhesive polymers. Mucoadhesive microspheres were found to be spherical, discrete, free flowing. Fourier transforms infrared spectroscopy (FTIR) revealed no interaction between drug and polymer(s). Scanning electron microscopy (SEM) shows microspheres were spherical. The microspheres appear with rough surface and encapsulation efficiency found to be in range of 72.18% to 80.65%. All the microspheres showed good mucoadhesive property and swelling index. The drug release was found to be in range of 94.57% to 87.66% over the period of 12 hours.

Keywords: Stavudine, Chitosan, Sodium alginate, Orifice ionic gelation technique, Microspheres.

INTRODUCTION

AIDS is a collection of symptoms and infections resulting from the specific damage to the immune system caused by the human immunodeficiency virus (HIV).[1] The late stage of the condition leaves individuals prone to opportunistic infections and tumors. Although treatments for AIDS and HIV exist to slow the virus's progression, there is no known cure. HIV is transmitted through direct contact of a mucous membrane or the blood stream with a bodily fluid containing HIV, such as blood, semen, vaginal fluid, preseminal fluid and breast milk [2]. Most researchers believe that HIV originated in sub–Saharan Africa during the twentieth century, [2] it is now pandemic, with an estimated 38.6 million people now living with the disease worldwide. As of January 2006, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) estimate that AIDS has killed more than 25 million people since it was first recognized on June 5, 1981, making it one of the most destructive epidemics in recorded history. In 2005 alone, AIDS claimed an estimated 2.4–3.3 million lives, of which more than 570,000 were children. A third of these deaths are occurring in sub-Saharan Africa, retarding economic growth and destroying human capital. Antiretroviral treatment reduces both the mortality and the morbidity of HIV infection, but routine access to antiretroviral medication is not available in all countries[3]. HIV/AIDS stigma is more severe than that associated with other life-threatening conditions and extends beyond the disease itself to providers and even volunteers involved with the care of people living with HIV. Drug delivery systems (DDS) that can precisely control the release rates or target drugs to a specific body site have an enormous impact on the health care system. Carrier technology offers an intelligent approach for a drug delivery by coupling the drug to carrier particles such as microspheres, nanoparticles and liposome, which modulate the release and absorption characteristics of the drug. By virtue of their small size and efficient carrier characteristics microspheres constitute an important part of these particulate DDS. Due to their short residence time at the site of absorption the success of this novel drug delivery system is limited .It would be advantageous to have means for providing a close contact of the drug delivery system with absorbing membranes. It can be achieved by coupling mucoadhesion characteristics to microspheres and developing novel drug delivery system known as mucoadhesive microspheres.[4] Novel drug delivery systems [NDDS] can selectively control the release rate or target drugs to a specific body site have had a great impact on the healthcare system. Microspheres comprise of an important part of these particulate drug delivery systems because of their small size and efficient carrier characteristics. However, due to their short residence time at the site of absorption the success of these novel drug delivery systems is limited. It would be advantageous to have means for providing an intimate contact of the novel drug delivery systems with absorbing membranes. Mucoadhesion characteristics of microspheres and developing novel delivery systems as mucoadhesive microspheres can achieve it [4]. Mucoadhesive drug delivery systems utilize the property of bioadhesion of polymers that become adhesive on hydration[5]. These drug delivery systems can target a drug to a particular region of the body for extended period [6]. Bioadhesion is an interfacial phenomenon in which at least one of which is biological, are held together by means of interfacial forces[7]. The attachment could be between an artificial material and biological substrate. The term mucoadhesion is used in case of polymer attached to the mucin layer of mucosal tissue. Mucoadhesive materials have been investigated and identified[8]. These are generally hydrophilic macromolecules that contain many hydrogen bond forming groups (e.g. hydroxyl and carboxyl groups) and will swell when placed in contact with water. In many cases these materials require wetting to become adhesive. The

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Wings to the Research

Review Article

A Study on Contraceptive Action

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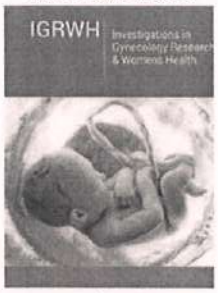

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Abstract

Vaginal contraceptive products have been available for many years and usually contain the membrane surfactant nonoxynol-9 (N-9) as one of the main ingredients. However, the major drawback of using surfactants is their detergent-type cytotoxic effect on vaginal cells. Besides, N-9 is also known to inactivate lactobacilli leading to disturbance of the vaginal microflora, which in turn increase the chances of STI/HIV transmission. Neem seed oil proved to be spermicidal against rhesus monkey and human spermatozoa in-vitro. Hexane extract of neem seed was reported to be precursor for immune contraceptive guided fraction whereas lyophilized neem leaf extract which is hydrophilic in nature has shown spermicidal activity against human spermatozoa in vitro. This review article proposes hydrophilic lipid for the extraction of hydrophilic and hydrophobic constituents from neem leaf to give novel aqueous neem leaf extract (NANE) which involves no use of organic solvent or thermal application and have no side effects. It is interesting to note that use of herbal contraceptives generally did not lead to permanent sterility, since discontinuation of the treatment allowed a prompt return to normal fertility.

Keywords: Contraception; Spermicidal activity; Novel aqueous neem leaf extract (NANE)

Introduction

The population explosion is a global problem that poses significant threat to the quality of life, more particularly in the underdeveloped and developing countries [1]. The extraordinary growth of the world population stands as one of the significant events of the modern era to think over. The current world population is around 6.46 billion and that of India is around 1.1 billion. The United Nations 'medium' projection has predicted that world population, which crossed the five billion mark in 1987, will increase to 10 billion by the year 2050 [2]. One of the critical problems of the developing countries like India is its geometrical increase in human population. Today we understand that our sheer numbers have increased so much that they are straining Earth's capacity to supply food, energy and raw materials. Advances in medicine and public health have led to a significant decrease in mortality and an increased life expectancy. This population explosion will have negative impact on our economic policies and would simultaneously misbalance our socio-economic infrastructure. Thus, the control of human fertility in the sense of its limitation is the most important and urgent of all-biosocial and medical problem confronting mankind today [3].

Approximately 49 percent of pregnancies in the United States are unintended. One cost analysis found that compared with pregnancy and abortion, contraception saves an estimated $9,000 to $14,000 per woman of childbearing age over a five-year period. Although Male or female condoms used correctly and consistently is the only available method shown to be effective in preventing both unwanted pregnancies and ST/HIV infections, women often have little power to negotiate the use of condoms with their partners and are unable to protect themselves from nonconsensual coercive sex. Further Female condoms are expensive and are not readily available in developing countries. Contraception is literally the prevention of conception, but generally is taken to mean the prevention of pregnancy [4]. Further, Overpopulation, particularly in developing countries, is complicated by the pandemic of sexually transmitted infections (STI) and human immunodeficiency virus (HIV) infections. The high incidence of these infections is owing to heterosexual intercourse, and the infections spread more readily from men to women than from women to men [4] New HIV infections

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Effect of *Platycladus orientalis* on the serum biochemical markers of oxidative stress in liver cirrhosis with histopathological microscopic study

Alok Kumar Dash and Jhansee Mishra

Abstract
Objective: The aim of the present study evaluates the hepatoprotective effect of aqueous and petroleum ether extract of *Platycladus orientalis* leaf by paracetamol-induced liver damage in rats.
Materials and Methods: Hepatic damage, as reveled by histology and the increased activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP) activities, and decreased levels of serum total protein (TP), albumin (Alb) were induced in rats by an administration of paracetamol (750 ± 5) mg/kg. Further, the effects of both extracts on serum thiobarbituric (TBAR), glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) were estimated to measure the degree of protection.
Results: petroleum ether extract of *Platycladus orientalis* at a dose level of (200 ± 5) mg/kg produce significant hepatoprotection by decreasing the activity of serum enzymes, while they significantly increased the levels of (GSH), (SOD) and (CAT) in a dose dependent manner. The effects *Platycladus orientalis* extract were comparable to that of standard drug, silymarin.
Conclusion: From this study, it can be concluded that the aqueous and petroleum ether extracts of *Platycladus orientalis* possesses both effective hepatoprotective as well as significant antioxidant activity.

