MAIT Journal of Technology

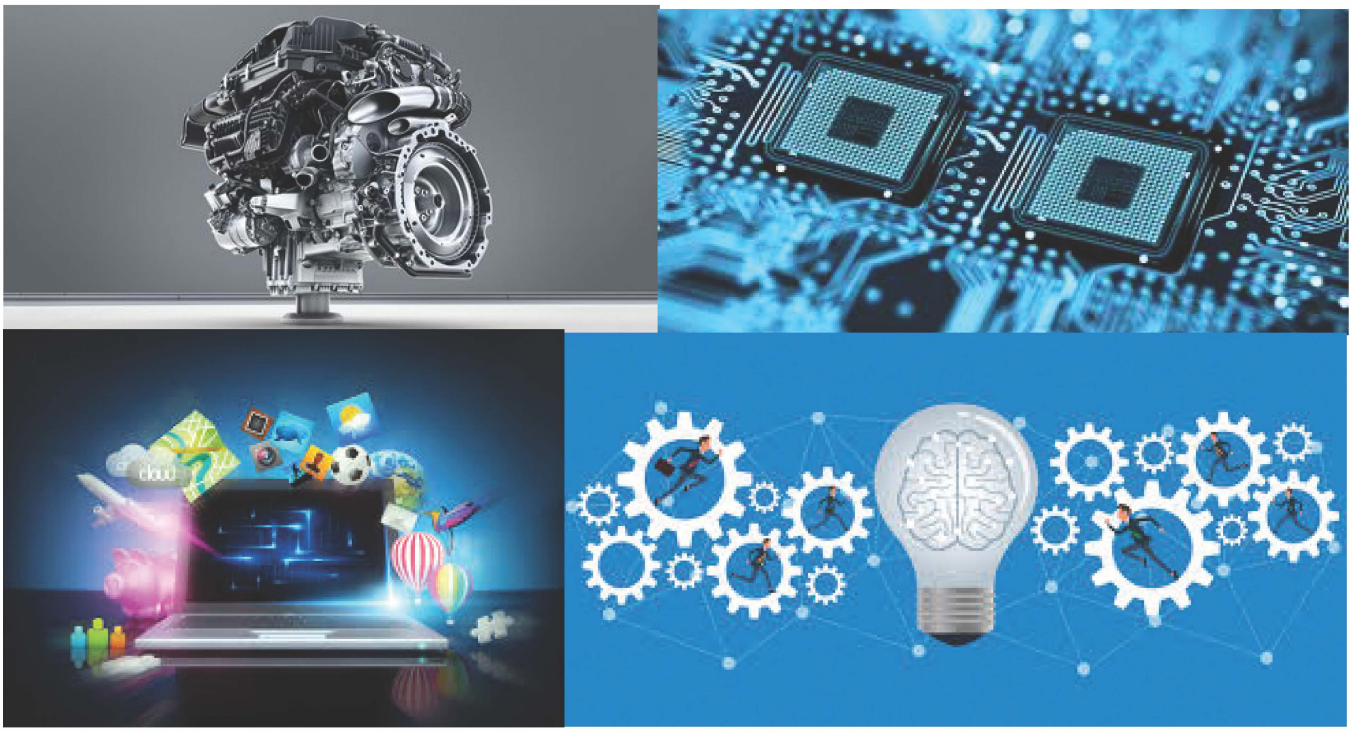
An Annual Refereed Journal of Maharaja Agrasen Institute of Technology

Volume 1, Number 1, December 2022

MAHARAJA AGRASEN INSTITUTE OF TECHNOLOGY
MAIT
उद्यमेन हि सिध्यन्ति
कार्याणि न मनोरथैः

Foreword by

Dr. Nand Kishore Garg



Maharaja Agrasen University Publication
(Maharaja Agrasen Technical Ed ucation Society, New Delhi)

MAIT Journal of Technology

Dr Nand Kishore Garg
Founder and Chief Advisor
Maharaja Agrasen Technical Education Society, Delhi &
Chancellor, Maharaja Agrasen University, Baddi, H. P.

FOREWORD

Education without innovative research and development is meaningless for the community. This is more so when we are intertwined globally and contribution to global knowledge is the call of the day. I feel pleasure on the positive response from contributors and like-minded educational fraternities exhibiting their deep interest in bringing this first volume of Journal of Maharaja Agrasen Institute of Technology-'**MAIT Journal of Technology'.**

I do appreciate and applaud the Editorial Board for their successful completion of this tedious yet daunting task of putting together the myriad thoughts and dreams of our students and faculty into a meaningful manner through this publication. I am also happy to learn that this is the Third publication of **'Maharaja Agrasen University Publication'** within a short span of six months. I congratulate its Office Bearers and Chief Editor.

Dr Nand Kishore Garg

Shri Vineet Kumar Gupta
Chairman
MaharajaAgrasen Technical Education Society, New Delhi

Message

Nurturing creativity and inspiring innovation are two of the key elements of a successful education and an Institute Journal is the perfect amalgamation of both. It harnesses the creative energies of the academic community and distils the essence of their inspired imagination in the most brilliant way possible. Hence, I am delighted to know that ***'MAIT Journal of Technology'- A Bi-Annual Refereed Journal of Maharaja Agrasen Institute of Technology, Delhi***, is ready for publication. I take this opportunity to congratulate the Editorial board for bringing out this publication as per schedule, which in itself is an achievement considering the effort and time required. May all our students soar high in uncharted skies and bring glory to the world and their profession with the wings of education!

Vineet Kumar Gupta

Printed & Published by **Dr Ravi Kumar Gupta on behalf of Maharaja Agrasen Institute of Technology, New Delhi** (Owner) and Printed at **D K Fine Art Press (P) Ltd**, AG Community Centre, Nimri Colony, Delhi-11052 and Published at **Maharaja Agrasen University Publication,** o/o Maharaja Agrasen Technical Education Society, Maharaja Agrasen Chowk, Plot No.-1, Sector-22, Rohini, New Delhi-110086
Editor: Dr Ravi Kumar Gupta (Professor, Maharaja Agrasen Institute of Technology, New Delhi)

MAIT JOURNAL OF TECHNOLOGY

VOLUME 1, NUMBER 1, DECEMBER 2022

Prof. (Dr.) M. L. Goyal
Vice Chairman (Academics), Maharaja Agrasen Technical Education Society

Message

Providing ample opportunities in Engineering education is one of the most fundamental obligations we owe to our students, because in 'MAIT' we are driven by the belief that every student deserves a high quality education. **MAIT Journal of Technology** provides an intersection of great challenge and great opportunity for the students and faculty as well, to review their efforts and to analyze their achievements in research and development. Technology is evolving at a dizzying rate and we need to keep pace with it. There may be shortcoming in the style of education but the pages of 'Journal' tell the tale of all that have been a part of what is right about the education they get in 'MAIT'. I congratulate the Editorial Board for their tireless efforts that have come to fruition in the form of this publication. I wish it all success and hope that this tradition that has been set will be carried through.

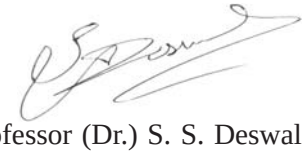
Best wishes

Prof. (Dr.) M. L. Goyal

Professor (Dr.) S. S. Deswal
Dean, Maharaja Agrasen Institute of Technology

Message

I am quite pleased on the release of maiden issue of the Institute Journal-MAIT Journal of Technology. This publication gives an insight into the range and scope of the imagination and intelligence of our students and faculty members. It endeavors to provide a forum for students, academicians, researchers and practitioners who are interested in high quality research and keen to promote, share and publish relevant high-quality research in the domains of Engineering, Technology & Applied Sciences. No doubt, this creative endeavor will bring out an array of scientific & technology expressions with distinct individual signatures. I appreciate the editorial team for the hard work and dedication they have invested in realizing this goal and wish my dear students success in all future endeavors.



