Techniques and Innovation in Engineering Research Vol. 2

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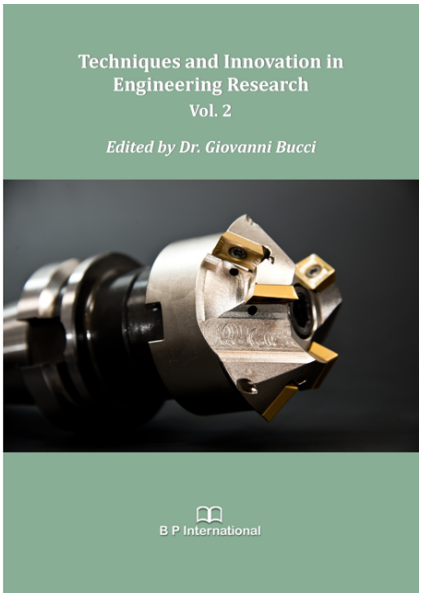

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Industrial Automation of Gas Tunnel Kiln Using Relay Logics, PLC and VFD's

K. Mahesh ; S. Inbasakaran ; J. Lithesh ; S. Praveen

Techniques and Innovation in Engineering Research Vol. 2, 20 September 2022, Page 43-58
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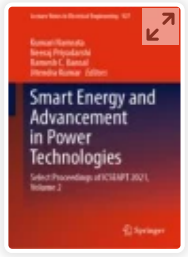
Abstract

Automation is one of the most pressing issues in any sector today. Automation is affecting almost every aspect of life, from agriculture to space technology. Plant automation is a must-have for the manufacturing business in today's internationally competitive market. It refers to the system's ability to function without human involvement at all times. We are designing a control circuit for the automation of the Gas Tunnel Kiln (GTK) using relay logics and Variable Frequency Drives (VFD's) in this paper because the current doors and movement of the transfer car in and out of the kiln are being operated manually and the temperature of the kiln is very high, making manual operation unsafe. The GTK has a vestibule on the front and the rear side. The charging and discharging of the green Insulators is being automated as a whole. The first stage is to create ladder diagrams that can be realised with hardware components and then simulate them using LADSIM - PLC Simulator.

Keywords: Automation; gas tunnel kiln; relay logics; PLC; VFD’s



Smart Energy and Advancement in Power Technologies pp 421–435

Simulation of Modular Fly-Back Current-Fed Push–Pull DC-DC Converter for High Voltage Low Current Applications

D. Beula ✉, M. S. Indira & N. Balaji

Conference paper | First Online: 22 October 2022

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 927)

Abstract

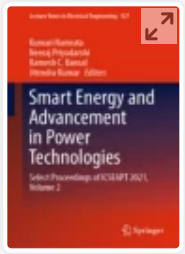
A DC-DC converter has been proposed using Fly-back Current-fed Push–Pull topology with multiple secondary windings for high voltage low current applications. The converter is modular at the output which gives the flexibility to cater to specific output voltage levels. The High Voltage Transformer (HVT) with multiple secondary windings and rectifier with voltage doublers result in a smaller turns ratio for

higher voltage conversion. The rectifier components on the high voltage side are subjected to lower voltages that reduce the voltage stress on the rectifier component, compared to HVT with the single secondary winding. The converter is operated in complete energy transfer mode (Discontinuous conduction mode) for effective utilization of stored energy in the fly-back inductor as it is fed-back to the source. The discontinuous current-fed scheme provides an instantaneous current limiting facility for short circuits at the load side. Zero current turn-on of switches due to the discontinuous mode of operation reduces switching losses and the non-overlapping mode of power switches minimizes conduction loss. The operation of the converter is analyzed under steady-state conditions. A design procedure is established and the converter is designed for a typical load of 5 kV, 500 W at a switching frequency of 20 kHz. The performance of the converter is verified by simulation.

Keywords

Current-fed **DC-DC converter** **Modular**

Energy feedback **High voltage application**



Smart Energy and Advancement in Power Technologies pp 331–341

Identification and Validation of Prominent Features for Predicting Mortality in Heart Patients with Left Ventricular Dysfunction Using Machine Learning

R. Subha ✉, Rekha Radhakrishnan, P. Sumalatha & B. R. Nayana

Conference paper | First Online: 22 October 2022

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 927)

Abstract

Machine Learning (ML) is a strong tool for medical prognosis, and it has the potential to give this branch of medicine a huge boost by allowing doctors to make accurate predictions about a patient's future

health using various forms of medical data. ML algorithms have proven to be reliable and effective in decision making with good classification accuracy. They can model nonlinear relationships, which are frequent in medical data, and apply them to predictive tasks such as forecasting a future event. In this paper, an attempt has been made to predict the mortality of heart patients with left ventricular dysfunction. Feature selection methods have been used to rank the input features in the dataset and identify four prominent features. Different combinations of these prominent features have been applied to five ML algorithms namely, Decision Tree, Gradient Boost, Random Forest, Support Vector Machine and k Nearest Neighbors to find the best performing combinations using F1-Score and AUC ROC. Considering additional performance parameters, further analysis is carried out to identify the best feature combination and the most effective ML algorithm for predicting mortality and the results are provided for the same.