Keywords: Chemopreventive, Silymarin, alp, aqueous, petroleum ether, hepatic damage

Introduction
Liver is the key organ of metabolism and excretion. It is often exposed to a variety xenobiotics and therapeutic agents. Until today, people have not yet found an actual curative therapeutic agent for liver disorder. In fact, most of the available remedies help the healing or regeneration of the liver (Subramoniam *et al*., 1998) [26]. The hepatotoxin paracetamol is frequently used to induce liver fibrosis in animal models treatment with paracetamol generates free radicals that trigger a cascade of events that result in hepatic fibrosis, mimicking the oxidative stress that has a fibro genic effect on HSC. Although no successful therapeutic approach to this pathogenetic mechanism in liver disease has been developed, antioxidants therapies have shown to achieve some positive effects (Hallowell *et al*, 1984: Hochstein *et al*,.1988) [9, 11]. Natural remedies from medicinal plants are considered to be effective and safe alternative treatments for hepatotoxicity. In view of this, the present study was undertaken to investigate the hepatoprotective activity of *Platycladus orientalis* extract against paracetamol induced hepatotoxicity in male Wistar rats. *Platycladus orientalis* has been used as a medicinal plant for thousands of years. *Platycladus orientalis* has held claim for therapeutic use for fevers, dyspepsia, gastric ulcers, sore throats, asthma, bronchitis, Addison's disease and rheumatoid arthritis and has been used as a laxative, antitussive and expectorant (Alok *et al*., 2013). Among its most consistent uses are as a demulcent for the digestive system, to treat coughs, to soothe sore throats, and as a flavoring agent. The present study was undertaken to evaluate the protective effect of *Platycladus orientalis* aqueous and petroleum ether extract on paracetamol induced hepatotoxicity. In addition, the antioxidant property of *Platycladus orientalis* extracts in liver-injured rats was investigated.

Materials and Methods
Plant material
Leaves of *Platycladus orientalis* were collected in the month of November 2011 from its natural habitat from nearby Dasapalla forest division, Nayagarh district of Odisha, India. The plant was authenticated by Dr. A.K. SINGH (H.O.D) T.D.P.G. College, Jaunpur, U.P, India,

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Batten the mistery disease: A brief on batten disease

Alok Kumar Dash and Jhansee Mishra

Abstract
The word Batten which it seems very rare and recessivene urder active disease which mainy found in children. Generally it grws with childhood which is the most common form of a group of diseasorder called as neuronal ceroid lipofuscinoses. In the field of medicine it is also called as Neuronal Ceroid Lipofuscinosis (NCL).The major difference between Batten and NCL are: Progressivness, age of onset, side effect, pathogenic response, mode of action to receptor etc.It is a genetic diseasorder which generay deveped during childhood The maximum risk factor is in between the age 5 to10.At eary stage the major symptoms are seizure and eye prbelms The earliest symptoms range from being fairly obvious, with a child experiencing seizures or vision problems, through to subtle signs such as mild personality changes or clumsiness. Now a day by through the development of many animal model and by the help of new technology gradually we controll over the disease.

Keywords: Batten, animal model, NCL, genetic, childhood, technology, treatment, therapy, nervous system, seizures

Introduction

Neuroal ceroid Lipofuscinoses which is also called as batten disease is an inerited disorder. Generally it starts from the childhood by through nervus system disorder. Batten disease (Neuronal Ceroid Lipofuscinoses) is an inherited disorder of the nervous system that usually manifests itself in childhood. Batten disease is named after the British paediatrician who first described it in 1903. It is one of a group of disorders called neuronal ceroid lipofuscinoses (or NCLs). The neuronal ceroid lipofuscinoses (NCLs) are a significant cause of childhood progressive intellectual and neurological deterioration (Hofmann *et al*, 2002) [21]. Collectively, this group of at least eight genetically distinct disorders is considered the most common pediatric neurodegenerative disease. Originally described as a form of 'amaurotic familial idiocy', these fatal disorders were subsequently renamed because of the characteristic intracellular accumulation of ceroid and lipofuscin. The precise relationship between the appearance of these lip pigments and cellular dysfunction remains unclear, but these disorders exert a profound effect upon the central nervous system (CNS) of affected individuals (Wisniewski *et al*, 2001; Mitchison *et al*, 2001) [57, 38]. The substantial impact of the NCLs upon carers has only recently begun to be evaluated (Labbe *et al*, 2002; Gardiner 2002) [30, 15]
Although Batten disease is the *juvenile* form of NCL, most doctors use the same term to describe all forms of NCL. Early symptoms of Batten disease (or NCL) usually appear in childhood when parents or doctors may notice a child begin to develop vision problems or seizures. (Hobert *et al*, 2006) [20] In some cases the early signs are subtle, taking the form of personality and behaviour changes, slow learning, clumsiness or stumbling. Overtime, affected children suffer mental impairment, worsening seizures, and progressive loss of sight and motor skills. (Rakheja *et al*, 2007) [47] Children become totally disabled and eventually die. Batten disease is not contagious nor, at this time, preventable. To date it has always been fatal. (Australian Chapter of Batten Disease Support and Research Association)
Batten Disease is the common, catch-all name for Neuronal Ceroid Lipofuscinosis (NCL). The NCLs are in actuality a group of disorders but because the name is so difficult to pronounce the name Batten Disease has been adopted to indicate all of them together. (Cooper JD, 2008) [11] They all have a common denominator and that is that they are also known as lysosomal storage disorders and have the same basic cause, progression and outcome. Being lysosomal storage means that the lysosome, a small membrane bound structure or compartment found in most cells stores material that it would normally recycle. The lysosome contains enzymes whose job it is to break down other proteins for recycling or elimination. A missing lysosomal protein can cause a build of proteins. (Wisniewski *et al*, 2001) [57]. Batten disease is rare and occurs in an estimated 2 to 4 out of every 100,000 births in the United States.

Science Communication Induces Safety Measures and Doses of Pesticides & Chemical Fertilizers in Crops: A Case Study

Dr. Manoj Mishra*

Indiscriminate uses of synthetic chemicals like pesticides insecticides and fertilizers are important brutal factors of agricultural soil, surrounding environment and human health. Recently, the whole world is facing the problems of synthetic chemicals due to their non biodegradable nature and application of high dose in agricultural field, which enter in trophic level from producer to human being. In the present study, four blocks of district Jaunpur were taken for evaluation and application of synthetic chemicals among the farmers in 2016, each site were about 20 km apart from each other. Application and use of synthetic chemicals in the each sites (S1;N=38, S2;N=45,S3;N=32 and S4;N=37) were examined on the basis of self administrative questioner among the farmers and sellers reveled that about 90% of the farmers were used in synthetic chemicals for vegetables and 10% for cereal crops among of them 86% of the farmers were unable to use the dose and brutal effects. Maximum farmers have less cultivated lands and they grown more vegetables as compared with cereals. Since 2016 we initiate the rigorous communication among the farmers to educate the scientific essence and use of synthetic chemicals in their regional language, and about 83% and 65% improvement was recorded in use of synthetic fertilizers and synthetic chemicals (Pesticides and Insecticides) as par their recommended standards respectively in year of 2018. Afford of the present study of three years, revealed that the science communication could be decrease indiscriminate uses of synthetic chemicals among the farmers.

Keywords: Synthetic chemicals, Use pattern, Farmers, Science communication

Introduction : Modern agricultural is an important part of engineered ecosystem while agriculture is perhaps the closest to the

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21 डी0जी0 तेन्दुलकर, महात्मा लाइफ ऑफ मोहन दास करमचन्द गां खण्ड 03, दिल्ली 1992 पृष्ठ 256

विकास मापन एवं संचार का बदलता नजरिया

डॉ0 अवध बिहारी सिंह*

विकास वह रचनात्मक परिवर्तन है जिससे व्यक्तियों समुदायों तथा समूची का सार्वभौमिक उत्थान होता है। यह समग्र रचनात्मक परिवर्तन ही मूलतः है जो वृद्धि एवं प्रगति से बढ़कर है। विकास किसी भी देश के सामाजिक, सांस्कृतिक बदलाव का वरण तथा परिणाम है। विकास प्रकृति प्रदत्त होता है परन्तुसतत विकास संसार के सभी व्यक्तियों, समुदायों, परिवारों तथा देशों का सार्वभौमिक ध्येय भी है। यह एक सामाजिक प्रक्रिया है। इसका सीधा सम्बन्ध समाज के आर्थिक पक्ष से है। आर्थिक विकास के द्वारा ही कोई भी देश विभिन्न सामाजिक उद्देश्यों को अर्जित करता है। वैसे तो विकास का अर्थ होता है विस्तार करना, सोपान का उद्घाटित करना। मानव समाज के सन्दर्भ में इसका अर्थ होता है आन्तरिक सम्भावनाओं को उद्घाटित करना तथा उसका विस्तार करना। सामान्य रूप से विकास का आशय अपनी क्षमताओं की पहचान कर अपनी स्थिति में वांछित दिशा में रचनात्मक बदलाव लाना है। तभी तो डॉ0 योगेन्द्र सिंह के मतानुसार "समाज के सदस्यों में वांछनीय दिशा में नियोजित सामाजिक परिवर्तन लाने के उपाय को विकास कहते हैं।" वहीं पानसियन ने अपनी पुस्तक **नेशनल डेवलपमेन्ट** में लिखा है कि "विकास सकुचित अर्थ में परिवर्तन है। यह वृद्धि से सम्बन्धित है जो पहले से किसी वस्तु में मूल अवस्था में विद्यमान है।" प्रो0 अनिल कुमार उपाध्याय ने विकास को परिभाषित करते हुये लिखा है कि" विकास वह परिवर्तन है जिससे समाज प्रगति को प्राप्त करने में सक्षम हो पाता है।"[2] आज के परिवेश में विकास के लक्ष्य को स्पष्ट करते हुए सुशील राय ने लिखा है कि "विकास बदलाव की वह प्रक्रिया है जो हमेशा समाज कल्याण के लिए घटित होती है, जिसका जीवन और समाज के हर पक्ष से जुड़ाव होता है। जिसमें सर्वोत्तम हित की कामना निहित होती है और बहुजन हिताय बहुजन सुखाय का उद्देश्य शामिल होता है, जिसे प्राप्त करने के लिए एक योजनाबद्ध प्रयास व अभ्यास किया जाता है।"[3]