Professor (Dr.) S. S. Deswal

www.mau.ac.in

Spark The Change....

MAHARAJA AGRASEN UNIVERSITY

UGC Approved

Atal Shiksha Kunj, Kalujhanda, Baddi, Distt. Solan, Himachal Pradesh -174 103

Inaugurated on 25th May 2013 by

Shri Pranab Mukherjee

President of India

COURSES

TECHNOLOGY EDUCATIONAL EXCELLENCE AWARD 2014 Conferred by GTU

UNIVERSITY OF THE YEAR AWARD 2015 by Higher Education Review

INTERNATIONAL COLLABORATIONS

Auburn Univiersity, Albama, USA,
University of Leicester, United Kingdom
University of Colombo, Sri Lanka
Ghana Technical University College, Ghana
Lyceum of the Phillippines University, Manila
University of Europeon
Tourism (UET) Milano, Italy

ADMMISSION OPEN

Admission through, valid score of entrance tests i.e. CAT, MAT, C-MAT, NATA, JEE, U-GAT, HPCET etc./ Internal Screening

MAIT-Delhi All India RANK 10th amongst All Private Colleges in India -DATAQUEST 20 June, 2017

MAIT-Himachal strives to attain the same excellence as MAIT-Delhi

Professor (Dr.) Neelam Sharma
Director, Maharaja Agrasen Institute of Technology & Editor-in-Chief

Preface

The MAIT Journal of Technology published by Maharaja Agrasen University Publication, New Delhi, provides a forum for publishing original contributionsand comprehensive technical review articles of interdisciplinary and original research on all importantengineering topics. The Journal encourages all experienced and qualified young and senior researchers, professionals, and other stakeholders to share their knowledge and experiences. The journal is proposed to be published Annually and it has applied for its RNI & ISSN no. *Please send the paper as per the template to editortech@mait.ac.in.*

AIMS AND SCOPE

It aims to be a leading peer reviewed platform and an authoritative source of information for analyses, reviews and evaluations related to all branches of engineering. Papers are welcome that investigate or consider the prospects of novel technologies, devices, systems, materials, processes, operation, performance, maintenance and control in the field of engineering. It is multidisciplinary Journal, which includes all areas of Science and Technology. The topics are covered under following broad areas (but not limited to):

Mechanical Engineering, Energy Engineering, Industrial and Production Engineering, Thermal Engineering, Automobile Engineering, Marine Engineering, Automation Engineering, Chemical Engineering, Material Engineering, Environmental Science, Computer Science and Engineering, Information Technology, Computer Networks, Data Communication, Database Systems, Data Mining and Data Warehouse, Software Engineering, Computer Animation, Artificial Intelligence, Operating Systems, Internet and Web Applications, Mobile Computing, Cyber Security, Algorithm and Bio-Informatics, Software and Cloud Computing, Web Mining, Image Processing and Computer Vision, Robotics, Quantum Computing, Embedded Systems, Electronics Engineering, Analog Signal Processing, Image Processing, Antenna and Microwave Engineering, Communication System, VLSI Circuits and Design, Microprocessor and Embedded Systems, Analog Circuit and Systems, Machine Learning, IOT and Automation, Sensors, Nanotech, Semi Conductor Physics, Material Characterization, Polymers, Analytical and Applied Chemistry, Acoustics, Statistics, Operational Research, Electrodynamics, Power Electronics, Control System, Signal Processing, Electrical Machines, Power Systems etc.

BENEFITS TO AUTHORS

The Journal papers are available to eminent scholars, students, faculties, scientists, and corporate sectors. We provide free PDF's and access to authors. This is a free Journal, i.e. no publication fee.

Maharaja Agrasen Vidyapeeth

Bright ideas to get success

A Senior Secondary School Established by Maharaja Agrasen Education Society- 1984
Campus: Rohtak Road, Mundka, Delhi-110041
Phone: 011-28341852, 9999836374 E mail: maharaja1852@yahoo.com
Website: www.maharajaagrasenvidyapeeth.com

The school is situated in the heart of Mundka village. The majority of the population, though urbanished are still agriculturist in character. Our school got recognition up to 8th class in the year 1985 and it became a Secondary School in the year 1996 and Senior Secondary in 2012. There is well equipped Science Lab, a well furnished Library and reading room. Here more than 6 thousands books, magazine, newspaper etc. are provided to the students and the teachers. A well equipped computer lab where more than 30 computers in there. There is a Drawing Room, Music Room, Sports Room, Smart Education, Two LCDs are also available for junior wing, Projector is also provided to enhance the learning process for all students for importing new development in the field of education. We participated in all the Zonal and District level sports and cultural activities. The school organizes inter-School Debate Competition in the month of November every year for the last 11 years in the junior and the senior level separately. Winners are suitably awarded cash and other prizes.

Governing Body

Dr. Nand Kishore Garg **Chairman**	**Sh. Vivek Garg** **Manager**	**Sh. B. L. Mahajan** **Director**

MAIT Journal of Technology

Volume 1, Number 1, December 2022

EDITORIAL BOARD

Maharaja Agrasen Global School

(School Established & Managed by Maharaja Agrasen Technical Education Society-2014)

Campus: 1, Lakhi Ram Park Sector-22, Rohini, Delhi-110086

Dr Nand Kishore Garg, Founder & Chief Advisor, Maharaja Agrasen Technical Education Society during **'Hawan Ceremony'** along with **Chairman Sh. Gyanendra Srivastava,** Office Bearers, Members of Governing Body & Staff of School

-An Upcoming School in Rohini

Governing Body

Sh. Gyanendra Srivastava Chairman	**Sh. B. L. Mahajan** Manager

MAIT Journal of Technology

Volume 1, Number 1, December 2022

CONTENTS

MAIT Journal of Technology 01 (2022) 1-5

MAIT
JOURNAL OF
TECHNOLOGY

Effect of Disturbance on Two Area Hydropower Interconnected System

Satvik Sharma[1], Aayush Bhatia[1], Ujjwal Kumar Jha[2], Neelu Nagpal*[1], Ravi Sharma[1]

[1]*Electrical Engineering Department, Maharaja Agrasen Institute of Technology, Delhi,*

[2]*Electrical Egnineering Department, HMR Institute of Technology & Management, Delhi*

Abstract

For reliable operation of a power system, the frequency deviation should remain nearly constant. The power system frequency depends on active power balance. In an interconnected power system, the generation within each has to be controlled so as to maintain scheduled power interchange. The control of generation and frequency in a power system is termed as load frequency control (LFC). If frequency deviation is minimum then this offers easy interconnection of two ac system and under-frequency or over-frequency conditions donot occur. In this paper, a load frequency control for two area interconnected power system is presented. The effect of step load disturbance (1% & 3%) is shown on frequency deviation &tie line power and it is found to be less. The dynamic model of interconnected power system is developed without controller and PI, PID controller. The PI and PID controller is applied to power system with hydro turbine in both areas. Simulation results show that it improves the damping of the power system and also minimum frequency deviation is obtained.