Keywords

Cardiovascular disorder **Classification**

Decision trees **Machine learning**

Medical prognosis

Innovative Data Communication Technologies and Application pp 915–928

An Efficient Machine Learning Approach to Recognize Dynamic Context and Action Recommendations for Attacks in Enterprise Network

K. B. Swetha & G. C. Banu Prakash

Conference paper | First Online: 24 February 2022

Part of the Lecture Notes on Data Engineering and Communications Technologies book series (LNDECT,volume 96)

Abstract

The size of the computer networks and the developed applications grow exponentially due to the rapid advancement of the modern technology. Meanwhile, a significant increase in the cyber-attacks to data networks has also been observed. Intrusion detection system (IDS) is the major layer of defense in case of data network and thus plays

vital role in detection or forewarning of any kind of intrusion in the network. Intrusion detection is quite important in modern data networks. Using the network packets information, identify the DoS/DDoS attack using machine learning model which predicts the network packet accuracy before hitting the application. The goal is to use machine learning/deep reinforcement learning algorithm to detect anomaly in the incoming network traffic.

Keywords

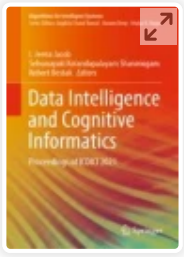
TCP-IP **DDoS attacks** **Enterprise networks**

Intrusion detection system (IDS)

k-nearest neighbor network

Deep reinforcement learning

Confusion model



Data Intelligence and Cognitive Informatics pp 459–465

A Smart Women Protection System Using IOT

Sasmita Mohapatra, C. Ramya, N. G. Sahana, V. Savithri & S. Yashaswini

Conference paper | First Online: 01 February 2022

Part of the Algorithms for Intelligent Systems book series (AIS)

Abstract

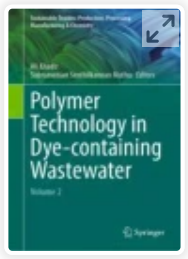
A self-defense system is planned particularly for ladies to shield themselves from present-day actual provocations and abusements. At any crisis circumstance, women get panicked and will most likely be unable to work their mobile phone applications and can't quickly shield the assailant and safeguard themselves. The proposed framework can be valuable for ladies for security reason. When an emergency situation is sensed by

a woman, the button is pressed and the location will be sent to the predefined number. At the same time, a live video is streamed, the buzzer acts as an alarm and alerts the nearby people by making loud noises, and a shock module is used for self-defense.

Keywords

GPS **ESP32 eye** **IOT** **Sensors**

Shock module **Buzzer**



Polymer Technology in Dye-containing Wastewater pp 227–245

Applications of Inorganic Polymers in Textile Wastewater Treatment

G. K. Prashanth, M. S. Dileep, P. A. Prashanth, Manoj Gadewar, B. M. Nagabhushana & S. R. Boselin Prabhu

Chapter | First Online: 23 April 2022

165 Accesses | **1** Citations

Part of the Sustainable Textiles: Production, Processing, Manufacturing & Chemistry book series (STPPMC)

Abstract

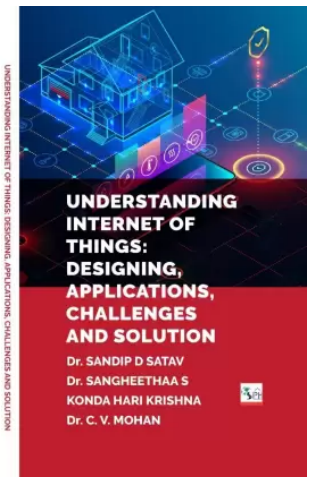
Water contamination is a global problem today. Water pollution comes from a variety of causes, including the textile, photographic pigment industries, and so on. Majority of industries discharge their waste directly or indirectly into the river. Therefore, water becomes polluted and as a result, human and aquatic life is affected directly or indirectly. Hence, it is important to treat waste before discharging it into the river to ensure the

survival of aquatic life and drinking water. Scientists all over the world have been working on recovering drinking water from textile wastewater. There are many ways to purify the wastewater which include making use of inorganic polymers (polymeric complex, polymeric nanocomposition), nanoparticles, complexes, catalysts, ion exchange resins, etc. Researchers are very interested in synthesizing inorganic polymer materials and evaluating their applications in textile wastewater treatment. Thus, it will be necessary to carry out a review on the inorganic polymers used in textile wastewater for the development of this field as well as for the new readers. In this chapter, we discuss inorganic polymers, classification of polymers, synthesis of polymers, and application of inorganic polymers in wastewater treatment.

Keywords

Inorganic polymers **Toxicant dyes**

Textile wastewater



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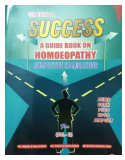

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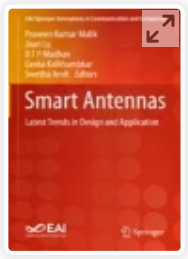

Smart Antennas pp 405–414

Antipodal Vivaldi Antennas Arranged in Circular Array for RADAR

Sasmita Mohapatra

Chapter | First Online: 03 February 2022

Part of the EAI/Springer Innovations in Communication and Computing book series (EAISICC)

Abstract

RADAR section usually requires antenna, which can be used as ultra-wideband antenna at a higher microwave frequency range, and at the same time, the antenna should be robust to withstand the adverse climatic effects. In this present work, an array antenna has been proposed, which consists of antipodal Vivaldi antennas. The Vivaldi antennas are arranged in a spherical fashion where each row of the antenna array can be used alternatively for transmitting and receiving signals also. The

designed individual antipodal Vivaldi antenna has very high directivity and stable VSWR over the frequency range of 2–20 GHz. The designed array of antipodal Vivaldi antenna can work for a wideband ratio of 10:1. However, if the antennas are arranged with little gap, the wideband structure is a little disturbed as individual antenna tries to resonate at a particular frequency. But this also leads to an advantage that when the individual Vivaldi antenna is arranged in an array, the azimuth and elevation coverage of the antenna array increases as a result of the combination of individual antenna beam area. To make the antenna structure mechanically reliable and electrically stable, a new dielectric material Astra® MT77 has been used, which has very low dissipation factor with stable dielectric constant and impedance throughout the antenna structure. For weather protection, the complete antenna structure is shielded by a radome with proper dielectric constant.