विश्व स्तर पर चर्चित 'विकास' एक बहुआयामी शब्द है। समय के साथ विकास का नजरिया भी बदलता चला गया जिसके चलते सर्वाधिक कठिन कार्य विकास के मापन का है। फलस्वरूप विकास को परिभाषित करने एवं उसके मापन

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Love of life, happiness, and religiosity in Indian college students

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ABSTRACT

The aims of the present study were (1) to explore sex-related differences, (2) to estimate the associations between love of life, happiness, and religiosity, and (3) to investigate the components from the correlation matrices. A sample of Indian college students ($N = 370$) took part in this study. They responded to the English versions of the Love of Life Scale, the Arabic Scale of Happiness, and the Arabic Scale of Intrinsic Religiosity. Results indicated that women obtained the higher mean scores on love of life and religiosity than did men and the effect size was small. All the correlations between the scales were statistically significant and positive. Principal components analysis extracted one component and labelled: Well-being and religiosity. It was concluded that those who consider themselves as religious experienced greater love of life and happiness.

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KEYWORDS
Love of life; happiness; religiosity; college students; India

Introduction

One of the main trends in contemporary psychology is the emergence of positive psychology. It studies the strong aspects of human life and virtues, such as well-being, happiness, satisfaction, optimism, hope, insight, honesty, persistence, resilience, rationality, mental health, religiosity, creativity, courage, and meaningfulness, among other subjects (see, e.g., Argyle, 2002; Aspinwall & Staudinger, 2003; Carr, 2004; Chang, 2001; Diener, Suh, Lucas, & Smith, 1999; Loewenthal, 2000; Seligman, 2002; Snyder & Lopez, 2002; Veenhoven, 2011). Subjective well-being (SWB) is an important theme in positive psychology. Love of life (LOL) was proposed by Abdel-Khalek (2007b) as one of the components of SWB.

The numbers of psychological studies on love are few in proportion to that on hate and aggression. Rubin (1970, 1973) was the first social psychologist to develop an instrument designed empirically to assess romantic love. It includes three components: affiliated and dependent need, a predisposition to help, and an orientation of exclusiveness and absorption. Rubin (1970) described love as an attitude that affects one's behaviour toward specific people or love objects. More recently, Sternberg (1997) defined three components of love: intimacy, passion, and commitment.

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Interplay of organizational justice, psychological empowerment, organizational citizenship behavior, and job satisfaction in the context of circular economy

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Abstract

Purpose – The purpose of this paper is twofold: first, to examine relevant organizational "human" aspects that support circular economy (CE); and second, to investigate the influence of perception of organizational justice (OJ), psychological empowerment on job satisfaction (JS) through mediating role of organizational citizenship behavior (OCB).

Design/methodology/approach – The study used survey questionnaire. The data were statistically analyzed using structural equation modeling (SEM) to test hypotheses of the study.

Findings – OJ positively and significantly influences psychological empowerment. Also, it was found that OCB and psychological empowerment to positively and significantly influence JS. Furthermore, OCB positively and significantly mediates the influence of OJ and psychological empowerment on JS.

Practical implications – Employees should be provided with fair and empowering environment to derive positive outcomes in terms of organizational citizenship behavior and JS. The study also suggests recognizing the importance of OCB in an organization to enhance JS and support CE.

Originality/value – The study presents empirical evidence in Indian context on how to encourage employees to display voluntary job behaviors and keep them job satisfied.

Keywords Job satisfaction, Organizational citizenship behaviour, Organizational justice, Psychological empowerment, Circular economy

Paper type Research paper

Introduction

The extant literature on circular economy (CE) suggests it as a new business model for sustainable development (Jabbour *et al.*, 2017; Mathews and Tan, 2011; Naustdalslid, 2014) and integration of economic activity and environmental well-being (Murray *et al.*, 2016) that to rely on 3Rs principles – reduction, reuse and recycle (Lett, 2014; Su *et al.*, 2013). We argue that the CE offers economic outline grounded in circular movement of products and materials (Masi *et al.*, 2018) and it emphasizes on replacing production systems based on the linear consumption model to a kind of closed system that ensures reusing resources and conservation of energy (Geng *et al.*, 2012). In other words, the CE focuses on removal of the prevailing linear economy model of "take," "make" and "dispose" which does not possess inbuilt mechanisms of preserving environment (Su *et al.*, 2013). Furthermore, in order to implement the CE, the organizations should emphasize on the 3R principles – reduction, reuse and recycle (Zhu and Qiu, 2007) in their sustainable value creation processes. Such a positive environmental attitude of organizations results in considerable improvement in

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Application of Sumudu Transform to Fractional Integro-Differential Equations Involving Generalized R-Function

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Abstract

In this paper, we applied Sumudu transform to investigate the solution of a Volterra type fractional integro-differential equation involving generalized R-function. Some specific cases are also mentioned.

Keywords: Sumudu transform, Volterra type Integro-differential equation, Riemann-Liouville Fractional Integral and Derivative, Generalized R-function of Lorenzo-Hartley.

1 Introduction

With the arrival of computers and advanced softwares, the differential equations played an essential role in all aspects of applied mathematics and gained greater importance. Numerous integral based transforms such as Laplace, Mellin, Fourier, Hankel etc. are applied to solve differential equations dealing with the engineering problems. In 1993, Watugala [7] proposed the Sumudu transform. Unit and scale preserving properties of Sumudu transform has a marvelous potential of applicability in the field of engineering mathematics and applied sciences. Weerakoon [11] gave the inverse Sumudu transform. We can find further details about it from Belgacem et al [5, 6], Loonker and Banerji [4] and many others.

The aim of this paper is to present some of the significant characteristics of Sumudu transform and a simple alternative derivation of the solution of Volterra type fractional integro-differential equation. Many authors have demonstrated the solution of fractional-integro-differential equation, including Barrett [8], Kilbas, Saigo, and Saxena [1], Ross and Sachdeva [2], Saxena [9], Jain and Tomar [10] and others.

Effect of Science Communication on Regional Peoples to Corrective Measures of Climate Change

Dr. Manoj Mishra*

Since, the development of human civilization science communication has play important role in balancing between human and climate change. Developing countries like India play a critical role in International climate change negotiations due to their rising national emissions and increasing vulnerability. Yet, we currently know little about the factors that influence public understanding and engagement with these valuable issues. The factors which responsible for environmental issues, definitely individual approach has play important role to ameliorate the hazardous effects of climate change. In this connection science communication has quite accountable; how they spread the things among the peoples. In the present study, micro climatic conditions of tree infected zone and without tree zone were observed since 2016 to 2018 at different blocks of Jaunpur district, about 10 to 8°C temperature were less in tree infected zone as compared to without tree zone in summer while 4 to 8°C temperature were more at tree infected zone as compared to without tree zone in winter session, almost similar findings were observed in the case of humidity. Ground water levels were fewer falls in tree infested zone compare with without tree zone in summer session. These results revealed the balancing mechanism of temperature by tree. Therefore, since 2017 we initiate the campaign among the people to plant the tree and save the micro climate, which would help to balance global climate change.

Keywords: Science communication, climate change, tree, temperature and surrounding.

Introduction : Traditionally, the communications have focused on the extreme consequences of climate change and the uncertainty surrounding climate research. Scientist/sociologist have been emphasized the dramatic aspects of climate change, and often used doomsday images. Current research focusing, how the science communication would become as asset to understand the climate change. Climate change is all around us, and researchers agree that if

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AN Input Based Random Number Generator

Prashant Kumar Yadav, Surjeet Kumar

Abstract: The this research article, a neoteric technique is introduced to generate four digit random number for authenticating a user as well as increasing the security of wireless and wired networks by using input based random number generator. An input based random number generator uses number conversion technique and some logical operations. Though the degree of randomness of generated number will not become very high but this hypothesis will increase the security in different areas of computer and sensor network.

Keywords : Random number generator; security; PRNG; TRNG.