Keywords : Load frequency control, PID controller, dynamic analysis, hydropower system

1. INTRODUCTON

There is a great importance of load frequency control of in power system design and operation. The primary aim of load frequency control is to regulate frequency to the specified nominal value and to maintain the interchange power between control areas at the scheduled power values by regulating the output of selected generator. This controlled action on the governor is termed as load frequency control[1-3]. The secondary objective is to allot the required change in generation among the units to minimize operating costs. In a network, variation in frequency may cause higher value of magnetizing currents in electrical machines. Generally, interconnection is formed in the neighbouring areas and the transmission lines inter-connecting them are termed as tie-lines. These Tie-lines helps in the process of power sharing between the areas [4-5].

The proportional integrator controller was the initially proposed control strategy which now is most commonly used in the industry. The integral gain limits the dynamic performance of the system is its main drawback. The degradation of the system performance due to high gain by the integral controller causes high oscillation and instability [6-7].

LFC (Load–frequency control) is obtained by two distinct control actions in the interconnected power systems which are:

(a) The primary speed control action.

(b) Supplementary or secondary speed control actions.

*Corresponding author: Neelu Nagpal

Email: nagpalneelu1971@gmail.com

MAIT Journal of Technology 01 (2022) 6-11

MAIT
JOURNAL OF
TECHNOLOGY

Effect of Active Fluxes on The Weld Bead Geometry and Hardness of Weld Bead in Shielded Metal Arc Welding

Govind Sharma, Sikarder Gupta, Manish, Vipin K. Sharma*, Sidharth

Department of Mechanical and Automation Engineering, Maharaja Agrasen Institute of Technology, Rohini, Sec-22, Delhi

Abstract

Present paper discusses about the effect of active fluxes on the weld bead geometry and hardness of the weld. Shield metal arc welding (SWAW) was used to weld the mild steel work pieces. Mild steel electrode was coated with cast iron flux, sliver brazing flux and aluminium brazing flux and conventional rutile material. Weld bead geometry and hardness of the welding wok pieces were evaluated using a travelling microscope and Rockwell hardness tester. All active fluxes resulted in better hardness of the weld bead as compared to the conventional rutile coating and the cast iron flux yields the maximum hardness. The rutile coated weld resulted in lowest form factor.

Keywords : Active fluxes, welding, rutile, hardness, welding

1. INTRODUCTION

Shielded metal arc welding (SMAW), also known as manual metal arc welding (MMA or MMAW), flux shielded arc welding or informally as stick welding, is a manual arc welding process that uses a consumable electrode covered with a flux to lay the weld. Welding power supply is used to form an electric arc between the electrode and the metals to be joined. The work piece and the electrode melt forming a pool of molten metal (weld pool) that cools to form a joint. As the weld is laid, the coating of the electrode disintegrates, giving off vapors that serve as a shielding gas and providing a layer of slag, both of which protect the weld area from atmospheric contamination. Costanza et al. [1] studied the weald ability of the steel materials by using different shielding gases. Oxygen (O_2), Helium (He), Carbon-di-oxide (CO_2), hydrogen (H_2) and argon (Ar) gases were used by the author for the experimentation. The authors concluded that introduction of He gas increases the penetration and fluidity, O_2 and CO_2 stabilize arc and bead quality. Mixture of inert gases increases electrode deposit. Ramkumar et al. [2] found out about effect of performance of gas tungsten arc welded on AISI 304 and Monel 400 using Ni-Cr-Mo alloyed filler material on dissimilar metal having butt welds which are subjected to air oxidation. The author also performed vikers hardness test on specimen and cyclic corrosion test. Later authors found out that dissimilar metal are subjected to welding defects such as segregation. Secondary phase formation, dilution and cracks. Elemental migration and carbon migration in Cr content forms galvanic corrosion. Microstructure examination revealed presence of predominant equi-spaced coarse grains with well-defined grained boundaries in heat affected zone due to high temperature at GTAW Ni, Cu, Cr, and Fe forms intermetallic compound. The author concluded that segregation reduces tensile strength, carbon denude soft zone deteriorates mechanical properties of joint at elevated temperature.

*Corresponding author: Vipin Sharma
E-mail: vipin.dtu@gmail.com

MAIT Journal of Technology 01 (2022) 12-16

MAIT
JOURNAL OF
TECHNOLOGY

Computational Fluid Dynamic Analysis of a Muffler of Two Wheeler Vehicle

Sandeep Sharma, Anurag Fulwaria, Shivangi Gupta, Ishita Rawat, Vipin K. Sharma*

Department of Mechanical and Automation Engineering, Maharaja Agrasen Institute of Technology, Rohini Sec-22, Delhi, India

Abstract

In the present work attempts were made to analyze the variation of the pressure and velocity of the exhaust gases in the muffler of a two wheeler automobile by using software techniques. The designs of the muffler with considering all the design parameters were made in SOLIDWORKS software and the analysis of variation of different parameters was done on FLUENT tool of ANSYS software. Three models were designed and analyzed. By evaluating all the parameters of design and performance a new design is proposed with improved performance.

Keywords : Muffler, pressure, velocity, FLUENT, solidworks

1. INTRODUCTION

Exhaust systems are developed to control emissions and to attenuate noise vibration and harshness to meet the regulatory requirements. The exhaust system components are manifold, close coupled and underbody catalytic converters, flexible bellow, muffler, resonator, connecting pipes, flanges, and tailpipe. The function of a muffler is to route the exhaust gases from the engine exhaust manifold while reducing the noise and back-pressure.Noise reduction is an emerging concern in the automotive industry, and reduction in back-pressure enhances the fuel economy of the engine.The material generally used for the fabrication of muffler are those which has high strength, corrosion resistance, absorption capacity etc. The gases that comes out of the muffler are mainly: Water vapor (H_2O), Carbon dioxide (CO_2), Nitrogen (N_2), Oxygen (O_2), Carbon Monoxide (CO), Unburnt hydrocarbons (HC), Sulphur and Nitrogen oxides (SOx, NOx).

Solid Edge and ANSYS are the two famous software tools which are used for designing and analyzing the software models. Solid Edge is a 3D CAD, parametric feature and synchronous technology solid modeling software. It runs on Microsoft Windows and provides solid modeling, assembly modelling and 2D orthographic view functionality for mechanical designers.

ANSYS is general nonlinear multi-physics software offering structural and thermodynamic analysis, continuum flow analysis, analysis of electrostatic and electromagnetic fields and acoustic analysis. Number of research papers has been published based on the performance studies of mufflers of automobiles. Nazir et al. [1] has studied a predictive model for life assessment of automobile exhaust mufflers which are severely subjected to corrosion failure due to condensation of exhaust gas. Authors presented a study on pitting corrosion on internal walls of automobile exhaust muffler. The dissolution of corrosive gases coming from the internal combustion of engine as well as condensation of low-pH acidic vapours in the water droplet can cause severe pitting corrosion on standard exhaust steel. In this work, an experiment is reported for internal corrosion, by using three exhaust mufflers of similar dimensions and material properties fabricated using stainless steel were used as test mufflers subjected to different environmental conditions. Their pitting rates have been compared with condensation rates.

*Corresponding author: Vipin Sharma
E-mail: vipin.dtu@gmail.com

MAIT Journal of Technology 01 (2022) 17-24

MAIT
JOURNAL OF
TECHNOLOGY

Automatic Number Plate Recognition System

Naveen Bhardwaj*, Gagan Chawla, Nikhil Kumar Sharma, Kavita Saxena

Department of Computer Science & Engineering, Maharaja Agrasen Institution of Technology, Delhi

Abstract

This project aims to develop a system that can be used to locate vehicle number plate and recognize the characters from it given an image in which number plate is visible. The Automatic Number Plate Recognition (ANPR) System is a mass surveillance system that can use special cameras designed for the purpose or the existing CCTV camera footage. This system can be used by different police forces to help them in their investigation or various other purposes like automatic toll collection, automatic parking and other access control situations. Ordinarily system uses infrared lightning to take photos but those systems could not be used in night. Now most of the systems uses neural network technique. The work proposed here uses Contour Detection, Image Segmentation and KNN algorithm for Optical Character Recognition (OCR) to make the system quicker and more efficient.