Keywords

Antipodal Vivaldi antenna **Array of antenna** **RADAR** **Radome** **Coverage** **VSWR**

Intelligent Surveillance System with Mask Detection and Temperature Monitoring

Publisher: IEEE

R Sivapriyan ; N Pavan Kumar ; CV Mohan ; N Sakshi **All Authors**

Abstract: An efficient and adroit surveillance system is im-perative in the fast-paced digital world, with a monumental rise in video-based surveillance systems for security and mo... **View more**

Metadata

Abstract:
An efficient and adroit surveillance system is im-perative in the fast-paced digital world, with a monumental rise in video-based surveillance systems for security and monitoring. The pandemic has created the need for effective surveillance and made it more relevant than ever before. The AI-based surveillance system proposed in this paper is capable of performing the traditional functions of a surveillance system and checking if a person is wearing a mask and if his temperature is below a certain threshold. The proposed surveillance system is a video-based surveillance system capable of logging people who are not wearing a mask or whose temperature is not below a specified value. This system is implemented with Raspberry Pi as the central hub for processing, extracting, and analyzing the video stream from a camera. The proposed system aims to identify the mask on people by using a cascade classifier generated by Machine learning techniques, thus mulling down the effects of external factors (lighting condition, position, etc.) that affect the performance of a traditional video surveillance system.

Published in: 2022 International Conference on Intelligent Controller and Computing for Smart Power (ICICCSP)

Date of Conference: 21-23 July 2022

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Date Added to IEEE *Xplore*: 25 August 2022

DOI: 10.1109/ICICCSP53532.2022.9862495

ISBN Information:

Publisher: IEEE

Conference Location: Hyderabad, India

Review of State of Health Monitoring Techniques inBattery Management System

R Sivapriyan, Sushmitha S V, C V Mohan, S Lavanraj
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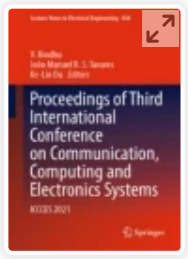
Abstract.

As in recent trends, the Electric Vehicles are tremendously growing and major research works are found in Battery Management System. This paper comprehensively analysis about the State Of Health (SOH) and its methodologies in applications of Battery Management System (BMS). Various algorithms along with the flowchart have been briefly discussed. The comparative analyses along with the various methodologies are included in the table for reference. The SOH monitoring and controlling applications in lithium-ion batteries and fuel cells are considered and discussed as regarding main topics. The model-based methods along with the real time applications with input and output features has briefed in general with a comparison. The algorithms with real time application in Machine Learning and AI techniques has given a highlight and its applications in real time examples are briefed. Thus, this paper briefs about BMS and discharge methods of the battery of the SOH techniques and highlights upon various algorithms which is used as model-based methods in Battery management system as well as SOH techniques.

Keywords. Battery Management System, State of Health, Experimental Method Analysis, Machine Learning, Model Based Methods.

1. INTRODUCTION

Nowadays, Electric vehicles are a trending technology in various applications, and one of its applications is used in Battery Management Systems (BMS). BMS monitors and protects the battery by considering its safe operation area such as Overvoltage/under voltage, Overpressure, over temperature/under temperature [1]. Also, to prevent the current leakage where battery cell is charged by an intelligent battery pack and makes use of rechargeable battery which has to be managed in an electronic or power storage system by considering available data for calculating and monitoring it in the environment and is efficiently used in the EV applications [2]. BMS consists of many cells stacked together within a smart battery pack to release the cell's energy to meet the load demand. Stability plays a significant role in the whole Battery Management System, where users can monitor each cell individually by authenticating and reporting the data [3]. There are many IC's available in BMS. It includes some functional blocks to keep track of all voltage balance,



Proceedings of Third International Conference on Communication, Computing and Electronics Systems pp 615–625

An Energy-Competent Enhanced Memetic Artificial Bee Colony-Based Optimization in WSN

S. Sowndeswari & E. Kavitha

Conference paper | First Online: 20 March 2022

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 844)

Abstract

Wireless sensor networks (WSNs) are a significant technology for the twenty-first century because of its wide range of applications in various fields. Energy consumption and network security are the major challenges among other challenges in WSN because of existence of various hard problems in wireless sensor networks. Those hard problems cause the reduction of energy in each node of the

network and also cause security threat which in turn decreases the packet delivery ratio and lifetime of the entire network. Some of the hard problems include routing, clustering, localization of the nodes, etc. These hard problems cannot be best solved using deterministic methods. Optimization methods are the best alternate to deterministic methods to address the hard problems in WSN. Mostly, the research involves multiple objectives which can be achieved by metaheuristic algorithms. Population-based metaheuristic algorithm is preferred than single solution-based metaheuristic algorithm because of its wide exploration to find the new good solution. In this research work, an energy-competent clustering and secure routing algorithm is proposed using artificial bee colony (ABC) metaheuristics with memetic technique which achieves the desired performance, and the results can be simulated using NS2/MATLAB.