I. INTRODUCTION

The traditional computer network isa network of computers and sensors nodes combined with some type of processing unit and a transceiver module, which may be wired or wireless. The sensors are those devices which have the capability to sense or measure some digital data or analog data, depending upon the type of sensor. Such devices are called sensor nodes; the size and dimensions of a sensor node areas small as these can be easily deployable without putting it in front of human eyes. The applications ofwireless as well as wired sensor networks can be of different kind which includes surveillance system for civilians as well as military people, weather forecasting, detection of any biological system, industrial diagnostics, etc. [1]. Because the sensor networks are rapidly growing day by day and play very crucial role in order to secure our privacy, hence the security of these nodes and data generated by these node must be ensured [2]. Because sensor networks may interact with some personal and sensitive information and operate in very far from us geographically, it is imperative that the security concerns be addressed for securing both the sensor nodes and sensor information [3].In this article a novel structure of Input Based random number generator (IBRNG) is introduced to increase security of wireless sensor networks. Because of inherent resource and computing constraints, security of sensor networks poses different challenges in comparison to our traditional computer network security.
In the recent days, the security field of computer and sensor network attracts researchers to do something for betterment of the security of computer and sensor network. Thus, the knowledge about this current field of research will provide a great advantage to researchers. Different methods are proposed for increasing security in these networks. Random numbers are much useful for different purposes, such as encrypting and decrypting sensitive information, the analysis of statistical data and for picking up random samples from a very large data set [4]. The most valuable applications of random numbers is in cryptography.
The main role of this research article is to authenticate user as well as increasing security of computer and sensor nodes and network by using input based random number generator to encrypt or decrypt sensitive data. The remaining sections of this research paper are organized as follows:
Section II describes a review of concrned works. Section III presents a freshperspective to increase security in computer network by using an input based random number generator to encrypt or decrypt data or for user authentication and information. Section IV concludes the paper and its uses.

II. RELATED WORK

Basically pins or passwords are generated using one of random number generation techniques. Some of them are as follows:

1. PRNG: It stands for Pseudo-random number generators (PRNGs), are predefined procedures that are capable to deliberately generate long numbers with excellent random properties but sometimes the sequence may repeat [5]. The random numbers generated by such algorithms is generally determined by a fixed number called seed [6]. Linear congruential generator (LCG)is the most common PRNG.LCG uses the recurrence to generate numbers which is:

$$X_{n+1} = (ax_n + b) \bmod m$$

where X is the sequence of pseudo-random values
m is modulus , a is multiplier
b is increment, X_n is the seed or initial value.

2. TRNG: The phrase TRNG stands for True Random Number Generator. This is also known as hardware random number generator. It uses physical process, i.e. some specific hardware, to generate random numbers rather than any specific algorithm [7]. Physically, a true random number can be generated with the help of four physical entities i.e. quantum, noise, FRO (free running oscillator) and chaos [8][9]. These entities are used to create some specific true random number generators named as:
(i). Quantum Random Number Generators (QRNG).
(ii). Noise based Random Number Generator (NRNG).
(iii). Free Running Oscillator Random Number Generators (FRORNG).
(iv). Chaos Random Number Generators (CRNG).
The chaos random number generator technique is the most objectionable method for generating random number because this technique uses conceptual mixing of randomness and chaos [7][10]. Some authors have thinking that if a system is hard to describe then it will behave in a random fashion.

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RESEARCH ARTICLE

More Solutions of Coupled Whitham–Broer–Kaup Equations

Mukesh Kumar[1] · Atul Kumar Tiwari[1] · Raj Kumar[2]

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Abstract The similarity transformations method has been applied to get invariant solutions of the coupled system of Whitham–Broer–Kaup equations. Seven different classes of similarity solutions are derived by using Lie similarity reduction process. The solutions involve invariants which are mixing of time and space variables. Numerical simulation is performed to accomplish the physical relevance of profiles in each case. Eventually, different explicit solutions have been derived by assuming suitable values of arbitrary constants involved in the infinitesimals.

Keywords Invariant solutions · Infinitesimals · Lie-group theory · WBK system

1 Introduction

The nonlinear partial differential equations (PDEs) play an important role to develop the physical system, and their solutions help to understand their natural phenomena. Some natural phenomena like sunrise, weather, fog, biological processes, decomposition, wave propagation, tidal flow and natural disasters such as electromagnetic pulses, volcanic eruptions, and earthquakes exhibit to model PDEs and ordinary differential equations (ODEs). Besides, the nonlinear PDEs have various physical applications in a variety of scientific fields, such as relativity, plasma physics, biology, marine environment and ultimately on the planet climate. To derive the closed form solutions of the nonlinear PDEs is not always an easier task for scientists and engineers.

Therefore, these interests led our motivation to solve analytically the coupled Whitham–Broer–Kaup (WBK) equations which describe various natural phenomena in the area of fluid mechanics.

$$u_t + uu_x + v_x + au_{xx} = 0, \tag{1a}$$

$$v_t + (uv)_x + bu_{xxx} - av_{xx} = 0, \tag{1b}$$

where $u(x, t)$ is the horizontal velocity, $v(x, t)$ is the height that deviates from equilibrium position of the liquid, a and b are constants represented in different diffusion powers. Subscripts are used for the partial derivatives. Nonlinearity in Eq. (1), occurs due to the presence of the terms $u\,u_x$, and $(uv)_x$. The coupled WBK equations have been studied by Whitham [1], Broer [2] and Kaup [3]. The WBK system transforms into approximate long-wave equations in shallow water if $a = 0$ and $b = 1$, while it transforms [4] into the modified Boussinesq equations if $a = 0.5$ and $b = 0$.

It is imperative to discuss some important facts about water waves. The water waves are categorized as: a shallow water waves is that travels at bottom depth less than $\frac{1}{20}$th of waves' wavelength while deep water wave propagates at bottom depth greater than half of the of waves' wavelength. If bottom depth lies between these two limits the wave propagating is called intermediate wave. Water waves in deep water are mainly transverse. However, as waves approach to a shore; they interact with the bottom

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PERFORMANCE ANALYSIS OF LOW CODE RATE AND HIGH CONSTRAINT LENGTH CONVOLUTIONAL ENCODER ON OIDMA SYSTEM WITH AVALANCHE PHOTODETECTOR

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ABSTRACT

IDMA (Interleave Division Multiple Access) is a prominent technology used in the 4G and 5G communication system. IDMA is a recent multiple access technique through which multiple access interference (MAI) and inter symbol interference (ISI) can be minimized in the communication network. The optical fiber channel provides the efficient bandwidth utilization for improving the performance of O-IDMA system. In this article, the impression of low code rate (1/2) convolutional codes with high constraint length (L = 7 and L = 9) has been analyzed on optical coded OIDMA system. The code rate depends on number of Ex-OR gates and constraint length depends on number of memory elements new algorithm for convolutional encoder which satisfies above condition of code rate and constraint length. Tree inter-leavers having larger memory, less power consumption and simplified design features, makes it useful to improve the quality of O-IDMA system. In present article various architecture of convolutional encoders are designed by varying the feedback connections and are tested for observing the BER performance of O-IDMA system implemented on MATLAB. Tree inter-leavers in taken into account for analysis purpose and BER with increasing number of users is plotted in graphical and tabular manner.

Keywords: *O-IDMA, Ex-OR, Code Rate, Constraint Length, Tree Inter-Leaver, BER5*

I. INTRODUCTION

A very motivating methods has been developed by L. Ping to combine coding and spreading, and it uses dissimilar inter-leavers to separate users known as Interleave division multiple access (IDMA). The major challenge with CDMA multiple access system is to reduce the ISI and MAI because as number of user increases ISI and MAI also increases and BER increases.The advantage of IDMA can be utilized in optical fiber communication known as OIDMA. It deals large band width for larger number of users at minimum cost. Higher capacity optical networks are required to achieve the growth of internet services and new digitized schemes. Interleaver is usually working a key component in turbo codes, due to the fact that iterative method of the turbo coding will use interleaved version of information iteratively to produce high coding gain [1-2].

A very powerful and widely used a variety of codes, called convolutional codes, which are used in a variety of system including todays standard wireless, optical and in satellite communication. Convolutional error correcting or channel coding is used to improve the efficiency and accuracy of information transmitted. Convolutional codes are beautiful because they are intuitive, one can know them in many different ways, and there is a way to decode them so as to recover the mathematically most possible message from among the set of all possible transmitted message. Other major reason for this is the possibility of

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Research Article

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Parallel symmetrical notches loaded patch antenna for wireless applications

Rakesh Kumar Bajpai[1] · Rajeev Paulus[1] · Ashish Singh[2] · Mohammad Aneesh[3]

Abstract

The theoretical analysis of parallel symmetrical notches loaded patch antenna for wireless applications is presented. The geometric analysis of the antenna is done to get the optimum results for wireless body area network. An antenna characteristic has been discussed for symmetrical notches length and width and distance between notches those optimum results. It is found that proposed antenna resonate at 2.37 GHz having the bandwidth of 14 MHz. The results of parallel notches loaded patch antenna is compared with reported, theoretical, and measured results.