Keywords : ANPR, HOG, localization, segmentation, recognition, optical character recognition (OCR), K-nearest neighbour (KNN)

1. INTRODUCTION

ANPR is an image-processing system which is a part of computer vision. Computer vision is a field of Computer Engineering in which a computer is used to find out abnormal information from a digital image. Computer vision provides the developers algorithms to process a digital image and to find out their useful information. Computer Vision can be used to localize and outline the numberplate.

The ANPR system consists of following steps:

(i) Vehicle imagecapture.

(ii) Pre-processing.

(iii) Number plate localization andextraction.

(iv) Charactersegmentation.

(v) Character recognition usingKNN.

In the first step, the vehicle image captured from a camera is provided to the system. After that the system uses various pre-processing techniques to sharpen the image. The pre-processing phase is important as it allows the system to detect the characters accurately. In the third step, the rectangular image of the number plate is extracted from the scene. Now after getting the number plate image, this image is pre-processed. Now in the fourth step, individual characters are detected using contour detection from left to right. In the final step, these individual characters are matched with the training data and by using KNN algorithm, these individual characters are recognized. Here the performance of the system depends on the training images used previously for the supervised learning. More the variations of characters in the training image more will be the performance of the system.

*Corresponding author: Naveen Bhardwaj
E-mail: naveen6252@gmail.com

MAIT Journal of Technology 01 (2022) 25-32

MAIT
JOURNAL OF
TECHNOLOGY

Multi Factor Authentication

Sneha Sagar, Poonam, Vinay Kumar Saini*

Department of Information Technology, Maharaja Agrasen Institute of Technology, Delhi

Abstract

World Wide Web is expanding day by day in number of users and websites. How a website could stand out in millions of websites to satisfy its users and provide them security as well.This is where the role of website evaluation becomes crucial.Website evaluation methods help website designers to understand behavior of users, to improve the design and layout of the website and are useful to improve the website experience for users. In this paper, we will use an effective but very less often used website evaluation technique called Multifactor Authentication. Click analytics records the clicks such as where a user clicks on the webpage and how many times. A keylogger, keystroke records, ip address recorder has been used to record the clicks of our website. The data was analyzed and the behavior of the users based on clicks was interpreted. We found that interpretation of click data can be difficult task and it needs guidance and expertise. To make the task of analysts easier and to improve websites effectively, we have proposed aframework. This framework is useful to help the website designers and researchers to interpret the meaning of clicks received on each element of webpage and take respective actionsto improve organization, design, authentication, security and navigability of websites and eventually the profitability of website.

Keywords : Authentication, web analytics

1. INTRODUCTION

In this digital era, a website not only provides cost effectiveand timely platform for communication with stakeholders, butalso helps to shape and present its image on the internet.Website designers have to use different methods to make a website more pleasing, usable, effective, robust,comprehensive, and competitively better.

Website usability can be defined as a “quality attribute thatdescribes how easy it is for a user to navigate through thewebsite”. Apart from traditional methods of website evaluation like expert based testing, user based testing, the importance ofweb based tools like web analytics tools, have been identifiedby researchers in recent time. According to the Web AnalyticsAssociation, “Web Analytics is the measurement, collection,analysis and reporting of Internet data for the purposes ofunderstanding and optimizing Web usage.” By learning aboutthe website users one may improve their website, take differentactions, and get to know how the website is performing [1].

We have chosen to focus on multifactor authentication for our website using PHP because most of the website developers have very little experience with security issues and authentications for the user/clients. Many of the website developers do not have knowledge about how to use a keystroke recording software for their website for monitoring keystrokes. Keyloggers are very helpful and effective inmonitoring ongoing crimes.

Now day’s attackers are growing stronger. They discover new ways to pierce the security levels daily. Thus security has always been challenging area of research. Security andrecovery both are the topics to be think on. So, keystroke recording and

Corresponding author: Sneha Sagar
E-mail: sagarsneha16@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 33-43

Smart Irrigation System Using IoT

M.L. Sharma*, Priya Varshney, Satyam Alok

Department of Information Technology, Maharaja Agrasen Institute of Technology, Delhi

Abstract

Water is a very precious resource and hence its optimal use is a need of the hour. Efficient irrigation watering helps not only in saving water but also in saving electricity and hence will improve crop quality as well as optimize electricity utilization. Various methods are available to measure soil moisture content, but the quickest and better one is with the use of soil moisture sensor electronic devices. For successful irrigation, it is necessary to monitor soil moisture content along with various other parameters as the sunlight, temperature, humidity, water flow which is actually required for the plant and thus providing the same. This paper describes an application of IoT for low-cost wireless controlled irrigation solution and real time monitoring of water content of soil along with various other parameters. The system measure the moisture of the soil, compare it with the desired values given by the user and turns on the motor pump if soil moisture goes below desired value. The system also measures various other parameters as temperature, humidity, etc. and send them to the cloud. It also helps in problems related to growing of crops in which irrigation is required at irregular interval.

Keywords : Hall effect, photo-conductivity, electrical conductivity

1. INTRODUCTION

Agriculture in India is largely depends on monsoon. As a result, production of food-grains fluctuates year after year. A year of abundant output of cereals is often followed by a year of acute shortage. This, in its turn, leads to price income and employment fluctuations. Due to the growth of population and break down of the joint family system, there has occurred continuous sub-division of agricultural land into smaller and smaller plots. At times small farmers are forced to sell a portion of their land to repay their debt. This creates further sub-division of land. Conventional methods of farming leads to more wastage of water. Therefore, it is high time now to replace traditional methods with the present technology. Many of the above problems can be solved using Internet of things. At present, farmers need access to the existing technologies. Automation of farm activities can transform agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human supervision.

*Corresponding author: M.L. Sharma

E-mail: madansharama.20@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 44-47

Measurement of Resistivity Profile of a Semiconductor Bar Using Linear Four Point Probe Technique

Ram Kishore*

Applied Science Department, Maharaja Agrasen Institute of Technology, Sector – 22, Rohini, Delhi -110085

Abstract

Measurement of resistivity and conductivity type of a semiconductor is essential for its application in device manufacturing. Linear four probe technique is a simple, easy to use and fast technique for measuring the semiconductor specimen. This paper deals with the technical aspect of the method as well as the proof of the formula used. This paper would be of paramount importance for the students and faculty teaching physics to the engineering students in their B.Tech. program.

Keywords : Resistivity, four Point Probe, semiconductors

1. INTRODUCTION

The resistivity (r) of a semiconductor is one of the fundamnetal properties which decides its application for fabricating devices from it. Leopoldo Valdes in 1954 came out with a four probe geometry to measure the resistivity of a semiconductor wafer and from 1975 this method was adopted by the American Society for Testing of Materials (ASTM) standards. We shall present this method in a simple way and elaborate its application as an easy practical approach to measure the semiconductor resistivity of a sample for its spatial as well as linear variations. The imprtance of the method will be discussed and experimental work on the resistivity variaion along the length of a zone refined silicon rod will be presnted.