Keywords

Wireless sensor networks

Energy consumption **Hard problems**

Optimization **Metaheuristics** **Memetic**

Secure routing **ABC algorithm**

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"STUDY OF BEHAVIOUR OF FLEXURAL AND SHEAR STRENGTH OF RC BEAM USING WELDED WIRE MESH"

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Abstract— **An alternative reinforcement system, Welded mesh is planned to achieve the purpose of stirrups in Reinforced Concrete Beams. Welded mesh reinforcement eliminates some of the detailing problems inherent in traditional rebar in the Reinforced Concrete Construction resulting in easier and faster construction, and better economy and quality control. The effects of welded wire mesh (WWM) used as shear reinforcement on the structural behaviour of reinforced concrete (RC) beams were experimentally investigate and to examine the flexural behaviour and crack pattern of RC beam. Totally five variations of beam were casted and number of mesh layers with percentage are varied in each specimen. The main test variables were spacings of longitudinal and transverse wires, two types of wire diameters and shear span to effective depth ratios. The tests showed that the degrees of improvement in the shear performance of the beams, such as shear strength and spacing of cracks, brought on by WWM were similar to those caused by vertical stirrups. It is obtained that the beam with continuous welded wire mesh and longitudinal bar given the maximum load carrying capacity and it is found that there is improvement in strength characteristics while using mesh layer when compared with control specimen.**

Keywords: Welded wire mesh, Flexural behaviour, Crack pattern, Maximum load carrying capacity

I. Introduction-

The development of reinforcement concrete structures was been largely employed under different methods and various situation based upon the conditions in engineering practice. Reinforcement concrete was been used in every place to withstand high strength to the building structures. As, renowned firms are involved in manufacturing and supplying a wide assortment of welded mesh, industrial wire products, welded wire products and other wire products. Our assortment includes welded wire mesh, mild steel wire, chain link fencing, barbed wire and galvanized wire. The use of welded wire mesh as the shear reinforcement in the flexural and shear behaviour. The welded wire mesh has a better characteristic strength and excellent bonding capacity it is formed from stainless steel that has extraordinary strength and reliability. The corrosion resistance meshed wire is long lasting. Because of its economy, ease and faster of construction as well as better quality control. Welded mesh has been widely used in bulldings that wired mesh can be a good substitute for the conventional reinforcement and yielded excellent results both in strength and ductility.

In the context of shear reinforcement, welded wire mesh is primarily used to resist the diagonal tension forces that occur in structural elements such as beams and slabs. These forces can cause the concrete to crack and potentially fail, compromising the structural integrity of the element. By incorporating welded wire mesh as shear reinforcement, the concrete's ability to resist these forces is significantly improved. The welds have strong mechanical anchorage behaviour at each the intersections are further responsible in imparting and immense deal of homogeneity to the R.C.C section as a whole. Welded wire mesh used for shear reinforcement typically has a square or rectangular grid pattern with evenly spaced wires. The wire diameter, spacing, and dimensions of the mesh are selected based on the design requirements and the specific structural application. The mesh is usually manufactured from high-strength steel wires, providing the necessary strength and durability to withstand the applied forces. Inadequate shear reinforcement causes shear failure. If the shear stress rides over the shear carrying capacity, the structures are possible to fail in brittle manner.

To overcome all above problems, Welded wire mesh is used as shear reinforcement. If we use closely spacing interlocks, the reinforced concrete member provides good ductility and bearing capacity.

II. LITERATURE REVIEW-

A. *EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF RC BEAM WITH WELDED WIRE MESH AS SHEAR REINFORCEMENT-((05- May 2018) S GAYATRI, T Kirthiga)*

Experimental and analytical investigation of reinforced concrete beam with welded wire mesh as shear reinforcement in flexural and shear behaviour with different parameters.
Properties of fine aggregate, coarse aggregate and cement.
Compressive and tensile strength of concrete is found.
Deflection of the beams were measured.
Deflection of all the specimens capable of cracking and crushing by using ANSYS 16.0 Software. Solid 65 elements were used to model of concrete. LINK 180 elements were used to model of Steel.

B. FLEXURAL BEHAVIOUR OF RC BEAM WITH WELDED MESH AS SHEAR REINFORCEMENT (IJESRT) - (Ajin. M, H. Gokul Ram (March 2015))

It is obtained that the beam with continuous weld mesh gives the maximum load carrying capacity. Properties of fine aggregate, coarse aggregate and cement. After 7 and 28 days of curing compressive and tensile strength of concrete is found.

Load Deflection Behaviour: Load Vs deflection plot has been drawn for all test specimens from the experimental data. The behaviour of test specimens is compared.

C. STUDY ON SELF COMPACTING BEAM WITH WELDED WIRE MESH AS SHEAR REINFORCEMENT(IJCRT) - (Anila P.A., Anima P. (08-August))

This presents a study of shear behaviour of concrete beams using welded wire mesh.
Compressive Strength of Cube and Split Tensile strength of cylinder.
Load Deflection Behaviour:
Load Vs deflection plot has been drawn for all test specimens from the experimental data.
The rate of increase in the ductility index of a beam increases with increase in number of layers provided.

D. Behaviour of Reinforced concrete beams with wire mesh as shear reinforcement (IJITEE) - (Elavarasi D, Sumathi A (12-October))

This presents a study of shear behaviour of reinforced concrete beams. It is evident from the result that the use of wire mesh enhanced improved shear performance and bearing capacity in the examined beams.
Compressive and split tensile strength of concrete is found.
Load Deflection Behaviour:
The load vs displacement graph was drawn from the readings obtained from the testing of specimens.