Keywords Notches · Symmetrical · Split ring resonator (SRR) · Wireless body area network (WBAN)

1 Introduction

With extensive increase in various wireless electronic gadgets for wireless application, especially in patient care monitoring through wireless gadgets has been used in our present day life. These wireless electronic gadgets are wearable and strong, light weight, cost effective, bio-compatible, and mechanically robust and low power device with satisfactory outputs. Therefore, WBAN are more suitable in medical field for wireless electronic equipment because such type of devices uses special type of antenna to communicate with nearby device or to transmit the information. In particular, WBAN are equipped with various types of patch antenna such as slot antenna, circular ring, inverted F-shaped antenna, grid array antenna, and filters etc. [1–9].

The patch antennas reported for WBAN applications such as shorting pin loaded circular patch antenna operating at 2.45 GHz, antenna designed with Y-shaped microstrip acting as ground plane, 6.8 dBi gain switchable mode antenna, T-shaped designed at 2.4 with metal back ground, slot loaded rectangular patch with ground plane, dipole antenna with slots on ground plane, inverted F-shaped patch antenna with tapered feed to increased bandwidth, rectangular ring shaped as radiating top and H-shaped slot on ground plane [1–4, 7–12]. All above discussed research papers of MSA are for WBAN but these papers has limitations such as complicated geometry, limited antenna gain and efficiency, parametric analysis is not provided and comparison with similar structure of antennas are not presented.

In this view, an antenna is proposed for wireless applications which have parallel symmetrical notches. The antenna performance has been studied theoretical and simulated results, further results are compared with similar radiating structures. All the antenna characteristics have been analyzed for wireless communication. The details of antenna design structures, radiation gain and efficiency are discussed in next section.

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Slot Size Prediction of H-shaped Rectangular Microstrip Patch Antenna Using Artificial Neural Network

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Abstract : This work proposes to predict the accurate slot size of the H-shaped RMSA over a preferred level of performance parameters. Several performance affecting parameters like resonance frequencies, gain, and efficiency for dual band frequency are observed with the variation of slot size. The range of parameters $2 \leq gain \leq 8$ dBi, $40 \leq efficiency \leq 100\%$ and 1 GHz $\leq f_r$ and $f_{r2} \leq 10$ GHz is considered as a input for ANN model. The slot dimensions L_s and W_s is considered as a output function for the ANN model. The tested result from ANN model for slot dimensions is used in rectangular patch to achieve desired level of performance. H-shaped antenna operates at dual resonance frequencies with sufficient gain and efficiency. The H-shaped RMSA found good applications for S and C band.

IndexTerms **- Artificial neural network, Multilayer perceptron, Rectangular microstrip patch antenna, Levenberg-Marquardt.**

I. INTRODUCTION

Microstrip patch antenna gained attention of researchers due to the large demand and wide range of applications such as mobile, satellite, and personal communication systems [1-3] etc. Microstrip antennas are used for single, dual, and multiband operation having more than two bands of frequencies. These features of microstrip patch antenna motivated to the researchers for designing antenna with dual band operation.

Dualband MSA was first reported by Wang *et al* [4] in 1984. Subsequently, the numbers of researchers presented their work on dual band MSAs [5-8]. To explore dualband MSA many techniques have been suggested by researchers for achieving dual frequency band [9-11], these are by inserting slots and notches, stacking of substrate etc. All these available techniques are based on the numerical method and analytical methods. Analytical methods are easy and specified to only definite shapes of the patch. These methods are not suitable for thick substrate. Whereas, numerical methods are suitable for all shapes of the MSA and require much more time in solving mathematical equations. For every minor change in geometry it needs new solution, so it becomes time consuming and lengthy process. For reducing some of these problems, an ANN model is proposed for predicting the slot size over a desired level of performance parameters for achieving dualband frequency operation. ANNs are suitable models for parameter optimization of microstrip patch antenna. ANN models are computationally much more efficient than EM models (Analytical and numerical methods). The ANN provides fast and accurate models for MSA modeling, simulation, and optimization. ANN is computational tools and based on learning strategies. The application of ANNs on the field of microstrip patch antenna is very recent. A numbers of paper [12-20] are present in the literature that signifies the importance of ANN in the field of microstrip patch antenna.

This work aims to design H-shaped RMSA for dual frequency band operation using MLP neural network. In this work MLP neural network is used for the predicting the slot dimensions for dual band frequency operation over a desired range of performance affecting parameters such as, $2 \leq gain \leq 8$ dBi, $40 \leq efficiency \leq 100\%$ and 1 GHz $\leq f_r$ and $f_{r2} \leq 10$ GHz.

II. ANTENNA DESIGN

The proposed antenna geometry of the H-shaped RMSA is shown in Fig. 1. Here a rectangular patch of dimensions $L = 28$ mm, $W = 29$ mm is used with a coaxial probe feed. The antenna is simulated on method of moments (MoM) based IE3D simulation software using foam substrate whose dielectric constant (ε_r) is 1.07, height (h) is 10.5 mm and loss tangent ($\tan\delta$) 0.002 for dualband frequency operation. These samples are generated in IE3D software [21]. Specified range of slot size is shown in Table 1 for the generation of samples of patch antenna used for training and testing of the ANN model. Fig. 1(a) shows the side view of the H-shaped RMSA geometry.

TO STUDY THE HALL EFFECT ON MHD FLOW IN A ROTATING SYSTEM

NIMISHA YADAV, P C YADAV ,RITIKA YADUVANSHI

Abstract: In this paper, we have proposed to study the free convection flow caused by buoyancy force when the semi-infinite span of fluid bounded by an infinite vertical porous plate rotates in unison about an axis perpendicular to the plate. The effect of Hall and rotation parameters on the drag experienced by the fluid particles at the plate has been discussed for constant and variable suction cases. The effect of small and large frequencies on flow parameter is discussed with the help of tables. An attempt is made to analyse the unsteady free convection MHD flow in a rotating frame of reference

Key Words: MHD oscillatory flow, Navier-Stokes equations , Hall parameter, Prandtl number, Grashof number, frequency parameter etc.

1 .Introduction:

The flow in the rotating frame of reference has attracted the attention of a number of scholars in geophysical engineering. There appeared a number of studies in literature viz. Vidyanidhy and Nigam [1], Gupta [2] and Jana and Datta [3]. The effect of uniform transverse magnetic field with or without suction was investigated by Gupta [8], Soundalgekar and Pop [1,2,3,4] and Mazumdar et al. [5]. The similarity solutions of the unsteady Navier-Stokes equations in a rotating frame of reference has been obtained by Gupta [6] Chandran et al. [7] and Singh et al. [8] studied the unsteady, MHD Couette flow of electrically conducting fluid in a rotating system. Bergstorm et al. [9,10] studied the flow in a rotating system.

The flow problem in a rotating system has been studied by several authors. It is well known that in a rotating fluid near the flat plate. Ekman layer exists, where the viscous and coriolis forces are of the same order of magnitude. Raptis et al. [11] have discussed the effects of mass transfer and free convection current on the flow past an infinite vertical porous plate with constant heat flux in a rotating fluid. An analysis of Hall and ion-slip current affects on the unsteady MHD free convection flow of a partially ionized fluid past an infinite vertical porous plate in a rotating system subject to a strong transverse magnetic field and fluctuating plate temperature with time about a constant non-zero mean is carried out by Ram [1,3]. Sacheti et al. [12,5] studied the effect of free convection in a vertical channel of rotating porous medium. Sharma et al. [16,17] studied the effect of unsteady flow and heat transfer through a porous medium in the presence of heat source and variable free streams.

Barcilon and Pedlosky [18] studied the linear theory of temperature dependent rotating stratified fluid motion. Recently the study of flow under strong magnetic field when the whole system is rotating with angular velocity about a fixed point in the frame of reference has provided a new impetus specially to practical engineers who are interested in MHD power generator and cooling turbine blades. Ingham
[4,5] have studied hydro magnetic flow in a rotating frame of reference. Forced and natural flows were discussed by Schlitching [1,6], Eckert and Drake [6] and Bansal [1].

1.1 Basic equations:

Consider an unsteady incompressible flow of electrically conducting fluid past an infinite vertical flat plate placed in x^*, z^* plane, y^* axis is taken normal to the plate. A uniform magnetic field of strength B_0^* is acting along y^* axis. The entire system of the fluid and the plate is in a state of uniform rotation about y^* axis. Since the length of the plate is large, therefore, all the physical variables depend on y^* only. The interaction of coriolis force with the hydro magnetic free convection sets up a secondary flow in addition to primary flow and hence the flow becomes to be three-dimensional. Since the plate is of infinite extent along x^* and z^* directions, all the physical variables (except pressure) are the functions of y^* and t^*

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To Study The Effect Of Convection And Electric Field Load Parameter On Mhd Couette Flow Past A Channel With Highly Permeable Bed.