2. DERIVATION OF FORMULA USED FOR RESISTIVITY MEASUREMNT

The schematic diagram used for the measurement of resistivity using four point probe technique is shown in Fig.1. When current is passed between the probes 1 and 4, we can consider probe 1 and potential distribution around the probe. The potential distribution can be shown as given in Fig. 2. The current travels from point of contact through concentric hemispherical shells. The current density J around the pointt may be writtens as :

$$J = I/2\pi r^2 \qquad ...(1)$$

*Corresponding author: Ram Kishore

Email: drramkishore@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 48-56

Technical Note on Modeling and Designing Aspects of the Nanolasers With Emphasis on Quality Factor and Surface Plasmon Polariton (SSP) Mode

Kamal Nain Chopra*

Applied Physics Department, Maharaja Agrasen Institute of Technology, Rohini, New Delhi - 110086, INDIA

Abstract

Modeling and Designing aspects of the Nanolasers with emphasis on quality factor have been discussed in this paper. Basic steps of the Fabrication Process for Nanopatch Lasers, and their important characteristics have been technically discussed. Microscopic lasers like Metal-clad semiconductor nanolasers and Subwavelength hybrid lasers have been analyzed in terms of their important mathematical parameters. Flexible micro/nano lasers and optical curvature sensors on a polymer substrate have been discussed from surface plasmon polariton (SSP) mode point of view. *To explain the theoretical aspects presented in this paper, some experimental results reported in the literature have also been reproduced for better understanding of the subject.*

Keywords : Nanolasers, microscopic lasers, metal-clad semiconductor nanolasers, subwavelength hybrid lasers, surface plasmon polariton (SSP) mode

1. INTRODUCTION

Recently, many types of unconventional lasers e.g. Phase Conjugated Lasers; Diode pumped Er Fiber lasers, Lasers based on Photonic Crystals, GaSb-based Type-I diode lasers operating in the optical spectral region around 3ìm, Quantum Cascade Lasers, and Raman Lasers in various modes for efficiency optimization, and novel applications [1] have been the subject of great interest. Many useful studies on the subject are available in the literature, especially in the last decade.

2. THEORETICAL MODELING AND DESIGNING OF NANOLASERS

The sub-wavelength nanoring laser can be made by conformally depositing a metal layer over a semiconductor ring structure. It is really very interesting to note that the metal enables tight optical confinement, and improves heat conduction of the device, and therefore, the device can be scaled to sub-wavelengths in all the three directions. The computations reveal the radial mode profile of the lateral and transverse optical modes, which thereby illustrates the surface plasmonic confinement that is as observed in the electric field profile near the metal-semiconductor interface. The working can be understood by noting that the transverse mode results due to the conventional dielectric confinement with the active region acting as the waveguide core. It has been reported in the literature that the simulations can be easily performed by using finite-difference time-domain (FDTD) simulator, and the cavity resonant frequencies can be computed by using the filter diagonalization method. It is a common practice to choose InGaAs of thickness ~ 400 nm as the active region, gold as the metal of choice, the total height of the ring~ 1ìm, and silicon nitride with a refractive index of 2 and thickness ~10 nm as an insulator material to

*Corresponding author: Kaman Nain Chopra
Email: kchopra2003@gmail.com

MAIT Journal of Technology 01 (2022) 64-71

MAIT
JOURNAL OF
TECHNOLOGY

A Comprehensive Study of Wireless Control of a Robotic Arm Using Manual & Voice Commands Via Android Application

Ashank Rudola*, Kartik Kalra, Shreya Walia, Monika Gupta

Electrical and Electronics Engineering Department, Maharaja Agrasen Institute of Technology, Rohini, New Delhi, India

Abstract

A robotic arm is a mechanical arm that can be programmed to make the human work easier by either. This paper studies working of a four Degree of Freedom (4 DOF) robotic arm which can be used independently or as a part of a more complex robot. Arduino UNO is used as the microcontroller to program the robotic arm. DC motors controlled by Arduino are used to operate the joints of the robotic arm. The microcontroller is then further interfaced with a Bluetooth module which is used for pairing Arduino to an android smartphone. An android application further acts as a medium for wireless control of the robotic arm via manual inputs or voice commands.

Keywords : Robotic Arm, voice control, android application, arduino

1. INTRODUCTION

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm and is widely used today in various industries for handling and transferring of various objects that maybe harmful or difficult to be handled by human hands. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand. This paper studies the functioning of robotic arm using Arduino Uno as the microcontroller. Arduino UNO is an open source platform and it consists of both a physical programmable circuit board and a piece of software called IDE (Integrated Development Environment). DC motors controlled by Arduino are used to operate the joints of the robotic arm. The Arduino is then further interfaced with a Bluetooth module.

This Bluetooth module is used for pairing Arduino to an android smartphone which acts as a medium between the human and the robotic arm. Both manual and voice control of robotic arm are studied and demonstrated in this research paper.

The study of pick & place robotic arm demonstrates and concludes that a robotic arm effectively mimics the motion of a human arm to a great degree. Hence, this robotic arm can act as a boon for people with special needs and aid handicapped and paralyzed persons in various daily activities.

The paper is structured as follows : Section 2 details the literature review and the motivation behind the project. Section 3 describes the mechanical structure of the robotic arm used in our research. Section 4 delves into detailed description and Section 5 describes how the project works. Section 6 discusses the results and outcomes. The observations and scope for future work is discussed in Section 7. The details of the hardware components used in the research are given as an appendix.

*Corresponding author: Ashank Rudola

Email: ashankrudola@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 57-63

Comparison of Conventional Fast Adders with Novel HSD Adders

Reibhu Sant*, Abhilasha Gokhale, Neelam Sharma

Department of Electronics & Communication Engineering, Maharaja Agrasen Institute of Technology, Rohini, New Delhi

Abstract

Signed digit number system presents addition without carry propagation and is popular due to its carry free property. Today's world is dominated by computers and embedded systems having fast processors where adders play a major role. This report discusses the design of a fast adder cell using RBSD and HSD number system. Since the use of this number system results in carry free addition, it leads to a much faster addition operation compared to traditional binary number system. The design of the RBSD Adder is implemented using verilog hardware description language. The timing report is compared with that of a ripple carry adder and the results clearly point to reduced propagation. This feature indicates that RBSD adder cell is more beneficial for fast computing processes but with a drawback of extra memory consumption. A middle path offering a mix of both signed and unsigned digit adder termed as hybrid signed digit adder is also discussed which offers a variable timing and memory consumption as per the designer's choice. This paper aims to compare the conventional adders (CLA and RCA) as well as RBSD Adder. The adders are compared in areas such as simplicity of design and delay time. The design of the HSD Adder is implemented using verilog hardware description language on Xilinx FPGA platform.

Keywords : HSD, signed adders, RBSD, verilog HDL, FPGA

1. INTRODUCTION

As an adder is the basic building block of multiplier, subtractor and divider, it plays an integral component in a digital system. Computer arithmetic processes play a major role in many applications such as signal processing, cryptography, data analysis etc. Thus improving performance of the adder would improve the overall performance of the system.

The carry propagation time is a limiting factor on speed with which two numbers are added in parallel. Although a parallel adder or any combinational circuit will always have some value at its output terminal, the output will not be correct unless the signals are given enough time to propagate through the gates connected from the input to the outputs. Since all other arithmetic operations are implemented by successive additions, the time consumed during the addition process is very critical.

An obvious solution for reducing the carry propagation delay time is to employ faster gates with reduced delays and different technologies for the same, but physical circuit have a limit to their capability. In this report a comparative study is done among different adders such as Ripple carry adder (RCA), Carry look-ahead adder (CLA), Redundant Binary Signed Digit (RBSD), and Hybrid Signed Digit (HSD).