E. Shear Strengthening of Reinforced Concrete Beam using Wire Mesh-Epoxy composite (C.E.J)- (Mustafa Al-Bazoon, Abdulkhaliq Jaffer, Haidar, Abbas Dawood (30 July 2022))

Load–deflection relationship, shear ductility index, beams' stiffness, energy absorption, were studied for all specimens and compared with those of the control beams to measure the improvement from WMEC addition.
After 7 and 28 days of curing compressive and tensile strength of concrete is found.
Load Deflection Behaviour:
Load Vs deflection plot has been drawn for all test specimens from the experimental data.
The behaviour of test specimens is compared.

III. METHODOLOGY-

Cement:
Ordinary Portland cement of grade 53 confirming to IS 12269-1987 will be used for the all the mixes.

Fine Aggregate:
M sand: Manufactured sand is a substitute of river sand for construction purposes.
- Sand produced from hard granite stone by crushing.
- The size of manufactured sand is less than 4.75mm.

Coarse Aggregate:
Locally available crushed granite aggregate, 12.5mm and down size will be used for all the mixes of SCC. The aggregates used for confirming to IS 383-1970.

Water:
Portable water fit for drinking will be used for making concrete.

Reinforcement:
(2-#10) in compression and (2-#12) in tension will be used.

Wire Mesh:
Stainless steel welded wire mesh of size 25mm*25mm of wire diameter of 3mm is used.
- These are available in steel, stainless steel and polymer varieties. It serves the same purpose as wire mesh; Enhancing concrete's flexural strength and preventing cracks.

Grade of concrete:
- M20 Grade concrete of 1:1.5:3 (Nominal mix) is used.

TESTS ON SPECIMENS-

6 Cubes of dimensions 150mmX150mmX150mm are casted for determining the compressive strength of concrete at 7 and 28 days.
6 Cylinders of dimension 150mm diameter and 300mm height for determining the indirect tensile strength at 7 and 28 days.
6 Beams of dimension 100mmX100mmX500mm for determining flexural strength by two-point loading at 7 and 28 days.

Different cases of beams-
- SP1- Fully conventional stirrups.
- SP2- Fully stirrup with weld mesh.
- SP3- From both the supports L/3 length of the specimen welded mesh and no stirrups for remaining length.
- SP4- From both the supports L/3 length of the specimen with double layer welded mesh and no stirrups for remaining length.

IV. TESTS ON CONSTITUENTS OF CONCRETE-

4.1 Tests on cement:

SPECIFIC GRAVITY OF CEMENT:

A 53 grade OPC from the local market is used and tested for the physical properties as per IS:4031-1988 conforming to specification as per IS:12269-1987.

Table 4.1.1. Specific Gravity Test on Cement

Sl. No	Description of mass	Results
1	Empty Bottle, W1	54 gms
2	W1+Water, W2	154.5 gms
3	W1+Kerosene, W3	134.5 gms
4	W3+Cement, W4	171 gms
5	Cement, W5	50 gms

Specific Gravity, S= W5 (W3-W1)/(W5+W3-W4) (W2-W1)
S= 50 (134.5-54)/(50+134.5-171) (154.5-54)
S= 3.15

NORMAL CONSISTENCY OF CEMENT:

Table 4.1.2. Normal Consistency of Cement

1	Percentage of Water	24%	28%	30%	32%	33%

2	Initial Reading	50	50	50	50	50
3	Final Reading	28	30	31	32	35
4	Height Penetrated (mm)	12	10	9	8	5

Normal Consistency of Cement = 33%

- FINENESS MODULUS OF CEMENT = 4 %
- INITIAL SETTING TIME OF CEMENT = 36 mins
- FINAL SETTING TIME OF CEMENT = 480 mins

4.2Tests on fine aggregate:

River Sand and Manufactured Sand are used as fine aggregates. The properties of F.A. like Specific Gravity, Fineness Modulus, Bulk Density are tested by using IS:2386-1963.

SPECIFIC GRAVITY OF FINE AGGREGATES:

Table 4.2.1. Specific Gravity of Fine Aggregates

	Description Of Mass	River sand (gms)	M-Sand (gms)
1	Weight of Empty Pycnometer, W1	442	442
2	W1 + 1/3rd Sand, W2	892	892
3	W2 + Water, W3	1528	1529
4	W1 + Water, W4	1248	1248

Specific Gravity, S= (W2-W1) / (W2-W1) - (W3-W4)
Specific Gravity of River Sand = (892-442) / (892-442) – (1528-1248)
Specific Gravity of River Sand = 2.65
Specific gravity of M-Sand = (892-442) / (892-442) – (1528-1248)
Specific Gravity of M-Sand = 2.66

4.3 Tests on coarse aggregate:

The size of the aggregate used was less than half an inch (12.5 mm). The tests are carried out as per the specifications of IS:2386-1963.