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Abstract In the present investigation, the MHD couette flow of an electrically conducting fluid through a channel with highly permeable bed, has been considered in the presence of buoyancy and magneto-electric forces. The effect of the buoyancy force, permeability of porous medium, load parameter, magnetic field, on the velocity distribution, temperature field, skin-friction, flux and rate of heat transfer are discussed.

IndexTerms - MHD oscillatory flow, Temperature field, Skin friction, Load parameter, Porous medium etc.

I. INTRODUCTION:

Flow through porous media are very much prevalent in nature and therefore the study of flows through porous media has become of principal interest in many scientific and engineering applications e.g. in the field of agricultural engineering to study the underground water resources, seepage of water in riverbeds. The effect of magnetic field on the flow of a electrically conducting viscous fluid has received considerable attention due to its wide range of engineering, geophysical, astrophysical applications. MHD channel flows have been studied extensively, including their heat transfer aspect. An excellent review of existing theoretical and experimental work on these subjects can be found in the recent books and monographs by Bejan[1], Cebeci[3], Chauhan and Vyas[4], Ingham and Pop[8], Jothimani and Anjalidevi[9], Kaviany[10], Nield and Bejan[14], Pop and Ingham[15] and Singh and Gholami[16].

Buoyancy driven convective heat transfer is of interest in relation to the underground spread of pollutants, solar power collectors, geothermal energy systems and others. In past, most of investigations have not been taken into account the effect of buoyance forces since the problems were on horizontal flows.

It was assumed that the buoyancy forces are almost negligible in horizontal flows, but some authors have shown that in the case of horizontal flow of liquids with low Prandtl number (Pr), the buoyancy forces cannot be neglected as they significantly affect the flow field. The buoyancy layer flows for such fluids have been discussed by Bejan and Khair [2]. Gholami and Singh [7] analysed the problem of simultaneous heat and mass transfer with the entire range of buoyancy ratio for most practical chemical species in dilute solutions and aqueous solutions. Yan and Chang [17] have investigated numerically the laminar mixed convective flow in the channel and simultaneous influence of the combined buoyancy effects of the thermal and mass diffusion for an air-water system. Gaxander *et al* [6] proposed an analytic solution to the governing equation of MHD to be used model the effect of a transverse magnetic field on natural convection. When the fluid is electrically conduction and exposed to a magnetic field the Lorentz force is also active and interacts with the buoyancy force in governing the flow and temperature fields. Employment of an external magnetic field has increasing application in material manufacturing industry as a control mechanism since the Lorentz force suppresses the convection currents by reducing the velocities. Study and through understanding of the momentum and heat transfer in such a process is important for the better control and quality of the manufactured products. The MHD heat transfer in two phase flow with fluid in one phase being electrically conducting was studied by Lahrashi and Sahai [12]. The problem of MHD heat transfer for short circuit case in a two-phase flow have discussed by Malashetty and Leena [13]. Firat *et al.* [5] observed the Lateral load estimation from visco-plastic mud flow.

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Performance Investigations of S-shaped RMSA Using Multilayer Perceptron Neural Network for S-Band Applications

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Abstract—In this article an S-shaped rectangular microstrip patch antenna (RMSA) is investigated for S-band applications using artificial neural network (ANN). The authors have done the parametric study of different radiating structures to obtain S-shaped RMSA. The size of inserted notches on the radiating patch for achieving wideband operation is computed through multilayer perceptron artificial neural network (MLP-ANN) over a desired range of its performance effecting parameters such as frequency, gain, directivity, antenna efficiency, and radiation efficiency. MLP-ANN model is trained and tested with seven different algorithms. The research found that Levenberg-Marquardt (LM) training algorithm takes less computational time with better accuracy for computation of notches size on radiating patch over a priory defined performance parameters. To verify the work, a prototype of S-shaped RMSA is physically fabricated on foam substrate and tested experimentally. The experimental results are in good agreement with the simulated results that are produced with ANN.

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1. INTRODUCTION

In modern communication systems, microstrip patch antennas (MSAs) gained attention due to their attractive features such as low profile, light weight, and low fabrication cost. However, they have a drawback in the form of narrow bandwidth that is one of the burning issues for researchers [1]. Several approaches have been used for improving the bandwidth so that wideband can be achieved. The most popular wideband structures in the area of MSA designs are U-slot loaded patch [2], V-slot loaded patch [3], W-shaped patch [4], E-shaped patch [5], half E-shaped patch [6], aperture coupled [7], H-shaped [8], and S-shaped antenna [9]. All the above reported papers are mainly based on analytical, numerical methods and experimental study. These available methods have their own limitations.

For example, analytical method is easy and applicable only for few definite shapes of the patch structures. On the other hand, numerical methods are applicable for all shapes of the patch structures require a new solution for every minor change in structure, so numerical methods suffer from rigorous time consuming processes. To avoid all these types of difficulties, artificial neural network is adopted. Artificial neural network (ANN) is useful tool for designing of microstrip antennas. The designing of MSA with the help ANN was reported in [10]. Further several approaches have been made with the help of ANN for calculating resonant frequency [11], radiation resistance [12], input impedance [13], and radiation patterns [14] of the microstrip patch antennas.

Some papers on compact geometries and day by day size reduction of MSA with the help of ANN were reported in the papers such as three-layered circular ring [15], aperture antenna [16], U-shaped antenna [17, 18], and microstrip line feed slot loaded patch antenna [19]. Several other valuable articles signify the importance of ANNs in microwave design [20–26].

In this paper, an S-shaped RMSA with reduced area using ANN is investigated. Here, an approach has been made to achieve wideband for S-band applications with inserting notches on the radiating patch. ANN

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Design of Compact UWB Circular Microstrip Patch Antenna using ANN and ANFIS Soft Computing Techniques

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ABSTRACT: A novel compact circular microstrip patch antenna (CCMPA) with DGS for UWB application is proposed for C, X, Ku and Ka-bands. For designing of UWB CCMPA an approach for optimizing the physical parameter, two robust techniques namely artificial neural network (ANN) and adaptive neuro-fuzzy inference system (ANFIS) are used. Commercially available Ansoft HFSS v.13 is utilized to extract the 144 data sets of CCMPAs having different sensitive parameters related to antenna dimensions and substrate materials. Apart from 144 simulated data sets, 129 were used for training and remaining 15 were utilized for testing of ANN and ANFIS model. The average percentage errors (APE) for first (f1) and last (f2) resonant frequency of return loss are calculated regarding performance of tested data sets of ANN and ANFIS model. The APE in ANN and ANFIS model are found in testing of resonant frequency f1 and f2 are 0.8731, 0.0699 and 0.7698, 0.0607 respectively. The very low error indicates that the models can be successfully applied for optimization of physical parameter of UWB CCMPA for computer aided design (CAD) applications. The trained ANN and ANFIS model can be used effectively for antenna parameter estimation, instead of running HFSS repetitively or other optimization techniques, which takes more time. Successfully implementation of CCMPA shows broader impedance bandwidth of 2.6 GHz to 52.3 as 180% at 26 GHz of centre frequency. Average gain and -3 dB beam width of the proposed antenna is found 4.14 dBi. The proposed antenna can be effectively used in C, X, Ku and Ka-band applications.

KEYWORDS: Compact Circular UWB microstrip Patch antenna, artificial neural network, adaptive neuro-fuzzy inference system, CAD

I. INTRODUCTION

Need of miniaturization and bandwidth enhancement of microstrip patch antenna (MPA) is today's challenge of researcher's, due to portability and uniqueness of MPA which covers maximum bands of communication applications. In this regard, many of researchers used substrate material with high dielectric constant in traditional MPA, and have been achieved miniaturisation but the bandwidth and efficiency is decreased [1-3]. Many of them has been tried to overcome this problem by applying slit/slot loading MPA [4-9], sorting pins [10-12], sorting walls [13], slot loaded patch [14-16] in traditional MPA and somehow success to reduce the size but not even more for bandwidth enhanced. For bandwidth enhancement the DGS MPA has been recently investigated [17-20] and the bandwidth enhancement up to 90% has been achieved. To achieve compactness and/or bandwidth enhancement in the designing of traditional MPA the analysis techniques such as cavity model [21] and transmission line model [22] is used. But the complicated shapes of MPA can't be analyzed with these traditional techniques. Hence some other powerful techniques such as method of moment [23] and finite difference time domain method [24] are used. But again these techniques, involves rigorous mathematical formulation with extensive numerical procedure hence, also more time consuming. In most of previous efforts some of them tried to design UWB MPA by these parametric analyses, and they have altered the parameter accordingly and achieved UWB characteristics [25-29]. Nowadays most powerful software such as IE3D, HFSS, CST Studio, is widely used for analysis of any type of antenna and other microwave structure with trial and error basis [5, 10, 17-20]. Hence again more time consuming and has no guaranteed to achieve a desirable goal even after numerous trial.