In RCA carry bit is calculated alongside the sum bit and each bit must wait until the previous carry is being calculated. In CLA speed is improved by reducing the amount of time required to determine carry bits. RBSD has a carry free addition and fast speed of addition. The HSD representations are capable of bounding the maximum length of carry propagation chains

*Corresponding author: Reibhu Sant

Email: reibhusant1@gmail.com

MAIT Journal of Technology 01 (2022) 64-71

MAIT
JOURNAL OF
TECHNOLOGY

A Comprehensive Study of Wireless Control of a Robotic Arm Using Manual & Voice Commands Via Android Application

Ashank Rudola*, Kartik Kalra, Shreya Walia, Monika Gupta

Electrical and Electronics Engineering Department, Maharaja Agrasen Institute of Technology, Rohini, New Delhi, India

Abstract

A robotic arm is a mechanical arm that can be programmed to make the human work easier by either. This paper studies working of a four Degree of Freedom (4 DOF) robotic arm which can be used independently or as a part of a more complex robot. Arduino UNO is used as the microcontroller to program the robotic arm. DC motors controlled by Arduino are used to operate the joints of the robotic arm. The microcontroller is then further interfaced with a Bluetooth module which is used for pairing Arduino to an android smartphone. An android application further acts as a medium for wireless control of the robotic arm via manual inputs or voice commands.

Keywords : Robotic Arm, voice control, android application, arduino

1. INTRODUCTION

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm and is widely used today in various industries for handling and transferring of various objects that maybe harmful or difficult to be handled by human hands. The links of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The links of the manipulator can be considered to form a kinematic chain. The terminus of the kinematic chain of the manipulator is called the end effector and it is analogous to the human hand. This paper studies the functioning of robotic arm using Arduino Uno as the microcontroller. Arduino UNO is an open source platform and it consists of both a physical programmable circuit board and a piece of software called IDE (Integrated Development Environment). DC motors controlled by Arduino are used to operate the joints of the robotic arm. The Arduino is then further interfaced with a Bluetooth module.

This Bluetooth module is used for pairing Arduino to an android smartphone which acts as a medium between the human and the robotic arm. Both manual and voice control of robotic arm are studied and demonstrated in this research paper.

The study of pick & place robotic arm demonstrates and concludes that a robotic arm effectively mimics the motion of a human arm to a great degree. Hence, this robotic arm can act as a boon for people with special needs and aid handicapped and paralyzed persons in various daily activities.

The paper is structured as follows : Section 2 details the literature review and the motivation behind the project. Section 3 describes the mechanical structure of the robotic arm used in our research. Section 4 delves into detailed description and Section 5 describes how the project works. Section 6 discusses the results and outcomes. The observations and scope for future work is discussed in Section 7. The details of the hardware components used in the research are given as an appendix.

*Corresponding author: Ashank Rudola

Email: ashankrudola@gmail.com

MAIT Journal of Technology 01 (2022) 72-75

MAIT
JOURNAL OF
TECHNOLOGY

Predicting the Direction of Stock Market Index Movement

Shreya Arora*, Anirudh Goel, Kriti Wadhwa

Department of Information Technology, Maharaja Agrasen Institute of Technology, Delhi

Abstract

In the business area, it has dependably been a troublesome undertaking to anticipate the correct day by day cost of money markets file; subsequently, there is a lot of research being led with respect to the expectation of the heading of stock value file development. Numerous variables, for example, political occasions, general financial conditions, and merchants'desires may have an impact on money markets list. There are various research considers that utilization comparative pointers to figure the bearing of money markets list. In this examination, we think about two fundamental sorts of information factors to foresee the bearing of the everyday securities exchange record. The primary commitment of this examination is the capacity to anticipate they course of the Following day's cost of the Japanese securities exchange record by utilizing an enhanced counterfeit neural system (ANN) demonstrate. To enhance the expectation exactness of the pattern of the stock exchange list later on, we streamline the ANN demonstrate utilizing hereditary calculations (GA). We show and check the consistency of stock value bearing by utilizing the crass breed GA-ANN model and afterward contrast the execution and earlier examinations. Observational outcomes demonstrate that the Type 2 input factors can produce a higher conjecture exactness and that it is conceivable to upgrade the execution of the advanced ANN display by choosing input factors suitably.

Keywords : Stock exchange, stock market, GA-ANN

1. INTRODUCTION

The course of money markets record alludes to the devel-opment of the value list or the pattern of vacillation in the share trading system list later on. Anticipating the bearing a useful issue that intensely impacts a money related dealer's choice to purchase or oiler an instrument. Exact conjecture of the patterns of the stock record can help financial specialists to secure open doors for picking up benefit in the stock trade. Subsequently, exact estimating of the patterns of the stock value file. can he to a great degree worthwhile for financial specialists. Leung, Daouk hold the view that exchanging could be made productive by an exact forecast of the course of de-velopment of the stock record. Their work recommended that money related forecasters and brokers should center around precisely foreseeing the heading of development to limit the valuations' deviations from the genuine 'watched esteems. Mustafa. likewise trusts that precise expo Cations of the course of stock value records are imperative for speculators. Be that as it may, the conduct of securities exchanges relies upon numerous subjective factors, for example, political, financial,and common variables, among numerous others. The securities exchanges are dynamic and display wide variety, and theexpectation of money markets therefore turns into an exceed-ingly difficult errand as a result of the very non-direct nature and complex dimensionality Gauging of the money related record is described by information force, commotion, non--stationarity, unstructured nature, high level of vulnerability, and shrouded connections.

Past investigations have connected different models in de-termining the bearing of the share trading system file development. Huang, Nakamori anticipated securities exchange development utilizing bolster vector machines (SVM), 131

*Corresponding author: Shreya Arora
E-mail: shreyaarora@mait.ac.in

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 76-81

Opinion Mining of Twitter Data by Using Classification Algorithms

Rishabh Kapoor, Shiva Verma*, M.L Sharma

Department of Information Technology, Maharaja Agrasen Institute of Technology, Delhi

Abstract

Big data is a term that defines data set are so large or complex that traditional data processing applications are inadequate. It is also defined by the 4V's i.e. Volume, Velocity,Variety and Varasity. By volume we mean the enormous amount of data that the organizations collect from various sources. Velocity here stands for unprecedented speed via which the data streams in and needs to be handled within proper time limits. Lastly, data comes in a number of formats: multi-language, structured, unstructured, email etc. Challenges faced by the organizations with this huge amount of data includes data analysation, capturing of data, data curation, search, sharing, transfer, visualization, querying and information privacy. The need of big data doesn't revolve around what amount of data you have, but what you want to do with it. You can fetch the data from any of the source and analyze it to examine and find answers that enable 1) cost reductions, 2) time reductions, 3) new product development and optimized offerings, and 4) smart decision making. Not all the data that is collected is important for the user, so there is a need to refine this data in order to find out the useful information as filtering the data can make your results more efficient. The aim of this paper is to use different classification techniques to develop a system for finding out the useful information from the raw data and to analyze the opinions carried out by twitter. Millions of tweet posted daily which contain opinion and sentiment of users around the world. The tweets having more than one language. Opinion Mining can benefit companies by analyzing customer opinions also by analyzing Multilanguage dataset of tweet is the main challenge. Till today no one has been able to propose a single soluion for above mention problem.