SPECIFIC GRAVITY OF COARSE AGGREGATES

Table 4.3.1. Specific Gravity of Coarse Aggregates

Sl. No.	Description of Mass	Values (gms)
1	Weight of Aggregates Suspended in Water with Basket, W1	2780.0
2	Weight of Basket in Water, W2	1488.5
3	Weight of Aggregates in Water (W1-W2) = Ws	1291.5
4	Weight of Surface Dry Aggregates in Air, W3	2001.5
5	Weight of Oven Dried Aggregates, W4	1988.0

Table 4.3.1. Specific Gravity of Coarse Aggregates

Specific Gravity of Coarse Aggregates = W4 / (W3-Ws)
Specific Gravity of Coarse Aggregates = 1988.0 / (2001.5-1291.5) = 2.8

Water Absorption = 100* (W3-W4)/W4 = 0.68 %

V. TESTS ON CONCRETE-

5.1 CALCULATION:

MATERIAL CALCULATION:

CONCRETE GRADE: M20 **MIX PROPTION: 1:1.5:3**
WATER CEMENT RATIO : 0.5

Compressive test (150*150*150mm)

Volume =3.375*10^-3 m^3
Cement =1/5.5*3.375*10^-3*2400*6 = 8.83 kg
Fine aggregate =1.5/5.5*3.375*10^-3*2400*6 = 13.25 kg
Coarse aggregate = 3/5.5*3.375*10^-3*2400*6 = 26.50 kg

Flexural test(500*100*100mm)

Volume =5*10^-3m^3
Cement =1/5.5*5*10^-3*2400 *6 = 13.09 kg
Fine aggregate =1.5/5.5*5*10^-3*2400 *6 = 19.63 kg
Coarse aggregate = 3/5.5*5*10^-3*2400 *6 = 39.27 kg

Split tensile test (Dia =150mm, L= 300mm)

Volume =5.30*10^-3m^3
Cement =1/5.5*5.30*10^-3*2400*6 =13.87 kg
Fine aggregate =1.5/5.5*5.30*10^-3*2400 *6 = 20.81 kg
Coarse aggregate = 3/5.5*5.30*10^-3*2400 *6 = 41.62 kg

Flexural test(700*150*150mm)

Volume =0.01575m^3
Cement =1/5.5*0.01575*2400 *6 = 41.23 kg
Fine aggregate =1.5/5.5*0.01575*2400 *6 = 61.85 kg
Coarse aggregate = 3/5.5*0.01575*2400 *6 = 123.70 kg

5.2 CASTING:

- After calculation of materials required for concrete 6 cubes, 6 cylinders, 6 beams are casted.
- Compressive strength, split tensile strength and flexural strength of concrete at 7 and 28 days are tested and the strength of concrete.

5.3 COMPRESSIVE, TENSILE, FLEXURAL STRENGTH:

- **Test done after 7 days of curing for specimens:**

Compressive strength of concrete = P/A
= (69*9.81*1000)/ (150*150)
=30.084 N/mm^2
Hence safe

Compressive strength of concrete = P/A
= (70*9.81*1000)/ (150*150)
=30.52 N/mm^2
Hence safe

Compressive strength of concrete = P/A
= (70*9.81*1000)/ (150*150)
=30.52 N/mm^2 Hence safe

- **Average Compressive strength**

= (30.084+30.52+30.52)/3= 30.37 N/mm^2

Tensile strength of concrete = (2*P)/(π*D*L)
= (2*22*1000*9.81)/(π*300*150)
=3.05 N/mm^2
Hence safe
Tensile strength of concrete = (2*P)/(π*D*L)
= (70*9.81*1000)/ (150*150)
=2.77 N/mm^2
Hence safe
Tensile strength of concrete = (2*P)/(π*D*L)
= (69*9.81*1000)/ (150*150)
=3.05 N/mm^2
Hence safe

- **Average tensile strength**

= (3.05+2.77+3.05)/3 =2.95 N/mm^2

Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (1.5*9.81*1000*500)/ (100*100^2)
= 7.35 N/mm^2
Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (1.6*9.81*1000*500)/ (100*100^2)
= 7.848 N/mm^2
Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (1.5*9.81*1000*500)/ (100*100^2)
= 7.35 N/mm^2

- **Average flexural strength**

= (7.35+7.848+7.35)/3 = 7.516 N/mm^2

Test done after 28 days of curing for specimens:

Compressive strength of concrete = P/A
= (104*9.81*1000)/(150*150)
=45.344 N/mm^2
Hence safe
Compressive strength of concrete = P/A
= (103*9.81*1000)/ (150*150)
=44.9 N/mm^2
Hence safe
Compressive strength of concrete = P/A
= (103*9.81*1000)/(150*150)
=44.9 N/mm^2
Hence safe

- **Average compressive strength**

= (45.344+44.9+44.9)/3= 45.048 N/mm^2

Tensile strength of concrete = (2*P)/(π*D*L)
= (2*29*1000*9.81)/(π*300*150)
=4.02 N/mm^2
Hence safe
Tensile strength of concrete = (2*P)/(π*D*L)
=(2*30*1000*9.81)/(π*300*150)
=4.16 N/mm^2
Hence safe
Tensile strength of concrete = (2*P)/(π*D*L)
=(2*30*1000*9.81)/(π*300*150)
=4.16 N/mm^2
Hence safe

- **Average tensile strength**

= (4.02+4.16+4.16)/3 =4.11 N/mm^2

Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (1.8*9.81*1000*500)/ (100*100^2)
= 8.829 N/mm^2
Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (1.9*9.81*1000*500)/ (100*100^2)
= 9.31 N/mm^2
Flexural strength of concrete = (P*L)/(B*D^2) (a>13.33cm)
= (2*9.81*1000*500)/ (100*100^2)
= 9.81 N/mm^2

Average flexural strength

= (8.829+9.31+9.81)/3 =9.31N/mm^2

VI. TESTS ON DIFFERENT CASES OF BEAMS:

6.1 CALCULATION:

Flexural test(700*150*150mm)