Recently ANN, ANFIS and/or SVM soft computing techniques have been used efficiently for analysis of any types of MPA without any rigorous mathematical calculation and time consumption. Because once a model of ANN, ANFIS or SVM has been designed for a MPA then it can be used many times at no time cost. Many of researcher [30-37] have been successfully used the ANN, ANFIS and SVM to analyse the various parameter of MPAs and design the model.

In this paper a Compact (20mm×20mm) UWB Antenna for C, X, Ku and Ka-Band application are modelled followed by parametric analysis with the help of ANN and ANFIS soft computing techniques. The basic design

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Self-esteem and Work Engagement Influencing Job Satisfaction

SANGEETA SAHU, ABHINAV SRIVASTAVA AND AVINASH. D. PATHARDIKAR

Abstract: *– The present study aims to predict job satisfaction through self-esteem and work engagement. The study further aims to propose a model which highlights the relationships among self-esteem, work engagement, and job satisfaction. Sample was taken from 17 school teachers (n=630) working in the central part of Indian subcontinents. Structured questionnaires were distributed. Confirmatory factor analysis (CFA) followed by structural equation modeling (SEM) was conducted to establish the relationships. Mediation effect of work engagement was analyzed through the bootstrapping method. The result of the study strengthens the job characteristic model theory. The entire three hypotheses framed regarding the relationship between self-esteem, work engagement and job satisfaction were proved. The findings suggested that self-esteem has a significant influence on work engagement and job satisfaction. Further, work engagement partially mediated between self-esteem and job satisfaction among the school teacher. This study suggests that a teacher's job should be designed in such a way that they should feel their self-worth, which in turn helps to keep them engaged and satisfied.*

Keywords: Job satisfaction, Self-esteem, Work Engagement, Job characteristics, School teachers.

Introduction

Organizations are looking for ways to improve their employees' performance to achieve organizational goals. Researchers have identified job satisfaction as one of the ways to improve employees' performance (Lawler and Porter, 1969; Locke, 1970; McGivern and Tvorik, 1997) and job satisfaction still has been the area of interest for many researchers and practitioners. Various studies on job satisfaction have been conducted, which makes the literature-rich. More than thirty variables have been identified as antecedents or consequences of job satisfaction (Brown & Peterson, 1993). This gives ample scope to study this

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Ultrasonic wave propagation in thermoelectric ZrX_2 (X = S, Se) compounds

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Abstract. In the present work, we have calculated temperature-dependent second- and third-order elastic constants (SOECs and TOECs) of thermoelectric zirconium disulphide (ZrS_2) and zirconium diselenide ($ZrSe_2$) using a simple interaction potential model. SOECs have been used for the calculation of ultrasonic velocity along different orientations of propagation. Thermal relaxation time and ultrasonic attenuation have been determined with the help of SOECs and thermal conductivity. Temperature-dependent specific heat, thermal energy density, elastic coupling constants and Grüneisen parameters are also calculated using SOECs and other parameters. The dominating cause behind ultrasonic attenuation, in the temperature range of 300–900 K, is the interaction of acoustical phonon and lattice phonon. In the present study, we observed that the thermal conductivity and energy density play significant roles in ultrasonic attenuation. Ultrasonic velocity and attenuation are correlated with other thermophysical properties extracting important information about the quality and nature of the materials which are useful for industrial applications.

Keywords. Elastic constant; ultrasonic attenuation; phonon–phonon interaction; thermal conductivity; Grüneisen parameter.

PACS Nos 43.35.cg; 62.20.Dc; 63.20.Kr

1. Introduction

Nowadays, most of the energy waste is in the form of heat. The thermoelectric (TE) technology may be an alternative and environment-friendly technology for energy conversion which directly converts this heat into electrical energy [1,2]. The efficiency of TE materials is defined as the dimensionless figure of merit (ZT) which is a symbol of TE performance. The figure of merit (ZT) is given by the formula $ZT = S^2\sigma T/k$, where S, σ, T and k stand for the Seebeck coefficient, electrical conductivity, temperature and thermal conductivity, respectively. The main challenging task for the research community is the lower efficiency of these devices because of low figure of merit (ZT). Conceptually, to obtain a better figure of merit, materials must have a high value of Seebeck coefficient with good electrical conduction property and low thermal conductivity [1–7].

Acoustics is a powerful tool to study the properties of different types of materials. Ultrasonics is a non-destructive and useful technique for determining the structural integrity of materials [8,9]. The ultrasonic technique can be used for detecting discontinuities, measuring thickness, studying metallurgy, detecting damage in composites and determining elastic properties along with other thermophysical properties of materials. Nonlinear elastic properties (second- and third-order elastic constants (SOEC and TOEC)) can be utilised to determine ultrasonic scientific parameters like attenuation and to provide information about the microstructural features of materials [10,11].

In the race for high-performance TE materials, semiconducting transition metal dichalcogenides (TMDCs) from group IVB have attracted great interest due to their small thermal conductivity. In our present evaluation, we have studied ZrS_2 and $ZrSe_2$ which have a hexagonal close-packed (HCP) structure with lattice

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RKTG Pair Amplifier with Gain Boosting Stage

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Abstract: *In the present investigation we have to study about Raj Kumar Tiwari and Gaya Prasad Pair (RKTG pair) amplifier circuit with gain boosting stage. The proposed circuit work for very low input signal like pulse rate of heart beat with higher gain 727.5435 and wide band frequency range with low cut off frequency 450.8454 KHz and high cut off frequency 1.5784 GHz having Bandwidth 1.5780 GHz This circuit also shows excellent stability in the large range of frequency. The RKTG pair circuit (Reference circuit) having gain 85.3723 with low cut off frequency 2.8840 GHz and high cut off frequency 138.0384 GHz with Bandwidth 135.1544 GHz at low input voltage signal. Thus it is seen that RKTG pair amplifier together with additional circuit called gain boosting circuit provide very good result.*

Keywords: *RKTG Pair Amplifier, Frequency response, voltage gain, boosting stage, stability.*

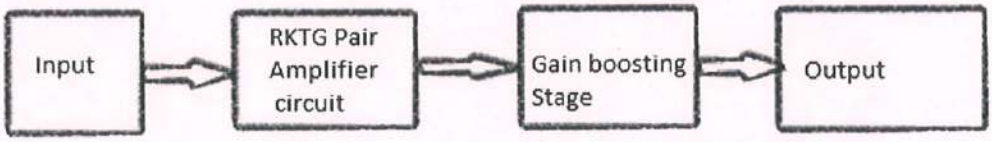
I. Introduction

Since the development of electronics majority of all the devices in use were invented and gradually technology is changing day by day to make electronics gadgets cheap and versatile with low power loss having high packing density fallowing Moore's law. Basic problem arises when we go to high frequencies as power loss increases with frequency. Thus it is demand of time to develop flexible electronic circuit having high speed and low power loss. That can be used in low and high frequency range. The literature survey [1-5] shows that CMOS devices used for various circuit design applications have very low power loss with high noise immunity.

Literature survey also shows that delay time can be controlled by controlling the scaling factor [6,7] upto certain geometrical limit. Keeping all merits of CMOS Compound Pair Amplifier [8-15] and future technology demand. In present investigation we have to study about RKTG pair amplifier with gain boosting stage that works for low voltage and high gain application with excellent temperature stability and bandwidth.

II. Circuit Analysis

RKTG pair amplifier circuit shown in the Fig.1 have been simulated having an a.c. input signal Vsin=2mV and the CMOS as combination of NMOS and PMOS is used as an active component to design the circuit having proper biasing with resistance R1=47 KΩ and R2=5 KΩ. The proposed circuit consist of a gain boosting stage by proper choise of components shown in Fig.2. This circuit having four parts of processing stage as shown in block diagram. All the simulation work have been carried out by cadence softwere, 180nm technology.



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RESEARCH ARTICLE

Skin Diseases Prediction: Binary Classification Machine Learning and Multi Model Ensemble Techniques

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ABSTRACT:

Unlike many other diseases, the skin disease has more irritability. Dermatology sicknesses incorporates normal skin rashes to serious skin contaminations, which happens because of scope of things, like diseases, warm, allergens, framework issue and drugs. First regular skin issue are dermatitis. Atopic dermatitis is relating current (perpetual) condition that causes eager, aroused skin. Most much of the time it appears as patches on the face, neck, trunk or appendages. It will in general erupt sporadically so die down for a period. A large portion of the dermatological sicknesses are not reparable but rather most the treatments depend on the administration of the side effects related with it. The focus of this research will be the Dermatology database. The problem is to determine the type of Eryhemato-Squamous disease like psoriasis, seboreic dermatitis, lichen planus, pityriasis rosea, cronic dermatitis and pityriasis rubra pilaris. The differential analysis of erythemato-squamous maladies is a genuine issue in dermatology. They all offer the clinical highlights of erythema and scaling, with next to no distinctions. Each pattern is a set of 33 numbers in the range linear values and one of them is nominal. The 80% of the dataset utilize for demonstrating and keep down 20% for approval. Objective is to accomplish best performer algorithm which will convey in dermatology informational collection so for this reason the gut feel recommends distance based calculations like k-Nearest Neighbors and Support Vector Machines may progress admirably. By using 10-fold cross validation and assess calculations utilizing the accuracy metric.