Keywords : NLTK, maximum entropy, Naïve bayes, language independent, text categorization, twitter API

1. INTRODUCTION

Twitter is one of the best micro blogging services provided on the internet. On, Twitter Micro blogs are called "tweet" and length of each tweet is 280 characters. A single opinion from one person may not seem important, but among the billions of person opinion through tweet can form a comprehensive picture. Sentiments are the main influencers of human behavior. Whenever we want to make any decision regarding any product or related thing, we first of all try to find out others opinion about that particular product. We can very well see it in the real word how businesses and organizations keen to find out the users opinion about their product via providing feedback or review columns. Same goes with the user, when the user wants to buy any product, they first look for the

Opinions, feedback and reviews for that particular product given by the other users. Surveys, opinion polls, and focus groups are some ways by which the organizations and businesses try to gather consumer's opinion about their product. Attaining consumer opinions has long been a massive business itself for marketing, public relations, and political campaign companies. Data has become a core part of every economy, industry, organization, business function and individual. Big Data introduce unique computational and statistical challenges, including scalability and storage, noise accumulation, spurious correlation

*Corresponding author: Shiva Verma
Email: vermashiva.9999@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 76-81

Opinion Mining of Twitter Data by Using Classification Algorithms

Rishabh Kapoor, Shiva Verma*, M.L Sharma

Department of Information Technology, Maharaja Agrasen Institute of Technology, Delhi

Abstract

Big data is a term that defines data set are so large or complex that traditional data processing applications are inadequate. It is also defined by the 4V's i.e. Volume, Velocity,Variety and Varasity. By volume we mean the enormous amount of data that the organizations collect from various sources. Velocity here stands for unprecedented speed via which the data streams in and needs to be handled within proper time limits. Lastly, data comes in a number of formats: multi-language, structured, unstructured, email etc. Challenges faced by the organizations with this huge amount of data includes data analysation, capturing of data, data curation, search, sharing, transfer, visualization, querying and information privacy. The need of big data doesn't revolve around what amount of data you have, but what you want to do with it. You can fetch the data from any of the source and analyze it to examine and find answers that enable 1) cost reductions, 2) time reductions, 3) new product development and optimized offerings, and 4) smart decision making. Not all the data that is collected is important for the user, so there is a need to refine this data in order to find out the useful information as filtering the data can make your results more efficient. The aim of this paper is to use different classification techniques to develop a system for finding out the useful information from the raw data and to analyze the opinions carried out by twitter. Millions of tweet posted daily which contain opinion and sentiment of users around the world. The tweets having more than one language. Opinion Mining can benefit companies by analyzing customer opinions also by analyzing Multilanguage dataset of tweet is the main challenge. Till today no one has been able to propose a single soluion for above mention problem.

Keywords : NLTK, maximum entropy, Naïve bayes, language independent, text categorization, twitter API

1. INTRODUCTION

Twitter is one of the best micro blogging services provided on the internet. On, Twitter Micro blogs are called "tweet" and length of each tweet is 280 characters. A single opinion from one person may not seem important, but among the billions of person opinion through tweet can form a comprehensive picture. Sentiments are the main influencers of human behavior. Whenever we want to make any decision regarding any product or related thing, we first of all try to find out others opinion about that particular product. We can very well see it in the real word how businesses and organizations keen to find out the users opinion about their product via providing feedback or review columns. Same goes with the user, when the user wants to buy any product, they first look for the

Opinions, feedback and reviews for that particular product given by the other users. Surveys, opinion polls, and focus groups are some ways by which the organizations and businesses try to gather consumer's opinion about their product. Attaining consumer opinions has long been a massive business itself for marketing, public relations, and political campaign companies. Data has become a core part of every economy, industry, organization, business function and individual. Big Data introduce unique computational and statistical challenges, including scalability and storage, noise accumulation, spurious correlation

*Corresponding author: Shiva Verma
Email: vermashiva.9999@gmail.com

MAIT
JOURNAL OF
TECHNOLOGY

MAIT Journal of Technology 01 (2022) 82-89

Smart Soil Testing

G.K. Jindal, Neelu Nagpal*, Bishal Das, Ashish Gupta, Manish Kumar

Electrical & Electronics Engineering Department, Maharaja Agrasen Institute of Technology, Delhi

Abstract

The aim of this research project is to conduct the soil nutrient test- fast, accurate and also to record the test results for monitoring of the soil chemistry and give farmers fertilizer recommendation and calculate fertilizer dosage as per the soil test results. It is done by obtaining the soil test results using Agrinex Corporation soil NPK and pH health indicator kit with the help of colour sensors and sends the results via SMS to a registered phone number. The sent SMS will also include an URL, opening that URL in web browser will result in saving the soil test results to a MySQL database to keep record of the soil nutrient level. It will direct to a web page showing the soil test results and a hyperlink. By opening the hyperlink, it will direct to a web page that will show number of fertilizer choices to choose from. Opening any of the hyperlinks (i.e., the fertilizer choice) will direct to a web page showing two tables one containing the recommended dosage of the fertilizer and other containing the dosage recommendation as per the soil test results.

Keywords : Soil nutrient, NPK & pH testing, colour sensors, Internet of Things (IoT), GSM modem

1. INTRODUCTION

Modernizing agriculture is one of the most important aspects in today's world. Agriculture provides food, fibre, medicines, etc. which leads to a healthy life. Soil quality is an integral part of agriculture [3]. There are many types of soil such as clay, sand, silt, loam, peat, and chalk. Each type of soil has different amount of nutrient content. For a particular crop, soil testing is necessary to check whether it is suitable for that crop or not [1]. Inspection of soil testing includes calculation of nutrient content and characteristics such as pH level.

The soil test comprises of Secondary nutrients tests major nutrients test which includes nitrogen (N), phosphorus (P), and potassium (K), includes sulphur, calcium, etc., Minor nutrients tests includes iron, manganese, etc.

The traditional way in which a person tests his land soil is by sending a soil to the nearby soil testing labs which takes approximately five working days to get the result hence it's a long wait till the results arrive. The longer the time duration between getting the soil sample and actual testing of the soil the higher will be the test errors due to soil biological and chemical changes [2]. This problem can be solved by using a soil testing kit to test the soil chemistry [3], but then government will not be able to keep a track of the soil quality of that particular land [1].

Keeping the record of the soil tests will help the government to keep track of the soil quality and react to the changes occurring to the soil chemistry to keep the agricultural output as high as possible.

*Corresponding author: Neelu Nagpal

Email : nagpalneelu1971@gmail.com

MAIT Journal of Technology 01 (2022) 90-93

MAIT
JOURNAL OF
TECHNOLOGY

Initiatives for the Development of National Standards in Illuminating Raw Food Items

Basant Kumar[1], Monika Aggarwal[1], Kawaljeet Singh Batra[2], Vidushi Singhania[2], Anupam Khattar[2], Kshipra Sethi[2], H N Dutta[2]*

[1]Applied Physics Department, Maharaja Agrasen Institute of Technology, Sec. 22, Rohini, Delhi – 110086, India

[2]Silver Line Prestige School, Ghaziabad-201001, India

Abstract

The development of human civilization is largely based on measurement standards but in many areas, humans are still dependent on their own psychological judgment or perception for various issues. The selection or purchase of vegetables, fruits and spices is still based on their physical appearances, colors, odors etc. and as such no standard has been advocated so far. However, with the advent of color LED lights, the raw food items are being illuminated to enhance their color perception so that they look stunning, healthy and add temptation to buy even at higher costs. Moreover, this fake perception masks various diseases on the food items and this manipulation is like adulteration in food. As buyers, we need to stop this open malpractice in the society and on the basis of the work carried out, we state laws pertaining to the illumination of vegetables, fruits and spices at night or in stores where these are illuminated by artificial lights.