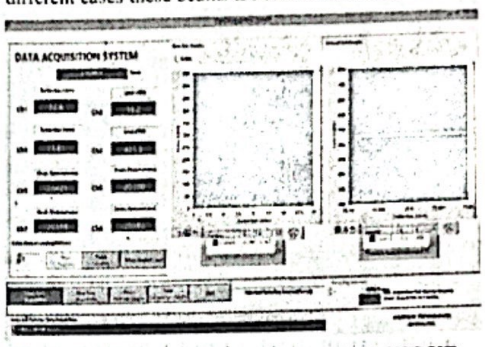
Volume	=0.01575m^3	
Cement	=1/5.5*0.01575*2400 *6	= 41.23 kg
Fine aggregate	=1.5/5.5*0.01575*2400 *6	= 61.85 kg
Coarse aggregate	= 3/5.5*0.01575*2400 *6	= 123.70 kg

6.2 CASTING:

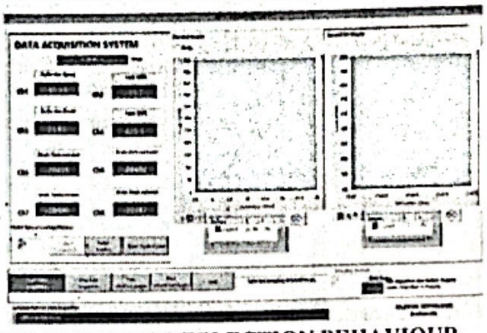
Beams with different cases of reinforcement are casted for determining the Load vs Deflection behaviour of beams.

6.3 TEST ON BEAMS:

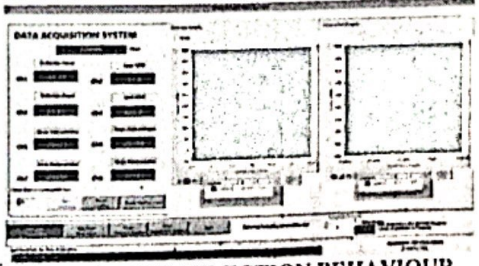
For determining the Load vs Deflection behaviour of beams with different cases these beams are tested under flexure.



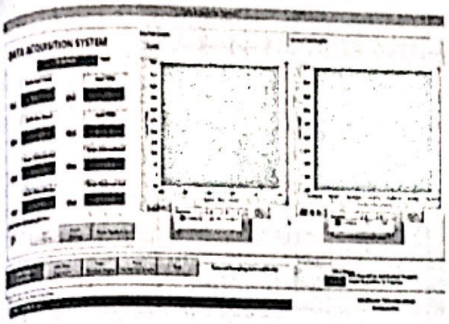
SP-1 LOAD VS DEFLECTION BEHAVIOUR



SP-2 LOAD VS DEFLECTION BEHAVIOUR



SP-3 LOAD VS DEFLECTION BEHAVIOUR



SP-4 LOAD VS DEFLECTION BEHAVIOUR

VII. RESULT-

- 7 days 28 days average compressive strength of concrete is 30.37 N/mm^2 and 45.048 N/mm^2.
- 7 days 28 days average tensile strength of concrete is 2.95 N/mm^2and 4.11 N/mm^2.
- 7 days 28 days average flexural strength of concrete is 7.516 N/mm^2 and 9.31 N/mm^2.
- 4 Beams of 700*150*150 mm are tested and results are as follows:
- Based on results of 4 specimens:

Load and deflection criteria were studied and based on the experimental results it was found that the fully welded mesh in comparison with other 3 cases the load taken by the specimen is more as well as the cracks developed it is seen that shear cracks are slowly developed with comparison with other 3 specimens and in this regard, it will be optimum to use fully welded mesh instead of conventional stirrups.

SL.NO	Different cases of beams	Ultimate load (KN)	Deflection (mm)
1	Fully conventional stirrups	533	9.8
2	Fully stirrup with welded mesh	534.7	18.17
3	From both the supports L/3 length of the specimen with welded mesh and no stirrups for remaining length	423.2	13.37
4	From both the supports L/3 length of the specimen with double welded mesh and no stirrups for remaining length	472.7	7.8

VIII. Conclusion-

1. The flexural strength of beam increases nominally and remains unaffected compared to that of control specimen for the fully welded mesh shear reinforcement provided throughout the length of the specimen.
2. Even though Shear Reinforcement was replaced with welded mesh there is no appreciable change in flexural load carrying capacity.
3. The load carrying capacity reduces in the case of specimen provided with very small volume of welded mesh shear reinforcement at the supports only.
4. In the mode of failure and crack pattern of the conventional RCC Beam specimen with welded mesh specimen are similar.
5. Failure mode and load carrying capacity depends on the volumetric ratio of welded mesh provided.
6. When the shear stirrups are completely replaced with welded mesh, when the welded mesh distribute throughout the span, behaviour of beam is better than other beam. Load vs deflection behaviour of this beam also better than other beams.
7. Out of the four specimens tested the specimens with the provision of fully welded mesh of grid configuration 25 x 25 mm exhibits better performance.
8. Since there is reduction in cost, the use if welded mesh is found to be a suitable alternative to conventional shear stirrups.
9. It reduces the workmanship of the bar bender as the welded mesh is easier to bind.
10. By reducing the number of stirrups and increasing the number of layers the ductility of the specimen can be made marginally more than the control specimen.