KEYWORDS: Dermatology, Atopic dermatitis, Eryhemato-Squamous, k-Nearest Neighbors, Support Vector Machines.

INTRODUCTION:

Around 1500 BC a medical document on skin ailments Ebers Papyrus was found in ancient Egypt. It portrays different skin maladies, including ulcers, rashes, and tumors, and recommends medical procedure and balms to treat the afflictions [2]. From that point to now the skin sickness portion has indicated colossal development. The predominance of skin malady in India is 10 to 12 percent of the all out populace with Eczema and Psoriasis being the significant benefactors.

Because of contamination, bright light, and an unnatural weather change, photosensitive skin issue like tanning, color obscuring, sunburn, skin malignant growths, and irresistible infections are expanding at a quicker pace. A one percent decrease in ozone prompts a two to four percent expansion in the occurrence of tumors. The seriousness of developing skin illnesses in India is additionally underlined by the way that the World Health Organization (WHO) has included skin infection under the most widely recognized non-transferable maladies in India. What's more, there is an absence of offices that give thorough skin related medicines under one rooftop." The circumstance is additionally compounded by the low accessibility of dermatologists in India. At present, there are around 6,000 dermatologists obliging a populace of more than 135 crore. This implies for each 100,000 individuals, just 0.49 dermatologists are accessible in India when contrasted with 3.2 in numerous conditions of the US."

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Dr. DINESH K. VERMA

ACS APPLIED MATERIALS & INTERFACES

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Zinc Oxide- and Magnesium-Doped Zinc Oxide-Decorated Nanocomposites of Reduced Graphene Oxide as Friction and Wear Modifiers

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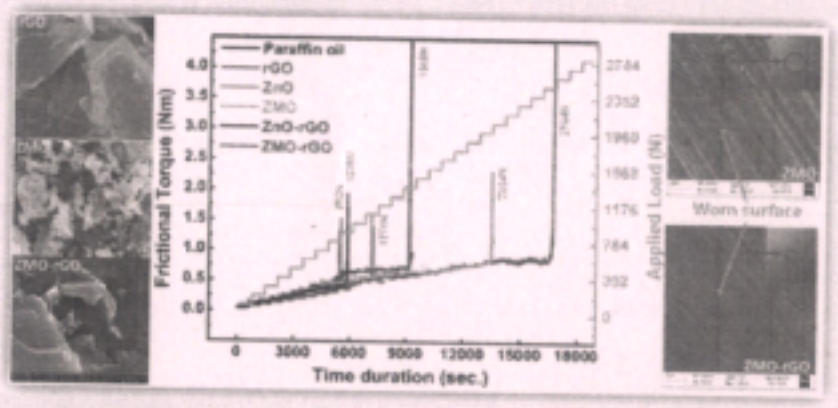
Supporting Information

ABSTRACT: Zinc oxide (ZnO) and magnesium-doped zinc oxide nanoparticles, $Zn_{0.88}Mg_{0.12}O$ (ZMO), were prepared by autocombustion method. Further, nanocomposites of the as-prepared nanoparticles with microwave-synthesized reduced graphene oxide (rGO) nanosheets, ZnO−rGO and ZMO−rGO, have also been prepared with a view to see the effect of doping of magnesium in zinc oxide on the tribological properties of the nanocomposite. Morphologies of nanoparticles/nanosheets and their nanohybrids have been studied by employing scanning electron microscopy (SEM)/high-resolution (HR) SEM with energy-dispersive X-ray (EDX), transmission electron microscopy (TEM)/HR-TEM, X-ray diffraction, Fourier transform infrared, UV−visible, Raman, and X-ray photoelectron spectroscopy (XPS) techniques. Triboactivity of the additives in paraffin oil has been interpreted considering the parameters mean wear scar diameter, coefficient of friction, load-carrying capacity, and wear rates obtained from ASTM D4172 and ASTM D5183 tests using a four-ball lubricant tester at optimized concentration (0.125% w/v). The performance of base lube and its admixtures has been found to lie in the order ZMO−rGO > ZnO−rGO > ZMO > ZnO > rGO > paraffin oil. Outstanding enhancement in triboactivity of nanocomposites, particularly that of ZMO−rGO indicates that nanoparticles are irrefutably instrumental in reinforcement of rGO, and on the other hand, rGO is associated with abatement of agglomeration of the nanoparticles. Thus, interactions between rGO and nanoparticles are vehemently synergic in nature. It is noteworthy that the best results were obtained with the following optimized concentrations: ZnO/ZMO 0.25%; rGO 0.15% and composites 0.125% w/v. Morphological studies of the wear track lubricated with different additives have been performed using SEM and contact mode atomic force microscopy. Results are in conformity with the order given above. The EDX analysis of ZMO−rGO exhibits the presence of zinc and magnesium on the worn surface, supporting their role in the formation of in situ tribofilm. Their role is further corroborated by XPS studies. Owing to their excellent tribological behavior, these sulfur- and phosphorus-free composites may be recommended as potential wear and friction modifiers.



KEYWORDS: *nanocomposites, ZnO/ZMO−rGO, friction/wear modifiers, surface characterization*

1. INTRODUCTION

The major challenges for the lubrication industry today are enhancing the service life of machines, reducing energy consumption, and finally controlling emissions.[1−3] In this regard, various lubricant additives have been used with a view to enhance the performance of the chosen lubricating oil.[3−7] Besides traditional organic molecules, researchers have also focused on introduction of inorganic nanoparticles to the base oil as they effectively reduce friction and wear of moving surfaces. These inorganic nanoparticles include metals like nickel,[8] palladium,[9] copper,[10] and silver;[11,12] metal oxides such as Fe_3O_4,[13] TiO_2,[14−16] Al_2O_3,[17,18] CuO,[18,19] ZrO_2,[19,20] MgO,[20] ZnO,[19,21,22] CeO_2,[23] and SnO_2;[24] metal sulfides like CuS,[25] MoS_2,[26,27] and WS_2;[28] and metal halides like lanthanum fluoride[29,30] or carbon-based materials, namely, nanotubes,[31] graphene,[32,33] and graphene oxide (GO).[33]

Graphene being a two-dimensional structure of sp^2 carbon atoms in a honeycomb lattice has acquired importance owing to its remarkable mechanical and optical properties, physical strength, thermal conductivity, and resistance against the entry of gases or liquids.[34−36] In addition to these properties, graphene is well recognized for its exclusive friction- and wear-reducing properties.[32,37−40] On the other hand, it is highly susceptible to agglomeration due to its high surface energy causing poor dispersibility.[41] To overcome this, environment-friendly ionic liquids have been used to functionalize graphene for better lubricating properties.[42−46] Tribological investigations carried out on graphene 1-butyl-3-methyimidazolium iodide hybrid material has shown its potential in reducing

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Register
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D K Verma

Relation of Smartphone Addiction with Well Being and General Health among University Students

-Janhvi Srivastava*

ground and Objectives :

he present study was planned and executed with the aim to investigate the relationship een Smartphone addiction ,general health, well being . In this study I have taken those students use Smartphone for at least 5 hours per day.

A spearman's Rho test was used to examin the differences between the variables .The result aled no significant relationship between the variables.

words- Smartphone addiction, general health, well being.

hods:

In all 100 participants were randomly ected (male-49,female-51)of university dents (V.B.S.P.U.Jaunpur).They were inistered the SAS,GHQ,PGI.

oduction-

The Smartphone

A smartphone is a mobile phone with highly nced features. A typical smartphone has a -resolution touch screen display, WiFi nectivity, Web browsing capabilities, and ability to accept sophisticated applications. majority of these devices run on any of se popular mobile operating systems: droid, Symbian, iOS, BlackBerry OS and Windows Mobile. ones are a class of mobile phones and of multi-purpose mobile computing devices. They are distinguished from feature phones by their stronger hardware capabilities and extensive mobile operating systems, which facilitate wider software, internet (including web browsing[1] overmobile broadband), and multimedia functionality (including music, video,cameras, and gaming),

Improved hardware and faster wireless communication (due to standards such as LTE) have bolstered the growth of the smartphone industry. In the third quarter of 2012, one billion smartphones were in use worldwide.Global smartphone sales surpassed the sales figures for

ssistant Professor, Department of applied Psychology, Veer Bahadur Singh Purvanchal versity, Jaunpur (U.P.)

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