Keywords : Raw food item, optical illumination laws, LED lights, RGB

1. INTRODUCTION

Humans have developed various measurement systems to deliver/accept various products and services but in buying / selling vegetables, fruits and spices, we are still dependent on various subjective psychological and visual parameters like shape, size, color, freshness etc. In fact, nature created these raw food items much before humans joined Earth and to identify these raw food items, humans were gifted visual perception to identify healthy raw food items. This perception was based on reflection/refraction/scattering of natural Sunlight from the raw food items. It is only due to this reasons, raw food items were primarily sold during the daytime hours. However, with increase in population and the availability of various optical light illumination sources like candles, petromax, bulbs, tube lights etc., these items are also sold at night. Until recently, there was no problem as the optical spectrum emitted from these light illuminating sources were close to the spectrum of light emitted by the Sun. But, with the induction of color LED lights (Lights based on a Light Emitting Diodes) for energy saving and efficient lighting system, these are being used by unscrupulous people to enhance visual perception of raw food items in such a way so that these items look healthy, stunning, fresh and many diseases on these raw food items remain undetected. This fake enhancement of perception is our concern and we address this social evil wherein, millions are getting cheated as there is no law to stop this malpractice in the society.

2. RAW FOOD ITEMS IN MARKET

Historically, India produced raw food items in such large quantities that these were being sold in the open market during

Corresponding author : Basant Kumar
Email : bktyagi26@gmail.com

MAIT Journal of Technology 01 (2022) 94-102

MAIT
JOURNAL OF
TECHNOLOGY

Reliability & Validity Analysis For Satisfaction: Loyalty Framework With Reference to Telecom Industry

Neeru Gupta[1]*, Nitika Sharma[2], Anita Gupta[3], Ravi Kumar Gupta[1]

[1]*Department of Management, Maharaja Agrasen Institute of Technology, Delhi*

[2]*Department of Commerce, University of Delhi, Delhi*

[3] *Formerly Department of Mathematics, Vaish College of Engineering, Rohtak*

Abstract

The study is focused on the impact of brand satisfaction on brand loyalty in telecom Industry and proposed a framework to explore the influence of brand satisfaction on the brand loyalty through brand trust and brand commitment. The present study proposed four novel constructs namely brand satisfaction, brand commitment, brand loyalty & brand trust and explored the positive relationships between brand loyalty and its drivers i.e. brand satisfaction, brand commitment and brand trust. The study employeda questionnaire survey to validate the hypotheses and to explore its managerial implications. The data was analyzed by using Structural Equation Modeling through Amos and SPSS. It includedthe direct and indirect effect of brand satisfaction on brand loyalty through brand trust and brand commitment. This study summarized the literature of brand satisfaction, brand commitment, brand loyalty and brand trust to develop a new framework. The study concluded the significance of direct & indirect effects of brandtrust and brand commitment on brand loyalty. The outcome provided the important findings to the researchers and practitioners as well as direction to the marketers. The conclusion drawn in this study can be used by the marketers to stimulate brand loyalty by understanding the role of brand satisfaction among telecom consumers. The branding has become a distinctive and distinguishes way of positioning a product or company, therefore, firms should exploit brand trust and brand commitment of consumers to magnetize new markets, customer and also retain the existing consumers in telecom industry.

Keywords : Brand Trust, brand satisfaction, brand loyalty, brand commitment, sem and telecom industry

1. INTRODUCTION

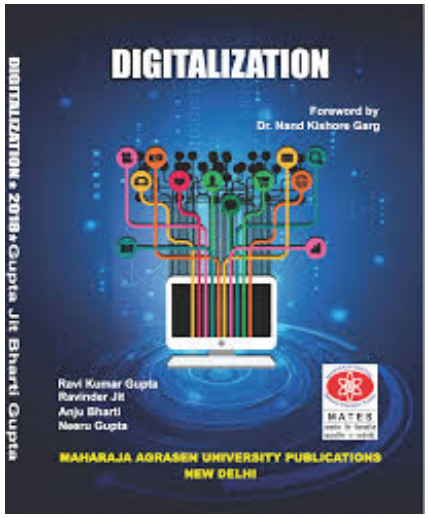
In today's highly competitive environment, improving brand loyalty among consumers facilitate the firms to secure higher positions in the market place (Aaker, 1996). Most of the times, loyalty is measured by repeat purchases of particular products or services during a certain period of time (Yi &Jeon, 2003) and this purchase possibility is often proposed as a means to measure brand loyalty (Farley 1964).

Thiele & Bennett, 2001 argued that there are two construct of loyalty namely attitudinal loyalty and behavioural loyalty. Attitudinal loyalty has a propensity of cognitive, affective and conative factors. It was observed that attitudinal loyalty drives the behaviour of customers and more enduring than behavioural loyalty (Lau & Lee, 1999). Behavioural loyalty includes repurchase, intention to repurchase, re-patronize the brand / company in future and wallet share of customer for particular brand (Schulz, 1998). This behavioural loyalty occurs due to the unique value generated by the brand comparative to alternative brands (Chaudhuri & Holbrook, 2001). However over the past few decades, due to intensified competition and short product life cycle gaining loyalty among customer is getting difficult. Therefore, to be successfulness of a company is largely depends

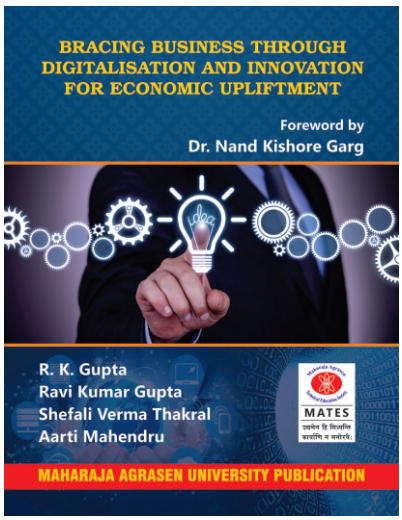
Corresponding author : Neeru Gupta

Email : doctorneerugupta@gmail.com

Recent Publications of 'Maharaja Agrasen University Publication'



Title: Digitalization
ISBN: 9789353114411 **Price Rs.1000/-**
Edited by:
Prof. Ravi Kumar Gupta, Prof. Ravinder Jit, Dr. Anju Bharti & Dr. Neeru Gupta (MAIT)



Title: Bracing Business through Digitalisation and Innovation for Economic Upliftment
ISBN: 8703ISBN2018P **Price Rs. 400/-**
Edited by:
Prof. R. K. Gupta, Prof. Ravi Kumar Gupta, Prof. Shefali Verma Thakral & Dr. Aarti Mahendru (MAU)

Maharaja Agrasen University Publication *(Since 2017)*

(Established by: Maharaja Agrasen Technical Education Society)
Maharaja Agrasen Chowk, Plot No.-1, Sector-22, Rohini, New Delhi-110086 INDIA
Phone-011-65162002, 65151163- Email-editormaup@mait.ac.in

Office Bearers

-Sh. Anand Gupta, Co-Treasurer, Maharaja Agrasen Technical Education Society
-Sh. Gyanendra Srivastava, Chief Executive, Maharaja Agrasen Technical Education Society
-Sh. Jairam Mani Tripathi, Chief Accounts Officer, MAIT
-Dr Ravi Kumar Gupta, Professor in Management, MAIT (Chief Editor)

Maharaja Agrasen Institute of Technology (1999)

(APPROVED BY AICTE & AFFILIATED TO GGSIP UNIVERSITY, NEW DELHI)

PSP Institutional Area, Plot No. 1, Maharaja Agrasen Chowk,
Sector-22, Rohini, New Delhi-110086 INDIA

Phone:011-27582095, 65151162/63, 65162001 Website: www.mait.ac.in

Courses Offered: B.Tech-CSE, IT, ECE, EEE, MAE, ME, CST, ITE, AI&ML, AI&DS, MBA, BBA