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ANNOCB1

ANTINEOPLASTIC EFFECTS OF *MUCUNA PRURIENS* AGAINST HUMAN COLORECTAL ADENOCARCINOMA

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Mucuna pruriens (MP) which is commonly called as Velvet bean is a familiar legume with medicinal and nutritional importance. This plant extracts have been proposed to have the antineoplastic effects on few cancer forms and useful for the management of several ailments. This investigation was designed to comparatively assess the anticancer and antioxidant effects two common varieties of MP, *Mucuna pruriens var. pruriens* (MPP) and *Mucuna pruriens var. utilis* (MPU) seed extracts against human colorectal cancer adenocarcinoma cells COLO-205. The highest antioxidant potential was recorded with MPP with a IC_{50} of 45.71µg/ml. The *in-vitro* anti-proliferative effects of MPP and MPU on COLO-205 showed an IC_{50} of 131.1µg/ml and 246.9µg/ml respectively. Our results revealed intervention of the MPP and MPU extracts in growth kinetics of the COLO-205 cells in concomitance with apoptosis induction up to 8.73 and 5.58 folds respectively. The AO/EtBr dual staining and the flow cytometry results also confirmed the better apoptotic efficacy of MPP over MPU. MPP at a concentration of 160µg/ml exhibited significant apoptosis and cell cycle arrest. Further, effect of the seed extracts on p53 expression was investigated by quantitative RT-PCR and a maximum upregulation of 1.12-fold was recorded with MPP.

Keywords: *Mucuna pruriens*, Velvet beans, Phytochemicals, Human colorectal carcinoma, Anticancer, Antioxidant, Flow cytometry, p53 gene, Apoptosis

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Automated Energy Conservation Using Quantized Neural Network and Internet of Things

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Abstract-

In developing countries like India, the demand for energy always keeps increasing due to the steady state increase in population of the developing countries. With this, negative economic and environmental impacts also increase. Hence there is a clear need to use the available energy efficiently. While the use of renewable sources of energy is booming in order to minimize the dependency on fossil fuels, managing the already available energy in an efficient and conservative manner is a challenge we need to face head on. This project aims to bring a solution to this problem. Using quantized artificial neural network and IOT in a residential or commercial building, the system will be able to locate areas with constant high energy consumption and using AI and ML, access the CCTV feed of that area and interrupt the supply if no humans are detected in the vicinity.

Keywords—Energy, Internet of things, Conservation, Quantization Network, NodeMCU, Relay.

I. INTRODUCTION

Energy is paramount in every aspect of human activity. The world today seeks to conserve energy not only due to the declining nature of non-renewable resources but also a way to tackle the environmental challenges that energy excesses have brought about especially global warming; its health effects, carbon emissions and footprints, and the costs incurred due to wastage **[1].** We want to live a comfortable, productive, and pleasant life. As a result, even if the temperature outside climbs slightly, we immediately turn on the air conditioner to keep our home cool. This is once again consuming energy. Unfortunately, we are unaware that we have begun to take things for granted and have started to waste energy unnecessarily **[2]**. Most of us forget that while energy is abundant, it is limited, and thus it is critical that we use our energy resources wisely in order to maintain our quality of life.

The energy consumption has become one of the major problems in our industry. Power consumption plays a vital role in energy consumption. Sometimes the user forgets to turn off the lights and fans; the energy gets wasted **[3].** Hence there is a need for power management system to save our electric power. Light, fans and many other electrical devices are controlled by on or off method. Nowadays most of them are controlled by the remote device **[4]**. To control through the remote, we need a system; often we need a fan and light to perform a daily basis so that most of the electric power getting wasted because we were making use of the computer to control the electrical appliances. Therefore, we need to spend the significant amount of power cost **[5].**

Energy conservation" and "Energy efficiency" are often used interchangeably, but there are some differences **[6]**. At the most basic level, energy conservation means using less energy and is usually a behavioral change, like turning our lights off or setting our thermostat lower **[**7**].** Energy efficiency, however, means using energy more efficiently, and is often a technological change. Energy efficiency measures the difference between how much energy is used to provide the same level of comfort, performance or convenience by the same type of product, building or vehicle. A combination of both energy conservation and energy efficiency measures yields an ideal solution **[8].**

One of the primary ways to improve energy conservation in buildings is to use an energy audit **[9].** An energy audit is an inspection and analysis of energy use and flows for energy conservation in a building, processor system to reduce the amount of energy input into the system without negatively affecting the outputs.

Consumers are often poorly informed of the savings of energy efficient products **[10].** A prominent example of this is the energy savings that can be made by replacing incandescent light bulbs with more modern alternatives. When purchasing light bulbs, many consumers opt for cheap incandescent bulbs, failing to take into account their higher energy costs and lower life spans when compared to modern compact fluorescent and LED bulbs **[11].** Although these energy efficient alternatives have a higher upfront cost, their long lifespan and low energy use can save consumers a considerable amount of money **[12].**

Energy monitoring systems are used widely in industrial plants and buildings to observe the energy consumption. The residential sector, unlike the commercial and industrial sectors, is made up of multiple small energy users such as houses, mobile homes, and apartments **[13]**. Research has shown that these residential energy consumers waste almost 41% of the power supplied to their homes. Change of voltage, energy consumption, power factor, and current parameters must be measured for buildings **[14].**Users that know exactly when energy consumption occurs and where it takes place are able to take more inform decisions about how to lower their building energy consumption rates **[15].** Currently, however, millions of users are still largely in the dark about the amount of energy they consume. In 2009 a study conducted by the Department of Energy on Energy consumption loads, found that miscellaneous electrical loads account for 45% of the electricity consumption in residential buildings and 34% in commercial buildings **[16]**.

Studies have suggested that savings of over 35% of the miscellaneous electrical loads total energy use may be possible. In this paper, we propose a system where we can automatically turn on or off the electrical appliances **[17].** These environmental issues are very critical and these